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AN ANALYSIS OF MICHIGAN MEDICAID PAYMENT POLICIES FOR MATERNITY SERVICES INCLUDING PROVIDER SUPPLY AND CLIENT ACCESS, UTILIZATION, LEVEL OF CARE, AND HEALTH OUTCOMES

By

Molly Anne Anthony

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ABSTRACT

AN ANALYSIS OF MICHIGAN MEDICAID PAYMENT POLICIES FOR MATERNITY SERVICES INCLUDING PROVIDER SUPPLY AND CLIENT ACCESS, UTILIZATION, LEVEL OF CARE, AND HEALTH OUTCOMES

By

Molly Anne Anthony

Michigan ranks fortieth in infant mortality among the states despite over two decades of government intervention. A full range of policy options supporting reproductive choice for childbearing women existed and the majority of low-income women had these services covered by Medicaid. The state advocated prenatal care as its major policy addressing infant mortality.

This dissertation evaluates two Medicaid policies designed to enhance access to prenatal care during 1985-1986: a 65% increase in remuneration when treating medically high-risk pregnant women and a subsequent provider increase of 47% for prenatal care and 13% for delivery services. The study investigates the pregnancies of over 62,000 women with Medicaid coverage.

The remuneration policies made little difference in the areas examined--provider supply, access to care, utilization of services, appropriate level of care, or health outcomes. The Medicaid demand for maternity care was stable and there was no change in maternity provider supply over the two years. Prenatal care providers significantly decreased in 1986 despite the significant increase in remuneration.

Most Medicaid women (68.6%) enrolled in prenatal care during the first trimester of pregnancy in 1985, but the percentage with early enrollment significantly decreased in 1986. The average utilization was 11 prenatal visits with delivery at 39 weeks in both years. The number with fewer than 6 prenatal care visits did not change. Level of prenatal care was appropriately assigned by medical criteria for 89%, with the prenatal providers of 11% qualifying for additional remuneration. Expenditures increased but receiving the appropriate level of prenatal care made no difference in the occurrences of neonatal deaths among high-risk women. No significant change in the hebdomadal or neonatal death rates, prematurity, or low birthweight rate ensued.

Despite prenatal care and Medicaid coverage, almost 1% of women experience a neonatal loss. When neonatal deaths are studied with prematurity or prematurity and birthweight controls, no racial gap exists. Excess deaths occur to premature births in both races. Neonatal death expenditures are more than 2.5 times the mean expenditures for surviving infants. Early and more prenatal care did not prevent poor outcomes. Women with no reported prenatal care had poorer outcomes than those with at least one visit.

This research concludes that reimbursement incentives were ineffective in increasing physician supply, client access, client utilization, or level of care and no infant outcomes in Michigan.

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1991-1992

DEDICATION

To Colleen, Brion, Megan, and Eileen

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KEY TO ABBREVIATIONS AND TERMINOLOGY

Term	Abbreviated	Definition
Allopathic doctor	MD	Licensed medical doctor.
Academy of Pediatrics	AAP	Professional society for board-certified pediatricians.
American College of Obstetricians and Gynecologists	ACOG	Professional society for board-certified obstetricians.
American Medical Association	AMA	Professional association for physicians.
Batch method		Batch programming refers to submission of a computer program to run without further interaction by the developer.
Blue Cross-Blue Shield	BCBS	Third-party insurance carrier and state's Medicare fiscal intermediary.
Client Information System	CIS	The welfare electronic data system with client enrollment records and demographics.
Cohort		A cohort refers to group of individuals sharing a common experience, here a delivery or birth year within Medicaid.
Data elements		Data are variables or stored information.
Department of Social Services	DSS	The offical state welfare agency.
Diagnosis Related Groups	DRG	The collapsing scheme based on medical classification of disease, procedures and complications into a diagnosis related group.

Episode		A continous experience related to a hospitalized condition.
Episode of Care File	EF	Computerized file based on hospital billing after January 31, 1985.
Family Planning	FP	Family Planning is planned spacing of children, or use of medically sound and effective methods of birth control distributed by licensed health professionals. It does not include abortion.
Fetal Death	FD	Fetal Death is the delivery of a stillborn infant or non-living child after the 20th, or 28th week of gestation, or after the fetus reaches 400 grams.
	FDR	Fetal Death Rate is the number of fetal deaths divided by the total fetal deaths plus live births in a population cohort X 1000.
Fertility Rate	FR	Fertility Rate is the number of resident live births divided by the total resident female population of childbearing age X 1000. (In the US the age used is 15 -44 years; less than 0.7 Michigan births occur to women outside this age.)
File		A file refers to the storage of data in a systematic structure on a 6250 computer tape.
Government Printing Office	GPO	Official printing agency for US government.
General Accounting Office	GAO	Investigatory research arm of Congress.
Health Care Procedural Coding System	HCPCS	Joint MSA and BCBS coding manual for Michigan medical care providers.
Hebdomadal Death	HbD	Hebdomadal death is death of a live born infant under one week of age.
	HbDR	Hebdomadal death rate is the number of live born infants who die under one week of age per 1000 live births. (In this study it refers to the birth cohort.)

Infant Mortality	IM	The death of a live born child prior to the first birthday is referred to as infant mortality.
	IMR	Infant Mortality Rate is the number of infant deaths per 1000 live births within a period of time or birth cohort. (In this study it refers to the birth cohort.)
Low-birthweight	LBW	Low-birthweight is a weight at birth of 2499 grams or less.
	LBWR	Low-birthweight Rate is the number of low weight births divided by total births in the cohort X 100.
Maternal and Child Health	MCH	Pertaining to women and children.
Maternity and Infant Care	MIC	Special constellation of services for pregnant women and their infant consisting of medical and allied health support components.
Medical Care Consumer Price Index	MCCPI	Michigan-specific consumer price index for the medical care field.
Medical Services Administration	MSA	The state Medicaid agency within the Michigan Department of Social Services.
Michigan Department of Public Health	MDPH	The offical state health and Title V agency.
Michigan State Medical Society	MSMS	Michigan's professional association for physicians (primarily allopathic).
Michigan State University	MSU	The state university in East Lansing.
Michigan Terminal System	MTS	University of Michigan computer system.
Michigan Universal Procedure Code	MUPC	Coding system used until October 1985 for Medicaid claims based on four digits.

Neonatal mortality	NNM	Neonatal mortality is the death of a live born infant prior to the 28 th day of life.
	NNMR	Neonatal Mortality Rate is the number of infants who die before 28 days per 1000 live births. (In this study it refers to the birth cohort.)
National Opinion Research Center	NORC	Private survey research company.
Office of the State Registrar and Center for Health Statistics	OSRCHS	Official agency that maintains state vital records within Department of Public Health.
Office of Technology Assessment	OTA	Agency created to investigate technology impacts for Congress.
Omnibus Budget Reconciliation Act	OBRA	Congressional act which describes appropriation compromises and other new legislation added at the conference.
Paid Claim	PC	As used here, a paid claim refers to the electronic record of adjusted provider claims for Medicaid recipients.
Prenatal Postnatal Care	PPC	Program funded by legislature that provided prenatal care and allied health services to women < 185% poverty level.
Program Codes		The Department of Social Services coding scheme for program areas:
	AFDC	Aid to Families with Dependent Children;
	L	Pregnant women or infant declared medically needy by income level alone;
	N	Family with a dependent child, usually a relative or special disregard case;
	Q	Recipient under 21 through Title IV-E or a dependent ward (Ribicoff amendment);
	SSI	Categorically needy grant recipient who is blind, or disabled.

Provider		Providers include all types of approved service givers except mental hospitals, nursing homes, county medical care facilities, state mental retardation facilities, psychiatric institutions, physical therapy, speech centers, and suppliers except as medical supplier.
Provider Master File	PMF	The historical computer listing of enrolled Medicaid providers.
Perinatal Death	PD	Perinatal Death is the death of a fetus after the 20th week of gestation or of a live born infant prior to the 7 th day of life.
	PDR	Perinatal Death Rate is the number of fetal deaths plus the number of hebdomadal deaths plus live births in a cohort X 1000.
Osteopathic doctor	DO	Doctor of osteopathy.
Omnibus Reconciliation	OBRA	Omnibus Reconciliation Act is the Congressional Budget Act which includes significant increments to programs along with budget authorizations.
Spontaneous abortion		A spontaneous abortion is the unplanned loss of an embryo or fetus before the twentieth gestational week.
Standard Deviation	SD Std. Dev.	Measure of dispersion in a distribution.
Very Low-birthweight	VLBW	Very low-birthweight is defined as a weight at birth of less than 1500 grams.

INTRODUCTION

Dissertation Organization

The problem of infant mortality serves as the basis for government involvement in health care and services to childbearing women and infants. The dissertation concerns the primary government approach to reduce the problem of infant mortality. The largest response to this negative health outcome lies within the federal-state Medicaid program and makes it the most appropriate vehicle to investigate. During the 1980-1987 period in Michigan, medically-based prenatal care was the backbone of the state's efforts to decrease infant deaths. Medicaid enhanced its program commitment to the problem by responding to provider requests for increased remuneration. This policy approach is the basis for the investigation. Provider participation and client outcome differences prior to and after policy change offer a case for two specific state financial incentives to providers in the Medicaid program. The ability to conduct this type of retrospective health policy research offers the state agencies insight into the strengths and weaknesses of their data bases. This researcher offers some recommendations for policy and procedure changes which could simplify future policy research efforts and expand on this data base.

Policy Questions

The dissertation's first research question addresses the effect of remuneration on provider participation in Medicaid. The examination includes two aspects of increased remuneration in Michigan: maternity care in general and only prenatal care procedures. The latter is especially important because it is a significant contribution to Michigan's rate of medical care inflation. At a time when physician services inflation was seven percent, the state raised prenatal Medicaid fees 47%. The second research question addresses the effects of greater remuneration to the provider on the

client: Does paying providers more translate into earlier access, better utilization, more appropriate levels of care, and improved health outcomes of the pregnancy of Medicaid women?

The dominant view of the policymakers was that raising remuneration fee screens would improve both provider participation and client outcomes. As this dissertation was conceived, a broader review of empirical findings led the researcher to anticipate no change in participation with enhanced fees and no better outcome with more or earlier prenatal care. The design addresses key health status outcomes of pregnancy between the Medicaid cohorts and lays the groundwork for future comparisons between the Medicaid cohorts and the non-Medicaid state births, and Medicaid women below poverty and the effects of the Congressionally-mandated expansion to low-income women above the poverty level. Evaluating the health outcome of clients requires data from the infant's birth certificate linked with Department of Social Services (DSS) client enrollment file information. Since the specific policies being implemented relate to enhancement in prenatal care access and utilization, only women with Medicaid coverage during pregnancy are included in these analysis. Women covered prior to pregnancy and at delivery, but with a gap in service during pregnancy, or those enrolled only from delivery are not included. Women with multiple delivery events are also not included in the analysis because of the difficulty involved in determining services and expenditures with short conception intervals.[1]

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[1]Limited information about clients not included in this part of the research appear in the Appendices. Data about infants added to Medicaid as newborns, without a participating mother, are omitted from the research data base because of the limited health information available on the pregnancy, but are included in the Appendix section on all Medicaid newborn infants.

The study compares the 1985 Medicaid cohort with the 1986 Medicaid cohort in which the only ambulatory provider policy change was the increase in provider reimbursement for pregnancy and childbirth services. No changes occurred in client eligibility or provider classification during this period. The expenditure difference for maternity services of all clients is assessed for each cohort. Expenditures for women studied in detail will be determined for the prenatal to 60-day postpartum period.

There are seven chapters. Chapter 1 describes infant mortality as the international indicator of social well-being by referring to U.S., Michigan, and international death rates. Infant deaths fall into three distinct time periods--perinatal, neonatal, and postneonatal; the neonatal mortality rate is the indicator least correlated to social class and racial differences of the mother, yet it is almost exclusively used in the U.S. health literature to show health care effects. In contrast other nations focus on perinatal mortality or the fetal death sub-periods. In the 1980s, the policy armamentarium slipped and prenatal care access became the major thrust for government action. Access to care is closely tied to the availability of medical providers and facilities.

Chapter 2 briefly discusses U.S. content of prenatal care and focuses on provider access incentives. Implementation of prenatal services roots in U.S. traditions and the health system leadership is recalcitrant to alter past practice. There is a paucity of data related to actual effects of remuneration and other incentives on changing participation of providers in Medicaid. Providers justifiably seek a fair and increasing remuneration for their services, but the standards to describe adequate remuneration are self-generated.

Chapter 3 presents the research, hypotheses, and measurements studied in the Michigan Medicaid childbirth and newborn cohorts. The remuneration policies

addressed feature two distinct approaches to evaluation of these Medicaid policies. The first deals exclusively with the entire caseload of pregnant women served with one or more prenatal care visits and the providers who billed for those services. The second approach enriches the data base of the pregnant women enrolled in Medicaid during pregnancy (delivery and infant entry points are also available) with their client demographics and infant birth-death records. Data for baseline and experimental years compare the health outcomes of birthweight, prematurity, and early death for participating Medicaid women.

Chapter 4 details the methodology used to identify the investigated cases and to combine administrative and vital records data. Some description of the variables used, the editing applied, Medicaid substitutes, and other pertinent facts present a richer understanding of the data base constructed for policy research.

The research findings appear in two separate sections. Chapter 5 presents the conclusions related to provider access and how remuneration changes altered supply. Chapter 6 describes the health outcomes of the Medicaid clients with enrollment during or continuing through a pregnancy. Chapter 7 concludes by summarizing the findings, setting some recommendations for further study, and suggesting a few procedural changes for Michigan agencies providing raw data for the study.

CHAPTER 1

The Politics of Infant Mortality

Introduction

Life expectancy and survival rates are long-standing measures of national development and economic well-being. Most American children are healthy but the death rate[2] during the first year of life is higher than any other age before 65. Infant mortality, or death in the first year, is used world-wide by politicians, governments, and social scientists as a measure of health and social status of nations. Thus, when the U.S. ranks 24th among industrial nations[3] for infant mortality, policymakers scramble for ways to lower the death rates. Similarly, Michigan policymakers in a state with well-developed and progressive public health and welfare programming are unhappy with an infant mortality rank of 41st in the nation.[4] Both national and state policymakers attempted to improve access to health care for pregnant women and infants as a solution to these excessive death rates. Specifically, Michigan policymakers believed that removing the financial barriers to care and offering more competitive remuneration for prenatal care services would ameliorate excessive infant mortality. This dissertation assesses the appropriateness of this public policy approach by answering two major questions.

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[2]A death rate is a measure used to compare the occurrence of deaths between populations. Death occurrences in a specific period are divided by the total population estimated at that age period and multiplied by a factor such as 1,000 or 100,000. For example, the infant mortality rate (IMR) is the number of deaths to live born infants, under the age of 1 year, divided by the total number of infants in the population, multiplied by 1,000. The US 1990 IMR is 9.3, or 9.3 infants out of every 1,000 born are dead before their first birthday.

[3]United States Department of Health and Human Services (DHHS), 1990.

[4]National Center for Health Statistics (NCHS), 1990, p. 36, shows the 1988 infant and neonatal mortality by state. Michigan ranked 44th among the states for neonatal mortality.

1) Will a significant increase in state reimbursement to the maternity care provider alter the access to care and the utilization of prenatal services by the targeted clients?

2) Does access and utilization of health services alter the health status of served pregnant Medicaid women and their newborns?

The study blends economic, health policy, and reproductive theories into a conceptual framework explaining the government role in financing and coercing women into the formal system of prenatal, delivery, and postpartum care believed essential in the United States. Administrative, paid claims, and vital health statistic files form the data base to investigate these public policy questions. The basic effects of monetary enhancements to providers are explored through the effect on provider supply. The impact on clients is measured using three health status indicators. Expenditure comparison is used to evaluate cost-effectiveness of the policies in preventing infant death.

The Michigan Setting

Like most large northern states of the east and midwest, Michigan has a substantial urban population and a sizeable black population. The cultural roots of the population are primarily from European immigrants and American Indians. Industrial growth and farming brought African-Americans and Mexican-Americans to the state and these ethnic groups are the predominant subcultures influencing the state today. Michigan's health insurance programs offer a wide variety of health-service benefits to the general public resulting from union negotiations. The high value placed on health insurance coverage made broad coverage options available through Medicaid and some specialized public health and mental health services. A statewide system of local public health agencies exist, but these agencies are generally

not comprehensive primary care providers. The state has a sufficient supply of physicians, including a large proportion of osteopaths. Both family physicians and obstetricians are at national average supply levels.

Michigan's Medicaid program offered the full range of optional services to medically and categorically needy pregnant women during 1985 and 1986. Medicaid (MSA) offered all features of the expanded eligibility for pregnant women passed by Congress between 1985-1990, except for expedited and presumptive eligibility; public health programs offered prenatal care to women above Medicaid but under 185% of the poverty level pre-1988. The state fully managed the Medicaid program and implemented a Diagnosis Related Group (DRG) approach to hospital payment in 1985.

The Medicaid program covered the prenatal care and delivery of almost a quarter of the state's live births during the 1982-1986 period. Medicaid clients in most areas had free choice of their provider,[5] with the majority using fee-for-service (FFS) Physicians. Managed care options concentrated in Wayne county, but Kalamazoo also had a participating Health Maintenance Organization (HMO). Medicaid clients served during pregnancy primarily fell into the categorically needy designation with incomes below 60% of the federal poverty level (PL). At the beginning of the 1980's MSA enrollment grew in response to a recession but the enrollment gradually declined to with Aid for Families with Dependent Children (AFDC) reaching its lowest point in 1986.

Maternity care and newborn services became a substantial service area representing 34.3% of 1986 Medicaid hospital expenditures with pregnancy and

[5]Managed care assigned AFDC caseload in Wayne county to a physician sponsor who serves as a case manager and primary provider. This program was just beginning during the study years. Assigned women had to participate but could select their provider among the participating physicians.

childbirth accounting for 25.2% and 20.5% of discharges, respectfully (MSA, Smith, 1988). State policy leaders sought full access to an appropriate level of prenatal care for all citizens. In tandem with this broad goal and client needs, Medicaid officials wanted to respond to provider demands related to maternity practice costs and remuneration levels and placed $5 million toward extra remuneration in this area in 1983 and 1986. This study evaluates what effects these two different types of reimbursement policies had on both the provider pool and the clients.

Although Medicaid is the primary program designed to deal with infant mortality, it is not the only program targeted to low-income women and children. For instance, Michigan had a diffuse family planning network of both private providers and clinics and confidential teen access. Induced abortion services existed throughout the most populated parts of the state through private physician offices and clinics in major cities; state funds covered abortions for Medicaid women during the study period. Genetic screening, counseling, and related services were available regionally under Medicaid, public health, and private medical services. The public sector provided nutrition education and supplemental food to pregnant low-income women. Counties with the greatest number of infant deaths had access to extra public health funding for comprehensive prenatal care services and outreach. An established system of regional perinatal intensive care existed and most teaching hospitals offered specialty perinatal clinics. Obstetric hospital beds remained in ample supply. Cooperation with providers was high, and no obvious statewide access problems appeared in either program or vital statistics. Welfare rolls were declining to pre-1980 recession levels. There were no changes in Medicaid eligibility during this study.

Defining the Problem: Infant Mortality

At the national level, concern about infant mortality lead to a Congressional mandate for a study. As outlined in the OTA report[6] several reasons prompted this effort: 1) the U.S. ranked 18th among the industrial nations of the world for infant mortality in 1985 and was dropping behind further; 2) early prevention and treatment services for infants should reduce lifetime disability; and 3) disparity existed in the population most affected by early infant loss. Research identified the major antecedents to early death and childhood disability as low weight at birth and congenital anomalies. OTA concluded that progress to reduce infant mortality required changes in the birthweight-specific mortality rates and the birthweight distribution. The U.S. was making progress in birthweight-specific mortality, especially for those infants under 1,500 grams (less than 3 pounds 5 ounces) but reported numbers of these very low weight infants increased each year, and the gains from neonatal intensive care (NNIC) ceased to lower infant death rates further. The U.S. was more aggressive in treating very premature infants than other countries, and this practice may account for the country reaching the plateau in neonatal mortality a few years earlier than other nations. The U.S. focused on biomedical and technological innovation and intensive infant-care services during the 1965-1980 Period, while the other industrial countries equalized access to health care and enhanced social systems for families as their priority. By 1987 infant mortality rates World-wide indicate that all industrialized countries are at a plateau, but U.S. rates are far above many others.

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[6]United States Congress, Office of Technology Assessment (OTA), 1988; updating Spain's infant mortality rate from 1983 to 1985 places us 18th of the countries listed in Table 2-1, p. 32.

U.S. Rates

In Appendix A, selected years of data for U.S. infant mortality indicators illustrate that the 1950 and 1960 rates of neonatal and infant mortality changed slowly with only two fewer white newborns dying per 1,000 live births and no fewer blacks over the decade. Increased health services and poverty programs in the United States saw the IMR drop from 26 to 20 between 1960-1970. In 1970, 15 infants died in the neonatal period and 5 in the postneonatal period per 1,000 live births. The availability of neonatal intensive care, abortion, and sterilization are credited with an IMR drop of another 5% annually for whites and 4.2% annually for blacks between 1970-1981, leaving the 1981 rate at 11.9. Black infant mortality improved the most between 1966-73 corresponding with the increased social programs for low income in cities and rural areas and federal funding for sterilization. Government-funded abortion services for poor women coincided with new funding for neonatal care services (1973-1977). By this time, disparity of racial benefit became evident as black rates dropped 3.9% and white rates 5.9% per year. Between 1977-81 rates declined 4% per year showing the effects of neonatal intensive care for both races.[7] There was no improvement in the birthweight distribution and prematurity was increasing for blacks. By 1980, 12.6 U.S. infants died for every 1,000 live births and almost nine died in the neonatal period. During the eighties, neonatal intensive care efforts ceased to make further significant reductions in death since the neonatal mortality declined by only two infants per 1,000 live births between 1980-1988. By 1985 postneonatal mortality ceased to improve in the U.S. and stabilized around three deaths per 1,000

[7]See Kleinman (1985).

live births. The U.S. world rank for infant mortality deteriorated from 13th in 1970, to 18th in 1985, and rests at 24th among industrial nations in 1990.

Rarely does a U.S. discussion of infant mortality relate national differences in the use of birth control protection and abortion, nor do we discuss the diversity and size of the childbearing population and the different indicators of reproductive loss within our population. Hoekelman and Pleiss (1988) summarized three prestigious U.S. medical reports (Surgeon General, Institute of Medicine, and Academy of Pediatrics) and their recommended actions to reduce infant mortality: 1) family planning services including education on reproduction and proper use of contraceptives, pregnancy spacing and reduced substance abuse, and use of genetic screening and pregnancy termination; 2) adequate nutrition; and 3) appropriate prenatal care beginning early in pregnancy. The policymakers worked hardest at implementing the third option as the first option deteriorated in societal support and funding. Prenatal participation in the WIC program has not achieved desired levels since program inception in 1972.[8]

The U.S. made no further recent increases in family planning access or effectiveness, nor in medical breakthroughs for childbirth problems. Therefore, it is not surprising that the infant mortality rate declined less than 2% annually between 1981-1988. Teen access to family planning and government-funded abortion services

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[8]The Midwest Regional Office of US Department of Agriculture (USDA) provided national caseload data for the Special Supplemental Food Program for Women, Infants, and Children (WIC) which indicates that 19.5% of the 1974 caseload was women (pregnant, postpartum, and lactating) and this proportion increased to 21.5% in 1986, and 22.9% in 1990. National WIC caseloads for pregnant participants are not available before 1988 but accounted for only 15% of over 4 million clients. WIC offers only a partial food supplement of selected foods but if used in conjunction with Food Stamps and careful buying practices can provide an adequate diet. The program is also required to provide nutrition education but the depth of these encounters maybe inadequate to help young mothers in limited socioeconomic situations.

were further curtailed during this decade. Prenatal care programs received considerably greater support at the same time that social forces restricted access to population control. As Hein (1991) states unintended pregnancy must be addressed if we want to lower our infant mortality rate.

Rates in Other Nations

OTA (1988) listed the 1985 IMRs for 35 countries.[9] Japan, Finland, and Sweden had the lowest rates. Japan's improvement was significant.[10] These three world leaders in good pregnancy outcomes undertook comprehensive, national program efforts. Most European communities agree that large declines in infant mortality first occur by increased standards of living (safe water, sewage disposal, control of communicable disease, better nutrition, education, and housing). All countries with significant improvement in infant mortality have more homogeneous social welfare systems than the U.S. and less class disparity. Ethnic differences are manifest in fertility and mortality rates of all nations and social class differences exist, but the disparity in health outcome and education is not as pronounced as in the United States.[11]

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[9]If we applied only white infant mortality, our 9.3 rate in 1985 places us behind Japan, Finland, Sweden, Switzerland, Denmark, Canada, Netherlands, France, Norway, Ireland, Spain, and before the United Kingdom, Belgium and East-West Germany.

[10]As Kondo and Matsuyama (1988) indicate, Japan dropped from an infant mortality rate of 19.3 in 1966 to 5.5 in 1985 and late fetal deaths were only 5.4. In contrast, the US went from an infant mortality rate of 24.7 to 16.6 during this period. Japan's postneonatal mortality is now among the lowest of industrial nations and this reflects in the infant mortality rate. Japan offers community-based maternal and child health services and uses abortion and other population control measures to keep the childbirth age range narrow.

[11]See Appendix B for a discussion of social class in Europe.

Over the 30 years between 1950-1980 economic, technological, and social influences altered the world's infant death rates.[12] Throughout the developed world current infant deaths occur primarily in the late fetal period and during the first week of life and relate to pregnancy and delivery factors. These perinatal (fetal and hebdomadal) deaths associate with conditions of prematurity, low birthweight, and congenital anomalies. Sweden (Kohler, 1990) attributes their improvement in perinatal deaths largely to the age and parity of their childbearing women.[13] In 1984 teenage pregnancies were only 2.84% of Swedish births.[14] Shortening the reproductive age span to between 20-35 years credits a 9% improvement in perinatal mortality in Sweden and a 10% reduction in the United Kingdom. Japan and France also show reductions in the age span of mothers with parallel mortality reduction. During the 1973-1980 period, Sweden associates a 10% reduction in perinatal deaths with improved birthweight. Illegitimacy is no longer associated with poor pregnancy outcomes in Sweden (50% of 1988 births) as society and improved welfare programs have altered the discrepancy between married and unmarried mothers.

Michigan Rates

Michigan's IMRs did not differ significantly from the national rates during 1950-1980. The 1980s began with an economic recession, moved into a recovery, and reached a lowered stability. The majority of Michigan infants who die do so in the first week of life. In 1984, 59.9% died before 7 days of age with 45 percent of all infant deaths occurring before 24 hours of age; an additional 9% died between one

[12]In 1950, the IMR was 29.2 in the United States, 20.5 in Sweden, 43.7 in Finland, 25.2 in the Netherlands, 27.7 in Norway, 47.4 in France, and 59.8 in Japan (US Department of Commerce, Bureau of Census, 1952).

[13]The number of live births per woman (parity) decreased over forty years.

[14]In comparison, 12% of US births are to teenagers and 12.2% of Michigan 1985 births occur to teens, but 24.8% of Michigan Medicaid mothers are teens.

and four weeks of age. Of those Michigan infants dying at 28 days to one year of age, 24.7% die between one month and five months and only 6.3% die from six months to a year.[15]

Over the 1980s, greater than a 300 gram difference between the average birthweight of Michigan black and white infants existed. The difference in the percent low birthweight and the percent premature reflect this weight difference. The state's median birthweight by race are stable at 3,430-3,440 grams for whites between 1980-86 and 3,147-3160 grams for blacks during this same period. At the 95th percentile the magnitude of difference was similar between the races but at the fifth percentile the difference by race was substantial, with the largest black newborns weighing more than 500 grams less than the smallest white newborns at the low end of the birthweight distribution.

During the 1980s Michigan failed to keep pace with the country in improving black mortality. In 1985, the state's black neonatal mortality rate (NNMR) was almost 17 while the national rate was 12, but white NNMR was 6.2 in Michigan and 6.1 for the U.S.. In 1988, after two years with statewide access to prenatal care at 185% poverty level and other program enhancements, the Michigan health statistics show black neonatal mortality at 16.5 (11.5 for U.S.) and black infant mortality at 21.9 (17.6 for U.S.).[16] Michigan's white neonatal and infant mortality rates are similar to the

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[15]Michigan Department of Public Health, Office of the State Registrar and Center for Health Statistics and Office of Nutrition, 1985.

[16]The 1989 data for Michigan is affected by a Medicaid abortion ban in December 1988. An estimated 20% of Medicaid births were born that otherwise would have been induced abortions. Although the black infant mortality rate remained at 21.9, there was a shifting between neonatal and postneonatal deaths. Delayed death of ill infants is speculated to be the cause of the black improvement in neonatal deaths since there was a corresponding increase in late deaths. This trend also occurred in whites but at an insignificant level of change. (Refer to Appendix A for further information.)

nation at 5.6 (U.S. at 5.4) and 8.6 (U.S. at 8.5) respectively. Increased outreach, broad prenatal care eligibility, and targeted services for low-income pregnant women showed no progress in closing the racial gap in the state. The overall state infant mortality rate was higher than the country's average since the 1981 recession, and the state's rate of change for blacks did not keep pace with many other states. During the 1980s an average of five more Michigan black neonates died per 1,000 live births compared to the national race-specific average.

Policy Response

Federal Efforts

Federal involvement in providing prenatal care began in 1921 under the Sheppard-Towner Act when Congress made one million dollars available to states; funding ceased in 1929. From 1963-1974, the federal government once again became actively involved in prenatal care access under Title V of the Social Security Act; 56 Maternity and Infant Care (MIC) projects received funding in 34 states, the District of Columbia, and Puerto Rico, to address the problem of access for poor women and higher infant death rates among the poor. The federal government returned operation and funding to states in 1974 with a maternal- and child-health (MCH) initiative called the Program of Projects,[17] the forerunner of the MCH Block grant. By the seventies maternal health advocacy addressed services to vulnerable populations and system approaches to improve health status. Agriculture offered a prevention activity

[17]The federal government created the MCH Program of Projects which supported perinatal clinics and neonatal intensive care (NNIC) in hospitals as new initiatives under amendments to Title V, the Social Security Act. The medical schools and large hospitals supported the development of new fields in pediatrics and obstetrics and created specialty boards and clinical services. Intensive care nurseries and regional centers stimulated infant transport to treat sick babies. Third-party payers, including Medicaid and State Crippled Children's programs, expanded traditional coverage for these high-cost infants.

for poor women as a supplemental food program tied to health services and nutrition education.

Congress addressed the status and problems of mothers during the eighties; the General Accounting Office (GAO) undertook several investigations of childbearing issues between 1984-1987. First, a secondary analysis of all WIC evaluation efforts revealed limited benefits for this popular program. Staff reviews of published work found up to a 20% decrease in low birthweight, with up to a 2% increase in mean birthweight of served clients in comparison to other groups. The second related issue assessed teenage pregnancy (1986 a) and recommended targeted services to unmarried, young teens, via federally-funded innovations with comprehensive evaluation designs included as part of funding. The third review addressed the health-system problem of medical malpractice (1986 b) and noted that nationally malpractice insurance costs rose 100% for physicians between 1983 and 1985, and 57% for hospitals. The overall cost of malpractice insurance for all physicians in 1984 was 9% of total professional expenses, with the greatest rate increase associated with obstetricians. Obstetric premium costs were 8% of gross income nationwide.[18] The fourth report (1987) investigated low-income women's use of prenatal care. Evaluation criteria for adequate care included care in the first trimester or achieving nine prenatal visits. A total of 63% of those studied fit this criteria and yet these women had 12.4% low birthweight infants. Barriers to care appeared to be lack of money to pay for care (17%), transportation problems, and unawareness of pregnancy. This report stated that increased provider reimbursement would not expand access to

[18]GAO (1986 b) found that in July 1985, the average Michigan physician liability premium for obstetrics was reported as $19,931 (significantly less than for an orthopedic surgeon but similar to a general surgeon). Family practitioners paid an average of $4,779.

care. Only 11% of the Medicaid women studied experienced any difficulty in finding a doctor (40% went to private doctor's offices and 52% to clinics). GAO staff statements suggest that alternate sources of care might be used, rather than requiring more providers. Expanded Medicaid eligibility was the policy preferred (in contrast to paying additional remuneration) and the Budget Office (CBO) estimated the cost for expanded client access would be covered by reduced NNIC and long-term institutional care expenditures. Another report recommendation was expansion of evaluation activities of programs designed to improve prenatal care access.[19] Under 3% of women lacked prenatal care. Private efforts and studies also appeared throughout the decade. Many vital records studies showed that women who sought prenatal care earlier and received it consistently had fewer low birthweight infants and less mortality. Multivariate studies used by both the Institute of Medicine (1985) and the OTA (1988) infer that prenatal care services reduced the incidence of low birthweight infants. The OTA cautiously expressed that prenatal care efforts would lower infant mortality rates because only half of 17 studies of poor women or teenagers found augmented prenatal care services affected birthweight or neonatal mortality. The OTA further estimated that the early receipt of prenatal care should reduce low-birthweight births 0.2-0.8%, or enough to cover immediate program costs, and might lower infant mortality somewhat. The subtlety of the analyses eluded

[19]GAO (1987) also validated 82 percent of women's responses regarding the number of prenatal visits received: urban hospitals had an 80% validation rate and rural areas had a 88% validation. Women tended to overstate their number of prenatal visits (by up to 3.4 visits) and say their care started earlier than documented in hospital records. Forty percent had more than one provider during pregnancy, and thus 18% of cases were not fully validated. In the sample, only 41% (as validated) received adequate care under the Kessner Index; racial disparity existed with whites having 56% adequate care and blacks only 30% adequate care as defined by the Kessner method.

legislators who rapidly expanded the state-federal role in removing financial and other access barriers to health care for pregnant, low-income women across the U.S. during the 1984-1990 period.[20]

This dissertation addresses only the major initiative undertaken to reduce infant mortality. It deals with the increased access and utilization of prenatal care implementation strategy because this was the major Michigan and U.S. policy thrust between 1983 and 1988. During this time Michigan offered a well-established family planning network of services through Title X funding, private Planned Parenthood, and fee-for-service access through Medicaid and other insurers. State-funded abortion access for Medicaid women lasted until December 12, 1988. Widely available WIC services offered supplemental food, nutrition education, and some counseling during the period. Women below 185% PL could use public health departments or Medicaid to access prenatal care. Selected counties offered other maternal support services including nutritional and social support counselling and education.

Michigan's Response

During the 1970s Michigan used state and federal funds to augment prenatal care access and other childbirth services for the low-income population. Although there was a recession in the early period, infant mortality rates remained with the national trend. Michigan's Medicaid program was in full partnership with the provider community and attempted to offer usual and customary fees to both physicians and hospitals in the seventies. As the caseload exceeded 10% of the state's population during the 1980-1982 recession, physician fees decreased in proportion to

[20]See Appendix C for a brief presentation of the Omnibus Reconciliation Acts related to pregnancy access.

charges.[21] Medical society representatives and public health officials noted problems with a changing pattern of infant mortality in the state. Physician societies reported members experiencing increases in costs to operate obstetric services. High-risk clients necessitated more time and they raised the risk of a liability suit according to member-advocates working with MSA and MDPH.[22] Participation by specialty providers in Medicaid was viewed as problematic throughout the country and the area of obstetrics was the lowest participating specialty. Michigan provider access experienced strain based on the medical liability problem.[23] Based on a 1983 report from the state medical society, local health department reports, and a downturn in infant health statistics, Michigan policymakers recognized the problem of excessive infant mortality and insufficient prenatal care access.

Medicaid policy staff wanted to improve the infant mortality rate and chose to cooperate with the physician community to improve access to prenatal care. New economic burdens constrained maternity services providers as liability premiums for maternity care accelerated in 1983 and the fear of litigation increased.[24]

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[21]See Appendix D for the Medicaid Physician Fee Changes for 1965-1991.

[22]Staff interviews including McCandless, Conklin, and McConnell.

[23]Liability problems are both financial and psychological. Michigan malpractice premiums increased from an average of 6% to 10% of operating costs between 1983 and 1986 in Michigan (ACOG 1985, 1987). Of almost greater magnitude than premium charges is the fear of losing a lifetime of material goods because of malpractice suit compensation beyond insurance levels. (Physician documentation of stress related to the malpractice process is anecdotal from interviews with several government and private practice physicians in Michigan.) Note: Although obstetric malpractice suits declined in number in the late 1980s, liability premium charges continued to rise.

[24]The prenatal care implementation strategy to address infant mortality did not compound with a lack of other prevention measures (such as abortion or family planning availability) which might affect client use and outcome. Access to preventive prenatal care reportedly became more difficult for Medicaid clients because of several parallel and paradoxical problems in the health-care system after this study period.

Medicaid policy implementation switched from a goal of enhanced health status to one of access to health care during the 1980s. When access drives the system, costs escalate. Access to prenatal care was a major state goal during the mid-1980s. The Medicaid program was the second-largest payer for this health service in the state. Once the political decision was made to prioritize services for pregnant women through a commitment of additional state funds, the medical community influenced the implementation process.

The first consideration in expanding access to care is the availability of providers. Michigan physicians vocalized the need to receive increased remuneration in order to continue obstetric services based on their rising costs to practice in the state.

Medicaid responded with two remuneration policies. The first was issued in the fall of 1983 and selectively reimbursed providers serving the high-risk clients 65% more than those giving care to normal-risk clients. This policy was not evaluated prior to this research. Determining the appropriate payment for level of care starts with investigating the health-care claims of women prior to and during pregnancy and the related prenatal care procedure code billed and paid. Differences in implementation over both study years are compared. The second reimbursement strategy, implemented in January 1986, raised the prenatal fee screen six times greater than the medical-care inflation rate for the fiscal year and about twice the inflation rate for delivery services.[25]

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[25]The Detroit-Ann Arbor Medical Care Consumer Price Index indicated an average inflation of 7% for physician services; the Medicaid fee increases were 47% for prenatal care and 13% for delivery services. The differential remuneration for high-risk prenatal care remained in the new fee screens.

Effectiveness of these policy strategies explored participation by providers in the provision of maternity care in general, and prenatal services specifically, using paid claims data and provider information. An important factor in the policy evaluation was knowing the size of the client demand and addressing the outcomes of the maternity services on a client-specific basis. Prior knowledge was also limited in this area and the state needed to know the level of prenatal care access among the Medicaid population. The ability of existing data files to address policy studies remained unknown in the prenatal care area for Michigan Medicaid. The efficacy of prenatal care underwent some questioning nationally[26] and the experiences of a statewide population of low-income clients with access to care was unknown. The implementation of prenatal care services matters only if it results in better outcomes for women and infants.[27]

Determining the effectiveness of these incentive policies and testing the efficacy of prenatal care requires an extensive data base. Evaluation of the provider access objective requires a statewide baseline measurement with another measurement after policy changes. Paid claims for maternity services linked with provider enrollment offered the method to investigate the effect. Client access, utilization, and outcome assessment require much more information than Medicaid records offered, thus, record linkage of paid claims for women with a Medicaid-paid delivery with the state birth file, and subsequently the matched birth-infant death file, provides a mechanism to assess client effects. Information on the birth record allows measurement of pregnancy timing, prenatal care access, care utilization, and

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[26]A number of writers questioned the value of prenatal care; see Hall, Institute of Medicine (1985), Congress, OTA (1988), and Wagner.

[27]Medical effectiveness research is concerned with outcomes of care. The outcomes under study are low birthweight, prematurity, and death.

outcomes. Medicaid claims data improves the information on level of medical risk and type of provider. This investigation primarily concerns effectiveness of prenatal care and Medicaid policies which facilitate the access and use of health services during pregnancy. Women with Medicaid eligibility for pregnancy care, as well as infants who added to Medicaid at birth, form the population to determine whether different effects occur to users of care under Medicaid. Who receives services, who benefits from policies, and who improves least through recession and limited recovery appear more clearly.

Significance

This study is important as a baseline study of the Medicaid services used and expenditures made for medically and categorically needy pregnant women and infants who fall below 68% poverty level in Michigan. This benchmark offers a beginning base for future evaluations of episodes of care in general, and specifically, the changing Medicaid prenatal caseload. It also serves as the first test of state remuneration enhancements on provider supply and evaluates prenatal care effects in the Medicaid population of below-poverty clients. The opportunity to learn about the Medicaid childbearing population pinpoints myths, alerts ecologic fallacies, and highlights differences inherent in subpopulations. Actual outcomes of enrolled Medicaid clients test the validity of projected savings of prenatal care and other program enhancements. Access and utilization of early prenatal care, of an appropriate medical level, within the Medicaid population who chose to keep a pregnancy, affords an assessment of birth outcomes of below-poverty clients. The study evaluates if Medicaid achieved its objectives for access and use of prenatal care and other health services and if closing the services gap alters health outcomes.

In addition to these benefits to Michigan, the methods used to derive a population served by Medicaid prior to, during, and after pregnancy, apply to other studies of the benefits derived from continuous access to health care, fertility, and subsequent pregnancies. Medicaid episodes-of-care analysis requires data-set construction which present the first research challenge. The process used here to identify and define an episode of care from linked inter- and intra-agency electronic record systems can be applied to other locations and diagnosis groups. Data availability, validity, and utility constrain some of the variables for analysis and limit the hypotheses tested. Policy and procedure changes required for further research become obvious and additional procedural recommendations and future research areas identify processes for Michigan and other states.

CHAPTER 2

Physician Reimbursement: Improving Access Through Reimbursement

Introduction

This chapter briefly describes how prenatal care evolved in the U.S. and how provider supply became the key government issue to improve access to care. Prenatal care definitions and comprehensiveness changed over time by adding service components. Consistent through the period is the center role of the physician in the system. New approaches in 1988 and 1989 (Institute of Medicine and Department of Health and Human Services [DHHS]) challenged prenatal care routines developed over the years.

The obvious barriers to prenatal care access (after removing fiscal constraint) are rooted in locating physician supply and stimulating client demand. State government concentrated significant effort in areas related to provider acceptance but little in provider participation or understanding different views on the demand for care. Expanded government efforts to foster approaches for client outreach, allied health support, and quality case management did not lessen efforts to increase payments for traditional providers.

Prenatal Care Coverage

Prenatal care, occurring early and in adequate amounts, was the major solution proposed to avoid high-intensive care newborn costs for government (Institute of Medicine, 1985). If prenatal care makes a difference in pregnancy outcome, its use

should be apparent in population data.[27] Increased use of prenatal care has not yielded the reductions in low birthweight, prematurity, or better birthweight distribution sought for low-income women. For poor women, the 1958-1965 Collaborative Perinatal Study of the National Institute of Neurological Diseases and Stroke[28] serves as a benchmark of prenatal care results after treatment in (primarily public) hospital outpatient clinics. During this period only 38% of white and 21.5% of black enrolles entered prenatal care by 16 weeks gestation (early second trimester). Black women had an median of 6-8 prenatal visits and whites averaged 9-11 visits. Most research on low-income clients uses hospital outpatient, specialty clinics, health department, or targeted program situations, and compares study women with others. Sites may offer different biases in patient and provider selection which might influence outcomes.

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[27]During the 1980-87 period, United States mothers with first trimester entry into prenatal care represented 76% (79% white and 61% black) of pregnant women. No reported care or third trimester prenatal care in 1986-87 was 5% of white women and 11% for black women with 1.9% of all women having no reported prenatal care. The number of prenatal visits increased from 11.4 in 1982 to 12 visits in 1987 with a small racial difference (white visits increased from an average of 11.8 to 12.2 and black mean visits increased from 10.2 to 10.6). Prematurity was 10% in 1986 and 10.2% in 1987, up from 9.4% in 1981. Racial disparity increased between 1986 and 1987 because black premature deliveries increased from 17.7% to 18% and white deliveries from 8.4% to 8.5%. (National Center for Health Statistics, 1989.)

[28]Niswander and Gordon (1972) studied 40,273 U.S. pregnancies between 1958-1965. Removing pregnancies which terminated before 20 weeks of gestation left 39,215 pregnancies with a live birth for analysis: 46% white, 46.2% black, 6.8% hispanic and 1% oriental women. This 20-28 year old collaborative study produced very similar outcomes for women receiving prenatal care as found in the Michigan Medicaid population of 1985-1986.

The mean birthweights are the same by race (7 pounds 4 ounces for whites and 6 pounds 11 ounces for blacks) with 13% of blacks having low birthweight and 7% white low weight offspring. Access, utilization, and biomedical improvements did not alter the premature deliveries; in the U.S. collaborative study, 7.1% of whites and 17.9% of blacks delivered at 20-36 weeks and in 1985-1986 black Medicaid women had 16.9% and white women had 10.1% premature singleton deliveries.

Since the 1950s, prenatal care content includes a medical core for physician diagnosis and fetal-maternal monitoring. Although modern prenatal care relies on technology to assess fetal well-being and visits are more frequent, the actual process has changed little. The goal of the first medical visit is assessment of the mother's health, identification and treatment of any health conditions or diseases, and pregnancy dating. Subsequent visits monitor fetal growth and treat any developing problems. Over the years prenatal care visits had to include more education on health behaviors, practices and basic knowledge on birthing and lactation. These educational components no longer transferred from home-acquired knowledge gained through observational experiences but evolved into a medical service.

The American College of Obstetricians and Gynecologists (ACOG) set the U.S. standard for prenatal care, and these guideposts remained unchallenged until 1988. The Institute of Medicine suggested that at-risk women needed auxiliary services in pregnancy. In 1989, the Public Health Service promoted an altered schedule of prenatal care visits which lowered recommended visits to nine visits (instead of 13) when women carry to term. These alterations in traditional prenatal care represent professional judgement based on outcomes from the traditional approach, but remain untested.[29]

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[29]The original Maternity and Infant Care projects of the 1965-1974 period do represent the multi-need and interdisciplinary effort suggested by the Institute of Medicine (1988). Indigenous workers from the projects visited women at home or in neighborhood centers. Some client improvements occurred from multi-disciplinary health and social support systems, but this level of care intensity cannot be afforded under the current delivery system and cost constraints. Tests of a client-need schedule of care have not been formally tested for prenatal care. Women would need to be empowered to recognize what was happening in their body and whether there was a potentially beneficial medical intervention.

Prenatal care, whether traditional or modified, represents a professional/client service. To receive a service, clients must seek a provider making it available and use that service. Access to health care purports to be the major obstacle for low-income pregnant women. Lack of financial resources and ignorance constitute the first barriers to care. With Medicaid and public health funding, fiscal barriers fade. Significant and continual educational activities altered female behavior in childbearing. The access problems of 1940-1950 recycled in the 1980s but the fiscal access barrier was the physician who could not afford to serve Medicaid clients, rather than the client who lacked payment for a visit.

Economics

One problem in the health care market is that the basic tenant of competition--free entry into the market--is missing. Both medical-care providers and hospital-care providers restrict entry and discourage use of less-costly substitutes to care. Government, at both the federal and state levels, cooperated with providers to regulate this industry and to restrict access of competitors (Marmor and Browning and Browning).

Politics and Price

Prior to 1930, the percent of the Gross National Product (GNP) spent on health care was 3.5%, during the eighties it moved to over 11% (Sloan and Bentkover). Medical professionals (originally as the American Medical Association and more recently its state chapters) traditionally acted as chief advisor to the Congress and state legislatures on matters of health. Strong coalitions existed between executive and legislative branches and the medical and health professional associations. Recognizing these long-standing interrelationships in health policy assumes the

development of further frameworks specific to the problem of implementing services to reduce infant mortality.

Physicians. Social theory is devoid of specific theories for the selection of a medical occupation. Changes in specialty practice, changes in the case mix, and earlier retirement occur at an increasingly early age.[30] Internal forces in medicine are poorly explored in relation to the problem of obstetric access to care. State legislatures and administrative agencies are told by medical groups that obstetric care is in crisis because of the increased costs to practice, but other factors affecting medical practice are left unexplored. It is beyond the bounds of this dissertation to explore theories for medical specialty choice, limitations to practice, or motivating incentives. Rather, the dissertation accepts the dominant paradigm and moves to test its application to childbearing.

Early social theory based occupational choice on desired lifetime income (Reinhart). Since the 1970s, a utility-maximizing theoretical approach gained prominence in medicine. Preferences related to income, location, leisure, and borrowing developed (Ernst and Yett, 1985). Hay (1980, 1981) clearly demonstrated by econometrics that specialty choice was income-motivated and that physicians have pecuniary motives. The market perspective assumes that providers supply units of service for a specified price, and more amenities are offered at higher prices. Consumers demand units of service at a price and fewer units are demanded when the price is high (Rapaport, Robertson, and Stuart).

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[30]The last decade shows a slight decrease in the number of new physicians choosing obstetrics and, more importantly, a decreasing age among those actively practicing obstetrics in the United States (ACOG, 1985 and 1987; AMA 1988).

Recession or inflation can decrease demand, which then decreases price in the market perspective. This argument can be used to acknowledge that no Medicaid reimbursement increases occurred during the 1980-1982 recession, and the same reimbursement levels continued while the caseload was above average in 1983. As the caseload on welfare dropped and the economy improved, providers cried for increased reimbursement. Exacerbating the lack of fee increases over four years,[31] large increases in practice costs appeared in the form of liability premiums, especially for obstetrics, beginning in 1983. Keynsian economics show that supply determines utilization. Michigan had an ample physician supply during the 1980s.

Supply Side Variables. Physician production is primarily controlled by the leadership peer group (professional associations) which direct training, educational experiences, and elements of licensure. Thus, the traditional free market system does not affect the overall supply. Another form of production control is the specific lifestyle of the physician--hours of work per week, arrangement of practice, selection of appointment hours, patients, etc. Local standards of practice, use of consultants, and referral pressures influence the service mix. Time limits how many services the physician can produce. Other constraints come from demand. With ample demand for services the physician can raise charges, increase appointment waiting time, expand practice size with extra help, or reduce the average amount of time spent per patient. Other supply factors include hospitals and other non-physician resources. (Government expenditures to hospitals increased more than physician expenditures despite DRG implementation.)

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[31]See Appendix D after McCardel, 1991.

The federal and Michigan governments have limited involvement in setting minimum standards of care for medicine beyond determining basic credentials and facility equipment for specified levels of care. Since 1981, DHHS moved into monitoring the necessity and quality of care of the Medicare client by creating a state-level review system with physicians. The state did not adopt such a plan for the Medicaid-only beneficiary. Michigan public policymakers stay out of the physician practice domain as much as possible. Therefore, a state initiative changing the amenities provided by physicians, minimum quality and content of care, or authorizations for other practitioners to receive equal payment for equal services are not within the frontiers approved by the administration of Michigan state government. Besides an appeal for social justice and a better statement of fact, price is the most amenable factor open to state-government policymakers to influence supply.

Health services may be produced by a variety of providers, lead by the physician. Michigan frequently reaffirms the superior role of the physician provider and only a few policies ever tried to alter this tradition; they did not survive through the 1980s.[32] As Michigan proposed ways to increase access to pregnancy services, it

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[32]The most significant public health and Medicaid policy which by-passed physician initial involvement was the Michigan Early Periodic Screening, Diagnosis and Treatment program (EPSDT, 1973). Federal law required all Medicaid-eligible children be screened through scheduled prevention testing. In Michigan, local social service workers arranged screening with subcontracting local health departments. The state health department established screening policies and conducted training for nurse screeners and new technicians on the scope of areas tested. Children with abnormal test findings were then referred to local physicians or other care providers for diagnosis and treatment as indicated. This system worked for a number of years, but by the 1982-1983 period physicians wanted the system changed. EPSDT moved from non-physician screening in public agency locations to primarily physician office-based screening (competitive) over the last three years of the decade. EPSDT was the only state administrative plan to implement a federal law via an alternative system to the pivotal role of the physician which survived past a pilot phase.

logically moved to stimulate production in the physician community via increased fee reimbursement. Two competing forms of financial-gain theory are proposed for the U.S. physician, either profit maximizing or target income. These two theories offer different explanations of the driving force for the physician's income.[33]

The profit theory is the traditional economic theory of the firm--there is an ideal size of operation and the entrepreneur expands to this point (maximized efficiency) and then maintains it. Market forces balance and satisfied customers desire to return, prices for services increase to keep making a profit, and the number of clients remain the same. This approach allows the provider to select a case mix which meets his desired professional goals and values. The target-income theory, on the other hand, posits that the physician has a desired annual income which drives his practice. As the income rises to meet a predetermined level, the provider reaches the point where he can trade off more leisure for more income. In both strategies, if the provider fails to charge what the market will bear, he will lose income and also allow excessive demand for visits.

Under the target-income approach, the physician is motivated to achieve a predetermined income rather than to maximize profit. As his annual income rises, it reaches a point where he trades potential income for leisure time. Once his target is reached, he will substitute higher rates of pay for more work, thus stabilizing his caseload; or, in the case of obstetrics and gynecology, the physician may change his case mix and specialize only in gynecology. Currently this theory does not describe how physicians choose their target income. To reach a target income, three variables

[33]Feldstein introduced the target income theory in 1970 and several researchers explored income during the seventies. See Reinhart (1975), Sloan and Bentkover (1979), Rapaport et al. (1982), and Ernst and Yett (1985).

are balanced: average price per visit, average cost per visit, and the number of visits produced. The physician should charge what the market will bear, so rising demand is a clear signal to raise prices. Price is one way to ration supply (professional services). Price discrimination occurs less now than the years before government care, but all provider surveys document limitation of Medicaid caseload and other low-income participants. Factors such as the lower rate of pay for services, increased liability fears, less client compliance, and other negative client reasons serve as justification for not addressing the needs for care according to Rapaport et al. (1982).

Local Issues. According to Ernst and Yett (1985), there is a paucity of models to explain physician practice location choice. The 1963 model of Rimlinger and Steele showed net income of the market area as the key factor. Subsequently, others have posed that psychological benefits equilibrate the supply in a location. For instance, the quality of the area school system, the housing available, the demographic characteristics of the population, and the ready access to leisure-time activities are important factors in deciding where to practice. Although the mechanism behind provider location choice is unclear, the physician-population ratio serves as an access measure to physician services relative to the general population. This measure is not easily or reliably quantified, as the physician may utilize his home, one or more office addresses, or a billing address in applying for a license, reimbursement authorization, specialty board, or society membership.

Physician supply was assumed to be stable over the period of this study since to do otherwise limits the feasibility of proceeding. Data from the Department of Licensing and Regulation supports this assumption and shows that the supply of physicians in Michigan with a regular license to practice in Michigan changed less than six-tenths of a percent between 1985 and 1986, and data from the Office of

Health and Medical Affairs concurs. It is difficult to estimate the actual number of citizens who cross state lines regularly for medical care, or the number of out-of-state physicians who actually practice in Michigan. The dissertation accounted for the primary provider location registered with Medicaid in the supply portion of the study and the county of residence of the women listed on the birth certificate for the health outcome component. Exploration of metropolitan, urban, and rural residence occurred.

Physician Participation in Medicaid

Access to care for pregnancy and delivery is a perceived problem nationwide. Historically, obstetrician-gynecologist specialty participation in Medicaid is low as demonstrated by Mitchell (1983). Mitchell and Schurman (1984) found that the national physician survey for 1977-1978, North Central United States area, showed that 30.8% of obstetrician-gynecologists saw no Medicaid patients. The average Medicaid participation rate of these specialists was 9.6% of caseload.

Most early work on provider participation in Medicaid rests on the two-market theory of Sloan, Cromwell, and Mitchell (1978) which states physicians can sell their services in either the public or the private market. In the traditional private market, the physician sets prices; in the public market she takes prices, accepting the government fee or capitation rate as payment in full (Brown, 1987).[34] Medicaid participation is a function of the demand for services, the costs of providing services, and the supply of providers serving each market. Professional discretion, reimbursement, and payment turn-around are stated factors of importance.

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[34]In Michigan, MSA establishes maximum fee screens periodically based on inflationary increases authorized by the legislature. HMO or other managed care plans set a per client annual fee (capitation) by contract. Medicaid clients can not pay additional out-of-pocket fees for medical care.

Obstetricians or other providers of services to childbearing women are rarely investigated; only the National Opinion Research Center (NORC) national physician survey used by Sloan, Cromwell, and Mitchell, and more recently Mitchell (1990) and internal surveys conducted by medical specialty groups or states offer specific data. The NORC surveys base in telephone interviews with physicians versus verified practices, whereas the American College of Obstetricians and Gynecologists (ACOG) and the Michigan State Medical Society (MSMS) surveys are mail questionnaires. Factors associated with limited or no Medicaid participation identified by physician surveys include lower reimbursement, limitations on covered services, administrative hassles, and client practices; these are thus commonly perceived obstacles to Medicaid participation. Clinics and out-patient services substitute for office-based care in Medicaid. Remuneration was the primary factor for policy change in the eighties. Literature on remuneration effects was limited for the childbearing age population.

Work by Perloff et al. (1986) support the idea that the physician-to-population ratio is inversely associated with Medicaid participation; this goes against the two-market theory. Other work supports the presence of additional factors.[35] The work of Perloff et al. with pediatricians (1987) also found that fees helped full Medicaid providers[36] but not limited participants, and shorter delays in payment improved limited participation only. Targeted reimbursement postulates to be more advantageous to full-participant providers. Other insurer practices also impact the desirability of Medicaid clients. The longitudinal work of Perloff et al. found that as

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[35]The most appropriate include Perloff, Kletke, and Neckerman (1987), Held and Holahan (1985), and Long, Settle, and Stuart (1986).

[36]Medicaid providers are of two primary types--full providers, who accept all Medicaid clients who request services, and limited providers, practitioners who accept some Medicaid clients but limit the number of them in their practice.

policy changes were put in place, and the supply of physicians increased, the effect of policy factors decreased, but with greater supply, there was diminished participation in Medicaid in the 1983 in the panel study. In metropolitan areas, office-based physicians have fewer clients. Fosset et al. (1989), also postulates changes to the existing two-market strategy advanced by Sloan et al. (1978). Prior work did not consider the true costs of expanding Medicaid caseloads. Based on efficiencies of scale and residence, urban area physicians are either likely to take very few Medicaid or very many, but not the middle of the road. The study by Fosset et al., using Illinois data, indicated major limitations for policies to alter Medicaid participation among urban office-based providers via increased fees.

Miller (1988) found that physicians, outpatient settings, and clinics substitute for each other. Major client eligibility policies also impact utilization, specifically the size of the medically needy category. Michigan offered the same benefits to all categories of eligibles (prior to 1987); equal benefits associate with larger numbers of physician providers. With restricted access, the poor must use more institutional care; in Michigan this is primarily limited to larger counties and metropolitan areas.

States vary considerably by supply- and demand-effects. Miller supports the agency-relationship hypothesis on the role of price and access; namely, as professional fees increase, providers are less likely to accept Medicaid. Medicaid clients are not attractive substitutes to privately insured patients with co-pays. Miller's work shows no significant effect of the reimbursement fees to physicians, but still shows that physician utilization is sensitive to price. Cohen (1989) found a negative relationship between the level of Medicaid fees and private reimbursement and the magnitude of outpatient services; states with low fees rely more on outpatient care. This study found the number of enrollees obtaining physician services rather inelastic; changes in

the Medicaid to Medicare fee ratio lead to a change in recipients only one-fourth as large. More importantly, the supply of doctors is negatively associated with per recipient physician costs (elasticity at -1.05), suggesting that as physician supply increases, the same level of service can be obtained without increased fees. Another conclusion argues that "most effective way to increase access is by broadening eligibility"--Illinois clients used physicians in private offices first and moved to outpatient settings only when there was limited access.[37]

The work of Hadley (1979) and Lee and Hadley (1981)[38] are exceptions to most studies of reimbursement incentive preference conducted primarily by physician survey. These California studies primarily examined participation and caseloads based on paid claims, whereas Kletke et al. (1985) compared 710 pediatricians' participation in Medicaid via interview (NORC 1979-1980) and sampled their visit notes. This study found that these pediatricians overestimated actual participation by 40% when comparing participation and survey response; they did not validate non-participation. Long, Settle, and Stuart (1986) used patient-level data to check reimbursement effects on physician utilization and selection of setting. This research did not find a relationship between reimbursement to physicians and the proportion of users, or the amount of services received, but type of care setting (emergency room, outpatient clinic, and other clinics) was different. Kletke et al. caution against using physician self-report data for participation rate policy changes or average caseloads where the payer is government because surveys do not reflect practice.

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[37]Michigan data for women supports these findings.

[38]They sampled California general practitioners, internists, and general surgeons for Medicaid participation in non-elderly, and Medicaid and Medicare providers, respectively.

These three data bases are the most appropriate comparisons to this Michigan investigation from the general literature published using claims data. Even here, estimates of the effect of an increase in provider reimbursement predicted from OLS regressions are not demonstrated empirically. Since reimbursement of continual increases to physicians beyond cost, or average inflation rate, received government support, it is important to study the effects of large remuneration changes in the Michigan program.

Summary

The content of prenatal care is not specifically controlled and the effects of care are open to question. Optimal components for the prenatal service have not been empirically identified yet the system resists modification.

Obstetricians or other providers of services to childbearing women are not specifically investigated in the literature on paid claims or survey validation work of provider participation in Medicaid. Survey work portrays difficulties in finding medical providers for Medicaid clients yet research in other areas of medical practice suggest that physician behavior does not concur with opinion-survey research in this area. When the Michigan remuneration policies were originally put into place only physician survey literature and Medicare studies were available. Literature based on paid claims support that clinics and out-patient services substitute for office-based care in Medicaid. The state-based research literature of the latter eighties does not support an expectation that increased fees correspond to increased physician supply for Medicaid clients.

CHAPTER 3

Research Questions, Hypotheses, and Measurement

Introduction

This dissertation tests eight hypotheses related to medically-managed prenatal care. The major conjecture is that the general theory underpinning the use of prenatal care (to eradicate infant mortality) is false and that medical intervention in pregnancy works only when specific disease or conditions exist, other than pregnancy, to treat. The act of seeking physician confirmation of the pregnancy and undergoing health screening tests to assess normality of the pregnancy is in order to protect the outcome, but conclusive benefit is not present on the value of a full schedule of prenatal care, absent any health risks or diseases.

American literature of the early- to mid-1980s promoted prenatal care services as the answer to reducing low birthweight, premature delivery, and thus preventable infant death,[39] with few researchers questioning the value of prenatal care in preventing infant loss.[40] In the United States, physicians and hospitals directed the process and no attention was placed on enhancing the social milieu of women during pregnancy and early motherhood. During the 1960s, federal and state governments began to address health-care access and utilization gaps for blacks and other low-income individuals. Nutrition, homemaker skills, psychosocial, and other non-medical needs of low-income women began to be addressed by allied health professionals in

[39]The literature supporting the value of prenatal care is extensive: the major references used by government during this period were the Institute of Medicine (1973 and 1985) and Miller, et al. (1986).

[40]The major references are Harris (1982) and OTA (1988).

selected public health-care settings.[41] Although federal efforts expanded the concept of medically-based prenatal care as being essential for pregnancy, not all women received it, and some chose to limit or avoid its use. Financial and cultural barriers to prenatal care were recognized. Medicaid and organized public health efforts made considerable progress in removing financial barriers to care. Michigan Medicaid paid for prenatal and delivery care for about one-fourth of the state's live-birth deliveries in 1983 and public health paid for 1.6%.[42] Despite broad access and utilization of prenatal care, nutrition services, prenatal education services, and other targeted programs for low-income pregnant women, the state's infant mortality rate remained high.

Assessment of fetal and hebdomadal deaths (known as the perinatal death rate) best reflect the status of the maternal and fetal environment and interventions prior to pregnancy, during pregnancy, or soon after birth. Other interventions for infants, including neonatal intensive care (NNIC), are more influential on delaying death past the first week of life. Low-income women experience greater incidence of problems during pregnancy, delivery, and the puerperium (first six weeks after

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[41]The Department of Health, Education, and Welfare began Maternity and Infant Care projects under Title V of the Social Security Act with grants to 55 areas. The Detroit site began in 1965. Since infant mortality continued to be elevated in Michigan, state funds were used in fiscal year 1973 to expand this multidisciplinary team approach to five other urban counties with higher than average infant deaths. These projects (Berrien, Ingham, Kent, Muskegon, and Saginaw) incorporated into the Prenatal, Postnatal Care (PPC) program during the early 1980s. Other hospital clinics also offered broader components to prenatal care with supervised residents conducting the physical monitoring. Most private group practices in the state offer some education on health behaviors for pregnancy, refer to childbirth preparation classes, and utilize nurses for patient monitoring and education at every other prenatal visit.

[42]Howell et al. (1988).

delivery), than the general population and their offspring are more likely to be born premature with low birthweight and thus at higher risk for death.

Does medical intervention throughout pregnancy influence this process? Recently medical experts[43] acknowledged that medical care during pregnancy had little impact on the incidence of prematurity and low birthweight over the last 50 years. The difference in pregnancy outcome owes to whether women access health care by the last trimester or deliver without any care.[44] The birthweight distribution among minorities in both the U.S. (NCHS, 1990) and Michigan (Michigan Department of Public Health [MDPH], 1990) is not improving even though access and utilization of prenatal care improved. For instance, in Michigan the number of very low birth weight (<1,500 grams) infants was 1.2% of live births in 1980 but increased to 1.5% in 1989.[45] Once a small neonate[46] delivers he has a greater chance of survival past the neonatal period with specialized care, but may still die during his first year of life despite intensive medical intervention. Vital statistics indicate that small babies continue to be born regardless of increased efforts in prenatal care access and alternative mechanisms of support for pregnant women.[47] Counter to empirical data, organized medicine, health advocates, and policymakers continue to promote

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[43]Johar et al. (1988), Binkin et al. (1985), Hogue and Yip (1989), and Tucker (1991) present research showing a lack of progress in precursors to infant death.

[44]The utilization of prenatal care was recently reported by Tyson et al. (1990) using ethnic groups in Texas.

[45]Of greater concern than the overall increase is the increasing prevalence of black infants born with very low birthweight–3.8% of all Michigan black live births in 1989 compared to 2.6% for minorities in 1980.

[46]A neonate is a live-born infant in the first 27 days of life. This unit used to be a key marker for survival potential, but with the enhancement of the neonatal intensive care nursery, very small (<1,500 grams) and sick infants can be kept alive to this point, only to die later in infancy or early childhood.

[47]Special tabulations (see Appendix A) for infant, neonatal, and postneonatal deaths in Michigan over the 1980s show different racial outcomes for neonatal mortality, postneonatal mortality, and total infant deaths.

expanded coverage for prenatal care without noting any reductions in low birth weight, premature delivery, and hebdomadal deaths expected from adequate care. Michigan Medicaid policy staff were anxious to determine the benefits of their prenatal care services[48] and supported data collection which enabled this study to address a chosen public policy solution for a major state health problem.

This dissertation uses Michigan's Medicaid clients (over 63,400 live-born infants) to assess the impact of state policies on providers and childbearing women. Underlying Michigan's childbearing services is a belief that appropriate medical care is needed for a healthy mother and infant, and this conviction moved Michigan policymakers to declare comprehensive prenatal care a basic right of citizenship in Michigan. The value of the prenatal care policy is its ability to reduce morbidity and mortality.[49]

All Michigan Medicaid prenatal, delivery, and postpartum professional services, reimbursed to physicians, clinics, and other major provider categories, for clients whose pregnancies resulted in a hospitalization for a childbirth-related service or a newborn-infant hospitalization between February 1, 1985, and December 31, 1986,

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[48]Medical care as defined under the Title V programs included broad services by physicians and allied health personnel. Michigan embraced this definition and when the state legislature declared comprehensive prenatal care as a basic health service in 1986. The Michigan definition of comprehensive prenatal care published by the MDPH in March, 1986 (no. H-980) states "comprehensive prenatal care includes outreach and referral to prenatal care, medical care, nutrition assessment, psychosocial assessment, routine laboratory procedures, patient education, prenatal vitamins, and referral for high risk prenatal services."

[49]Morbidity refers to illness; significant preventable conditions and illnesses have huge inpatient costs and non-economic losses to families. Prematurity and low birthweight are associated with increased morbidity and mortality in all studies in which they are investigated. Congenital malformations, most of which are not viewed as preventable, are the third most important independent factor associated with morbidity, mortality, and infant costs. Preventable deaths (mortality) cause unnecessary resource loss.

encompass this study population. This dissertation uses the number of physicians and clinics reimbursed by Medicaid for maternity services in order to address the provider issue; women enrolled in Medicaid during pregnancy form the population investigated to determine the client outcome. Paid claims are the source of participation, utilization, diagnosis, and expenditure data, and linked- birth and infant death certificates provide health outcome data.

Research Questions

The study investigates the policy implementation strategy of prenatal health-care services in the context of total health care[50] to answer the question of how program reimbursement policy changes effect targeted provider supply and client services. The major program evaluation questions address the effectiveness of the policies for providers and clients and investigate implementation:

(1) **Do targeted reimbursement increases for prenatal care and delivery professional services improve provider participation and the level of care rendered in Medicaid?**

(2) **Do targeted reimbursement increases (the percent increase in amount paid) for prenatal medical care services effect the Medicaid clients' access to care, utilization of health services, and health outcome experienced?**

These questions focus on the short-range impact of a policy on the number of professional providers and the pregnant woman and her infant. They confront the effect of the prenatal care service and the remuneration policies for providers as mechanisms to facilitate prenatal care and improve infant health.

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[50]Michigan's Medicaid program covers all necessary health care during pregnancy and after birth; postpartum care for both mother and baby covers up to 60 days, or through one year after delivery based on categorical eligibility. Health services with paid claims form the basis of the Medicaid data.

Reimbursement Incentives

Policymakers perceived that monetary incentives resulted in increased access to physicians by reducing the gap in income generated from serving those on Medicaid versus those privately insured.[51] Furthermore they believed that low-income women increase their use of health services to that of the general population given the same opportunities.

The Michigan Medicaid program undertook two types of financial incentives. The first recognized the greater amount of time required to treat women at higher medical risk. In the early 1980s, Michigan physicians began to petition Medicaid to improve the reimbursement rates for obstetrical services; they felt that these clients were of higher risk than their usual caseload. Medicaid responded by creating a differential reimbursement by the level of medical risk of a client, assuming that clients at high risk would require more intensive services and time from the provider. This level of care policy for prenatal procedures originally increased the fee differential by 65 percent for the maximum level of provider reimbursement when the client classification of high medical risk appeared versus those at normal risk.[52] The test of this policy implementation considers the appropriate classification of the client's level of medical need, versus the level of care the provider billed and accepted. This policy activated in the fall of 1983, so this evaluation discusses the impact from months 17 through 39. The second reimbursement approach was a

[51]McCandless interview (1986).

[52]The initial level of care differential was nine times the rate of medical-care services inflation; other insurance carriers do not provide a differential for risk level.

targeted,[53] across-the-board increase of **47 percent** for professional prenatal care services and a **13 percent** increase for professional delivery service fee screens beginning in January 1986. The second evaluation examines the change in provider participation from the previous 11 months of service baseline (February-December 1985) and the first 12 months of implementation (January-December 1986).

The Effectiveness of the Incentives

In order to evaluate the effectiveness of reimbursement policy changes it is necessary to determine whether the program policy goals and objectives are met.[54] Second, it must then be determined whether the policy changes achieved their desired outcomes. The immediate state goal in this area is early enrollment of women in prenatal care. In the Medicaid program this translates to enabling women to receive care by providing a sufficient physician pool to provide services at the appropriate level of medical intensity. The dissertation will compare the 1985 and 1986 Medicaid cohorts to determine the degree of achievement for these process objectives. Achievement of the intermediate program goal (healthy newborn) manifests as infants born weighing at least 2500 grams (5 pounds 8 ounces), delivering on time (after 36

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[53]Medicaid targeted only prenatal care and professional delivery procedures for a significant incentive increase in maximum fees for 1986; other services did not increase above the medical Consumer Price Index (CPI under 7% for physician services). All categories of providers of the professional services for these procedures received the increase in fee screens.

[54]During the 1980s, Michigan emphasized its commitment to improve pregnancy outcomes and to reduce infant mortality. The Michigan Infant Health Initiative served as a state planning document and policy budgetary tool for program expansion. Inter-department staff work began in this area early in 1983, so several policy changes were already in place before the document was released by MDPH in 1986.

weeks gestation), and being alive at birth.[55] An underlying assumption for these positive outcomes is that all women receive medically-directed prenatal care appropriate to health needs.

Prenatal Care Effectiveness

The ultimate goal of Michigan's public policy initiative is a healthy infant population with no occurrences of preventable infant mortality. Medicaid's objectives are to achieve provider access for those served and to pay for care which reduces morbidity and mortality--for infant mortality the level of the 1990 Surgeon General's Goals.[56] This dissertation looks at antecedents to morbidity but does not investigate illness during infancy, as the focus here is prenatal care. The design addresses key health-status outcomes of pregnancy between the Medicaid cohorts, and lays the groundwork for future comparisons between the Medicaid cohorts and the non-Medicaid state births, on the one hand, and Medicaid women with incomes below

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[55]The World Health Organization and more recently the International Classification of Diseases, 10th revision, Clinical Modification (ICDM-10), classify a term pregnancy as a gestation with at least 36 completed weeks but less than 42 weeks gestation. The ACOG and the MDPH define term pregnancies as those which achieve 37 completed weeks of gestation but not more than 42 completed weeks. This preterm discrepancy affects 5% of live Medicaid births.

Birthweight should be appropriate for gestational age because intrauterine growth retardation is associated with increased morbidity. Michigan has not made weight-for-gestational age data available for public use, so this dissertation applies a simplified assessment of appropriate weight-for-age as achieving a birthweight of 2,500 grams or more if delivery is near term.

The desired evaluation of perinatal health is the perinatal mortality rate. Michigan does not have a complete fetal-death registry, so perinatal mortality is undercounted. This dissertation studies the hebdomadal death rate as the most appropriate measure of outcome available for the state.

[56]The Department of Health and Human Services (DHHS) released national goals for the health status of all Americans in 1979. Several goals are set for infant health including rates of infant mortality and low birthweight by racial group. The levels set for 1990 were as follows: Infant mortality less than 9/1000 live births and a minority mortality rate less than 12/1000 live births, with low birthweight at less than 5% of live births.

poverty and those added above the poverty level through the Medicaid expansions implemented in 1988, on the other.

Access to Care Measures

Access to care is an enabling objective of the goal for optimal health. The availability of physician providers specifically related to the pregnant women's enrollment into prenatal care determines prenatal care access. The number of physicians or clinical settings reimbursed for maternity services reflects the Medicaid maternity care supply. Supply depends on the processing of a claim. Some pregnant clients receive other forms of fee-for-service medical care through Medicaid, but not their prenatal care; this newly recognized category of client represents a dilemma for the program evaluator. The prenatal study investigated the providers of all cohort women for both years of paid claims to determine unduplicated participation. Alternate sources of prenatal care are discussed.

The second form of access is the ability to receive early appointments for care. This access measure operates as entry time into prenatal care, reported by month on the birth certificate, aggregated by trimester for analysis. Client-linked birth certificate data determine entry into prenatal care and whether there is a change in early entrance (first-trimester enrollment) into care when providers are reimbursed at a higher level. Both the provider and the client control entry time since the client must seek a medical appointment and the provider must schedule it.[57] Entry into prenatal care is difficult to describe through the Michigan paid claims process, so the birth file

[57]The average appointment wait time from phone call to first visit is two weeks in Michigan. There is no difference in mean or median wait time between the Medicaid client or the privately insured client according to a recent survey done by the MDPH and University Associates (in process of release, 1991).

determines if Medicaid clients achieve the national standard for first-trimester entry into the prenatal care system.

Client Utilization and Outcome Measures

The use of health care services by low-income clients is often reported to be below that of the general population, and the number of services used by blacks less than those of whites, implying that low use of medical care is the reason for ill-health and poor pregnancy outcomes.[58] The client's number of prenatal visits and the total number of health services reimbursed during the pregnancy serve as the measures of utilization for this study. Paid claims act as one source of use, but the count of prenatal care visits must come from birth certificates for the majority of women. The period of pregnancy for each woman uses data from the birth certificate gestational age at birth and the paid claims date of service to calculate the pregnancy period dates. Services received under Medicaid classify as either medical (clinical ambulatory and inpatient) or non-medical care.[59] A preliminary cost effectiveness analysis (CEA)[60] assesses differences in expenditures with occurrences of newborn death in the different years, controlling for access, utilization, and level of care received. Unnecessary loss of life cannot be adequately addressed by cost savings or expenditures, but differences in death rates for similar populations offer a preliminary measure of program benefit or policy change. Pregnancy outcome describes what

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[58]See Aday (1976) and Berki and Parsons (1988).

[59]Each adjusted paid claim form represents up to six procedures and makes a service count. The number of prenatal visits used is supplied by the birth certificate because the paid claims data is incomplete in this area since the majority of prenatal care is billed as a package of care and no visit count is available.

[60]US Congress, Office of Technology Assessment (OTA) Case Study 10 (1981) and Case Study 38 (1987).

happens to the client's pregnancy. Health outcome data of the infant come from linked vital records.

Health Outcome Effects

Apart from the delivery of a live birth, health outcome is measured in three ways: birthweight (2500 grams or more is desired), maturity at delivery (birth desirable at 37 gestational weeks or later), and alive status through the early infancy period. These key outcomes are the basic health effects desired from prenatal care. Many factors[61] influence health outcome measures and the paid claims for women enrolled in Medicaid during pregnancy determined effects of Cesarian-section delivery, poverty program level, age, medical risk, race, illnesses, educational level, plurality, and residence.[62]

Hypotheses

Balanced supply and demand for prenatal care of the general population operated during the period of the dissertation. The state's three major thrusts for infant mortality prevention are: (1) family planning, induced abortion, genetic counselling; (2) adequate nutrition with supplemental food and nutrition education access; and (3) financially available prenatal care. The evaluation and testing of the Medicaid pregnant woman's access and use of prenatal care addresses the health theory underpinning the efficacy of early and continuing prenatal care. The prediction for the impact of remuneration increases on providers and clients rests as null hypotheses. These hypotheses root in the early work of Eastman (1947), the U.S. Collaborative Perinatal Study, edited by Niswander and Gordon (1972), findings shared by the International Collaborative Effort on Perinatal and Infant Mortality

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[61]Institute of Medicine (1985).

[62]Fetal deaths are not available for file linkage in Michigan.

(ICE), National Center Health Statistics (1985, 1988),[63] and findings by social class in the United Kingdom and Scandinavia. These works indicate that pregnancy outcome is related more to socioeconomic factors than to utilization of the medical care system.

Hypotheses Related to Research Question #1[64]

1. Provision of an appropriate level of prenatal care through monetary reimbursement does not significantly differ between 1985 and 1986.[65]
2. Targeted increases in reimbursement for professional maternity care services, and specifically prenatal care, do not improve the supply of medical providers who serve Medicaid women.

Hypotheses Related to Research Question #2[66]

3. Targeted increases in reimbursement for maternity services by ambulatory medical providers do not improve access[67] of women to prenatal care.
4. Targeted increases in provider reimbursement do not change the use of the reimbursed services by women.[68]

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[63]More recent findings of the ICE group have not been published but were presented at the annual meeting of the American Public Health Association in 1989 and 1990, except as found in Kohler (1991).

[64]Refer to page 43 for **Question (1)**. Reimbursed providers of the selected procedures are studied in entirety and as a subgroup of clinical providers and then as physicians using the adjusted paid claims.

[65]Appropriate level of care is defined as the provision of high-risk care to women found to be medically high risk in pregnancy and low-risk care is rendered to women found to lack any criteria making them medically high risk (Medicaid policy).

[66]Refer to page 43 for **Question (2)**. Medicaid clients enrolled during pregnancy with one delivery event live birth during the study period are studied.

[67]Access for clients is measured by 1) the mean and median entry time into prenatal care and 2) proportion of women with first-trimester entry. Validation of no known prenatal care is investigated between the paid claims and the birth certificate.

The arithmetic mean represents the average of all values and the median is the center point of the population where half of the cases fall above and half fall below. Concurrence of the median and mean reflect a small dispersion of average values.

[68]Use is measured by the mean number of prenatal care visits recorded for each woman and the proportion of women who achieved six or more prenatal visits. The total number of visits relates to the length of gestation of the pregnancy.

5. Medically high-risk women[69] do not show reduced neonatal death occurrences when they receive high-risk care during pregnancy in comparison to high-risk peers who use only normal-risk care.
6. The health outcome of pregnancies does not change with targeted provider reimbursement.[70]
7. Actual aggregated paid claims for pregnancy, labor, delivery, and postpartum care will not show a cost-effectiveness ratio[71] favoring enhancements.
8. The prevalence of neonatal death does not change with different amounts of prenatal care.

Design

This study is a cohort design with partitioning as described by Cook and Campbell. Use of the Medicaid caseload in 1985-1986 selects individuals of similar income status and medical need; partitioning to control for the timing of pregnancy enrollment in Medicaid further reduces differences between the groups. Figure 3.1 illustrates the study of the policy intervention process from the prenatal component of Medicaid to the research design. Medical-risk assignment also factors increased medical need (beyond low-income status) into comparisons. The contiguous cohort data sets minimizes other threats to validity related to program eligibility, changes in

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[69] Medical high risk as used here refers to Medicaid established medical risk eligibility for the preferential rate reimbursement; the diagnoses must be part of the paid claims history of the woman during the period (primary or secondary diagnosis) or age related to be identified on the computerized system. Women with fee-for-service (FFS) prenatal care through Medicaid paid claims are evaluated.

[70] Health outcomes measure the occurrences of premature delivery, low weight at birth, and hebdomadal death.

[71] Expenditures available reflect only those covered by Medicaid even though an estimated 4% of women have other insurance for some part of their care. Neonatal deaths averted is used as the effectiveness measure. This analysis is limited to pregnancies which resulted in a live birth, had Medicaid payment, and have a known infant status at one year of age.

medical practice or coverage, and client characteristics (such as race, age, residence, and length on Medicaid). The Medicaid cohort of 1985 serves as the comparison-control group for the changes in remuneration policy issued in 1986. Matched vital records allow the level of risk-fee differential to be evaluated from the standpoint of health outcome. Matched records linked with Medicaid claims allow an assessment of all women with prenatal care to determine program effectiveness for the Medicaid clients.

Population Under Investigation

As with any public policy study of the social environment, control or comparison groups are ethically and/or practically unavailable, hence complete pregnancy experience is difficult to study. Recent research by Boklage (1990) estimates that almost three-fourths of conceptions do not survive to six weeks of gestation. Of those that make it to the early period of pregnancy confirmation, about 10% can survive. Vital records indicate that approximately 35% of confirmed conceptions in U.S. result in abortion (20% induced), miscarriage, or fetal death,[72] so the sampling framework for the study pregnancies was set on a criteria of hospitalization for a childbirth-related problem. This selection framework investigates pregnancies not terminated by mother's choice. Thus, the study uses the entire Medicaid caseload hospitalized for a childbirth problem or event over a 23-month time span. This complete data base evaluates the first research question of

[72]Most women do not recognize the pregnancy if the loss occurs before the 12th week of pregnancy. The Centers for Disease Control, Reproductive Health Division, believe that the best estimate of early pregnancy loss is 10-15% of pregnancies. Elective abortions are not part of this study. Office of the State Registrar and Center for Health Statistics (OSRCHS) estimated pregnancies in Michigan resulted in 20% elective abortions, 15% miscarriages and fetal deaths, and 65% live births in 1985 and 1986.

Figure 3.1
Policy Investigation Flow

Policy Objective

Expand Medicaid-client access to early prenatal care at an appropriate level of intensity for total health needs.

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Policy Intervention

1) Increase provider fee levels by 65% for high-risk prenatal care over the provision of normal-risk prenatal care.

2) Increase preferentially provider fee reimbursements for prenatal care (47%) and delivery professional services (13%).

↓

Research Design

1) Assess supply and demand and their change.
   - 1.1 Determine physician supply to Medicaid.
   - 1.2 Determine prenatal care demand by Medicaid pregnant women cohorts.
   - 1.3 Contrast supply and demand for the baseline cohort with the experimental cohort.

2) Assess pregnancy-enrolled Medicaid client behavior and outcomes.
   - 2.1 Determine Medicaid women's early access and utilization of prenatal care.
   - 2.2 Compare the difference in access and utilization for these two subcohorts.
   - 2.3 Determine the incidence of prematurity, low birthweight, and early infant death.
   - 2.4 Compare the difference in outcomes--prematurity, low birthweight, and death for the two pregnancy-enrolled cohorts.

3) Determine cost effectiveness of policy in early deaths averted.
   - 3.1 Compare Medicaid expenditures for pregnant women and change in early infant death rates.

remuneration benefits to provider supply. A subset of clients from both cohorts investigates the second study question dealing with client access, services utilization, level of care, and outcomes from the pregnancy. The rationale for this split approach is presented in detail in chapter four. The 1985 Medicaid cohort serves as a **baseline**[73] for maternity providers and establishes the status quo of pregnant women hospitalized for delivery or antepartum health problems, and newborn infants whose health care was paid by the Medicaid program in Michigan under the new Diagnosis Related Groups (DRGs) system of hospital reimbursement.[74] The 1986 cases, which meet the same selection criteria, form the **experimental cohort**[75]. Women enrolled in Medicaid during pregnancy, with a resultant linked live birth, form the primary group used to investigate prenatal care and delivery policies and to determine policy impacts on the targeted professional providers and the clients.[76] Evaluating the reimbursement effects (access, utilization, and health outcomes) required information only available in the birth-matched infant death file at the Michigan Department of Public Health (MDPH).[77] The broad-based fiscal intervention (increased maternity

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[73]The DRG system began in Michigan with hospitalizations from February 1, 1985; previous admissions for the year did not convert to the DRG system if the length of stay was short. Since this research uses the Episode of Care File, only 11 months of data were available for 1985. The clients with validated Medicaid enrollment and paid claims formed the Medicaid cohort. The 1985 clients identified by this process provide baseline cases.

[74]DRGs began for Medicare in 1983 (PL 98-21) and adapted for Michigan's Medicaid program in February 1985.

[75]The validated cases with an index childbirth event in 1986 are the experimental cohort. The maternity providers of these clients received a large increase in reimbursement.

[76]The categorization of prenatal medical risk level required additional data beyond paid claims; age was available from either the DSS Client Information System (CIS) or the MDPH birth certificate, but parity (number of previous live births) was only available from the birth certificate file.

[77]The movement from conceptual development to variable operation is described in chapter four. This section and related Appendices also cover the process of data linkage, collation, and caseload editing.

professional services reimbursement) took place on January 1, 1986, and thus the 1986 cohort serves as the reimbursement intervention group for a substantial provider increase targeted to these procedure categories. The 1986 cohort also allows continued monitoring of the preferential-rate incentive for serving higher risk pregnant women. After editing to verify Medicaid eligibility and the presence of paid claims, the women's files separate into cohort years for investigation of the effects of reimbursement changes for maternity procedures[78] and pregnancy outcomes.[79] This process identified some newborn infants[80] covered by Medicaid without an enrolled mother; Table 3.1 describes the major client populations investigated by the study.

Providers

The state is strongly vested in the role of the physician as gate-keeper to the medical care system. Access to physician services is a necessary component of maternity care use in Michigan.[81] The study accepted the most common providers of medical care professional services for the paid claims aggregation. Physicians may be

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[78]Maternity procedures are professional services which include prenatal care, delivery, and postpartum visits. The miscellaneous maternity code was also included to capture all cases.

[79]The birth outcomes (birthweight, gestational age at delivery, and alive status) for women eligible during pregnancy are studied. Other women added to Medicaid at delivery were accepted into the investigation to determine if significant access and utilization differences appeared in those who did not enroll in Medicaid while pregnant.

[80]Infant cases are not part of the dissertation study hypotheses per se, but include any case in which Medicaid newborn enrollment occurred and a birth certificate was identified. Appendix K presents some information from the health records of these infants.

[81]The Michigan practice acts codified in PA 368 of 1978 as amended determine that the physician is responsible for medical management of life-threatening conditions. This umbrella covers pregnancy, labor, and delivery. In the 1985-1986 period, very few physician substitutes (nurse midwives) were authorized to practice under physician supervision in Michigan, although the office-based use of nurse practitioners in prenatal care and family planning was increasing. These physician extenders were not authorized for insurance reimbursement as independent providers at this time.

concurrently enrolled as a Medicaid physician provider (MD or DO), a public or medical clinic provider, and in a hospital setting.[82] The major ambulatory settings were selected as clinical provider sites.

Table 3.1

Medicaid Cohort Population for 1985[a] and 1986

Cohort Group	1985	1986
All Women	29,974	32,778
One Delivery Event	(24,419)	(26,650)
Pregnancy Enrolled	(22,040)	(23,847)
All Infants	30,261	33,033

a The 1985 cohort includes only 11 months due to DRG enrollment.

Administrative leaders, the medical community, and local health policymakers continued urging the state administrative agencies to offer relief in the obstetric crisis and to improve the provider rates in Medicaid. Medical Services Administration (MSA), the state Medicaid agency, issued targeted rate increases for maternity care procedures effective in January 1986 and then again in February and November 1987.[83] The paid claims processing was insufficiently complete at the initiation of this data base development to investigate these subsequent reimbursement increases,

[82]Some clinics are run by hospitals in which physician care is delivered by rotating community physicians with admitting privileges or house staff, others are located in public agencies, and still others are physicians using another site than their office.

[83]See Appendix D on physician fee changes in Michigan's Medicaid program.

so the analysis deals only with the first substantial increase in targeted procedure codes.[84]

Research Tools

The primary data analysis method used here is contingency table analyses, which offers several advantages for both categorical and dichotomous variables. First, the dependent variable can be examined by multiple independent variables without encountering problems of multicollinearity. This parsimonious approach provides a broad description of the pregnant women with some consideration of the multivariate relationships.[85]

Chi-square tests of independence or homogeneity follow after Pearson, Maximum Likelihood, and Mantel-Haenszel methodology. These three methods each test the null hypothesis of no association between the row and column variables. Based on the size of the data set, chi-square distributes appropriately for evaluating the null hypothesis. The Pearson chi-square statistic uses the difference between observed and expected frequencies, and the Likelihood ratio chi-square involves the ratios between observed and expected frequencies to test general associations as the alternative. The Mantel-Haenszel chi-square tests the alternative hypothesis that a linear association exists between the row and the column variable. This test adjusts for confounding within variable relationships since it is based on analysis with only one degree of freedom. The chi-square values obtained for relationships without confounding are the same as produced by the Pearson method. When the table analysis uses a control variable or multiple variables, the Mantel-Haenszel chi-square

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[84]Medicaid Policy Bureau, MSA, did conduct a 1989-1990 study to look at provider participation and this is discussed in Chapter 5.

[85]The next phase of research will use logistic-regression analysis for a more in-depth assessment of the value of prenatal care components.

may differ from other association tests based on greater degrees of freedom in other methods. The more restrictive test is always selected throughout the dissertation findings. Ratios and proportions are assessed by chi-square analyses after Fleiss (1981) to standardize the samples (cohorts). In a few situations the cell size falls below ten and chi-square incorporates the Fisher's Exact Test to increase the likelihood of finding the same results in other populations. Relative Risk, after Bishop, assesses the probability of death or presence of a condition. Gamma estimates prediction of the dependent variable and relative predominance of pairs.

All computerized analyses were done on the Michigan State University IBM 3090 Mainframe using SPSS-X versions 3.1 or 4.1. The level of statistical significance is set at an alpha level of 0.01 for the client-health outcome effect, since this is a large data set, and 0.05 for the provider reimbursement enhancement portion of the study. Most analyses show significance beyond the alpha .0001 level. Whenever client health outcomes approach an alpha level of .05 they are presented for discussion.

The data for this study originated from official state agencies under a formal request to conduct policy research as a confidential medical research project.[86] Data sources and variables used in this project reflect the sole selection of the investigator but original compilation by the researcher needed the assistance of state personnel.[87] The variables are described in the next chapter.

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[86]The state Public Health Code (PA 368 of 1978, as amended) authorizes the director of the department to designate confidential medical research projects under Part 26. This status protects both the researcher and the cooperating agencies from any breeches of confidentiality.

[87]Any omissions or errors in judgment are the responsibility of the researcher. All file editing was done by the researcher based on element standards determined by the investigator without concurrence of the departments. Work on this project was done in a student capacity and was uncompensated by the state.

CHAPTER 4

Methods of Data Collection, Programming, and Editing

Introduction

The most time consuming component of this research was development of the data base. Medicaid, the state's largest public provider of prenatal care, utilizes a significant number of private sector providers and a minimum of public clinics. Although the Medicaid Policy Bureau knew that childbearing women and infants totaled 45% of the hospitalized population and accounted for $172.9 million (over 34%) in hospital payments in 1986, they knew little about the utilization of services at the client level.[88] The policy support staff knew that 125,292 prenatal and delivery claims processed between April 1984 and March 1985 corresponded to $10.6 million in expenditures and 50.2% of charges but the number of corresponding clients was unknown.[89]

National policy makers perceive the financial discrepancy between Medicaid and private third-party payers as the over-riding reason for a lack of provider participation in Medicaid.[90] Current investigation into the access issues requires documented response to reimbursement changes by the payment source and the supply of participating providers. Medicaid serves as a payment source for a significant portion of state births. Will medical care providers accept Medicaid clients,

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[88] MSA, Smith, 1988. The Medical Services Administration (MSA) lost staff in the 1980-1982 recession and had limited resources available to conduct policy research.

[89] MSA, McCandless, 1986.

[90] In OBRA 1989, DHHS instituted rules that require states to document physician participation in obstetrics and pediatric services and to pay physicians the going rate for their care. During this period Medicaid prenatal care rates commanded equal or better reimbursement than traditional private insurance rates but remuneration for delivery lagged far behind.

and if so, at what level of reimbursement? There is no control group for these low-income Michigan women to measure differences in access and utilization of care.

This chapter addresses several key points in developing the policy evaluation data base. Selection of the sampling frame is crucial to study integrity and comparability. Likewise, the choice of data elements plays an important part in an evaluation design. Careful criteria and editing methods can reduce selection bias and other internal threats to validity. The effects under investigation involve pregnant women, their providers, and their newborns.

Pregnancies are the primary health condition required for inclusion into this study because the policies on remuneration deal specifically with childbirth treatment under Medicaid. Earlier chapters contain the general background for the study so this section develops the rationale and methods used to select and create the data base. The section on study populations describes the rationale used for pregnant client selection which establishes the sampling frame. Two research questions require different subpopulations. The client-oriented part of detailed data formation summarizes the batch record linkages within the Department of Social Services (DSS) files and describes the client evaluation and the client linked-provider data processes. The second part of the client record generation details the batch and interactive name linkage between matched Medicaid-welfare mother and infant records and the state's vital records and how this information is used to merge data for policy evaluation. The third section describes the provider supply component. Limitations in paid claims-based administrative files and vital record linkage present in the fourth part; these sections also discuss validity and reliability issues related to specific variables.

Administrative and paid claims files limit studies because they lack data on health status; the linkage with vital records improves data available for policy

analysis. The linkage of Medicaid records with vital records and other DSS files is one means of evaluating state policy and subsequent alterations to existing policies and programs. The data set developed for this dissertation is capable of investigating several policy questions but the dissertation design is specifically evaluating two Medicaid reimbursement policies in the maternity area. Hypotheses focus on both provider and client effects. Client data relied heavily on additional information from the birth and birth-matched death records, whereas, the extrapolated Medicaid Paid Claims History File (PC) linked to the Medicaid Provider Master File (PMF) creates the base to evaluate provider supply changes.

The Michigan Medicaid Services Administration (MSA) was first approached about access to a policy evaluation data set in late 1986. The researcher obtained clearance for the dissertation from the DSS, Office on Policy, in 1987 after receiving project concurrence from the Bureau of Medicaid Policy, MSA. The programming began with the availability of the Episode of Care File (EF) in April 1988. The Michigan Department of Public Health (MDPH) agreed to supply data from vital records and declared the study a confidential medical research project in 1988. Data tapes became fully available from MSA in January 1990.

Bases. The study addresses two policy questions. Provider supply to Medicaid clients is the first area investigated. This component required two data sources: adjusted Medicaid paid claims and the Provider Master File (PMF). Paid claims provide a service site identification number for the provider and a client identification number with details on the claim regarding the service procedure, diagnoses, payment, and dates of service. Providers can have many site identification

numbers (the highest physician frequency was 57). Achieving an unduplicated[91] count of providers requires linkage with the provider's unique identification number from the PMF. This study identifies clients from the childbirth and newborn diagnosis related groups (DRGs) of the Episode of Care File (EF). Maternity client demand and corresponding provider maternity supply are studied in 1985 and 1986. This client-provider base allows for all paid maternity procedures to be accumulated, either by an unduplicated count of women receiving service, or by an unduplicated count of providers of the service. Client identification numbers on paid claims needed to be linked with the welfare Client Information System (CIS) to locate demographic and participation data and to determine the family case number. The case number is the only way to link a women with her infant in Michigan's health and welfare data system. The second question related to clients uses a subcohort of pregnancy-enrolled women with one delivered live birth in the study.

Study Populations

Within the Medicaid file system only two means of identifying all pregnant women exist: 1) procedure codes billed on provider claims for fee-for-service (FFS) care or 2) inpatient diagnosis or Diagnosis Related Group (DRG) codes. In both of these situations Medicaid must have paid for prenatal, maternity, or childbirth

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[91]Unduplication is a time-intensive process through which six to eight digit numbers are sorted and combined while retaining unique characteristics from each claim and provider record. Women's identification numbers are unique and SPSS-X aggregate function in conjunction with a mainframe utility sort program complete this file after COBOL programming combined the specific characteristics selected. Provider identification numbers are not unique representations of provider supply; they require linkage with the DSS-PMF to determine a unique identifier and then undergo a series of mainframe utility sorts and SPSS-X aggregation steps. An unduplicated provider or client is counted only once in the cohort. In contrast, duplicated counts are summarizations from one file type and infer that the client or provider can be counted more than once in the data, depending on the aggregate variable.

services. As described earlier, many pregnancies are never recognized before they are lost and 35% of recognized pregnancies do not produce a live born. Use of all pregnancy procedure codes would identify many women[92] who would loose the pregnancy through elective or spontaneous abortions and miss others who had not initiated care, yet lost the pregnancy. Most pregnancy losses occur by 8 weeks of gestation with most of the induced terminations completed by 16 weeks.[93] Contrary to procedure codes which over-select actual pregnant women seeking prenatal care, hospital admissions limit the clients to those with pregnancies lasting long enough to require medical intervention. Selecting hospital admission files provides dates for an episode-of-care and a birth cohort year analysis. Specifically, the recently available (spring 1988) Hospital Episode of Care File (EF) based on DRGs serves as the sampling frame. In addition to reducing pregnancies to those not electively terminated, actual begin and end dates for the inpatient episodes are available. The status of most cases can be determined. Since the policies evaluated aim to assess the effects of remuneration for prenatal care, only women enrolled in pregnancy should be studied. Few mothers of Medicaid infants gave birth outside the hospital. Michigan Medicaid's use of DRGs began in February 1985; thus, the study began with these childbirth and newborn episodes. Infant newborn admissions identified by DRG allow additions to Medicaid after birth. This sampling frame allows for few false positives.[94] It includes all mothers and infants with confirmed Medicaid

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[92]MSA estimated that the approximate annual induced abortions during this time numbered 18,000 (Reagan, 1990).

[93]Medicaid data indicated that most elective abortions occur in the first eight weeks and state abortion reporting confirms early use with only about 5% of induced abortions after 16 weeks gestation. A paucity of claims noted fetal loss in the diagnosis area of the claims making it difficult to identify late fetal loss.

[94]A false positive case is one in which the selection criteria was incorrectly applied and the client did not have a childbirth or newborn classification.

enrollment and payments of hospitalization for mother, infant or both. Cases of birth when the mother either was not enrolled in Medicaid or had other insurance to cover pregnancy and delivery services prior to a first birth are included if the infant was enrolled as a newborn. Pregnant women enrolled in Medicaid during their accepted pregnancy form the core for evaluating the prenatal and delivery remuneration policies. All women with accepted pregnancies covered either at delivery or in the antepartum and delivery periods are analyzed.

Discussions with key program analysts, computer support, and policy staff laid the foundation necessary to develop the research proposal with an exact plan for acquiring the data elements required to answer the research questions. Based on the lagtime in services billing, claims review for adjustments, and provision of provider payment, the data compiled for 1985 and 1986 paid claims available in the summer of 1988 can evaluate the first two reimbursement policy enhancements for obstetric care in Michigan when augmented with other data. After the proposal was approved the researcher then spent two days per week at MSA reviewing reports, record layouts, and policy manuals to refine the actual data plan. Program testing included record and case verification and documentation. Two separate strategies, one for each research question, evolved.

The major initial effort focused on gathering, collating, and collapsing the client-based data to address access, utilization, and outcome of health services during pregnancy and the immediate postpartum period. The actual volume of data drove some decisions to further condense information for data management and analysis at Michigan State. The client-based data record initiated from the EF but was based on adjusted paid claims records and augmented information from the CIS, and linked birth-infant death matched vital records. All client records used a childbirth

hospitalization year cohort, which gave preference to the year of delivery or birth. The total client files formed four separate subfiles: mother-infant linked pairs for each birth cohort (This file was further subdivided into women with one live birth event in the 23-month period and women with two or more live birth events in the period.), infants added to Medicaid as newborns for each year linked with vital records data, women who did not link to an infant in Medicaid and/or the vital records, and infants who did not link to a mother and/or birth record. All women files served as the search base for prenatal care and other maternity professional services codes to investigate providers. The single live birth event files served to evaluate client effects of the pregnancy policies.

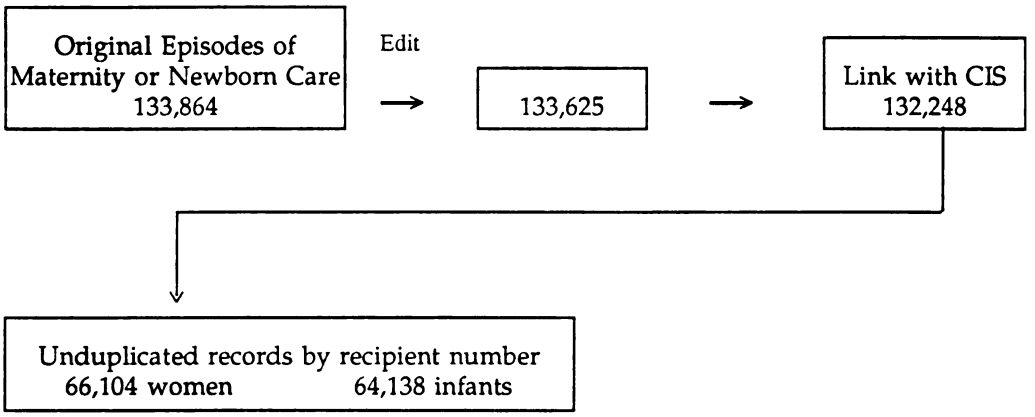
Process. The linkages used for this project within the Department of Social Services are traditional mainframe batch processes from stored data tapes. The crucial files are the Episode of Care File, the Paid Claims History File (as adjusted claims), the Client Information System File, and the Provider Master File; the former two are within the Michigan Medical Services Administration (MSA) and the latter from the DSS, Health and Welfare Data Center.[95] Results of the linkage approaches and discussion of selected features and constraints are described. Figure 4.1 presents a simplified overall flow process used at DSS to generate the core of the base data.

Research Operations

The concepts driving the study questions and hypotheses require looking at program policies separate from their underpinning theories. Program evaluation first determines the potential supply of providers in both the state and Medicaid

[95]Staff from the Office of Support Services were most helpful in discussing options and mechanisms to obtain desired information. Janet Robertson, Senior Programmer, did all the programming for the DSS data access.

Figure 4.1 DSS Record Stream



enrollment files.[96] An excess of providers may appear in the PMF since purging requires a special notification to Medicaid resulting in a slightly inflated denominator of supply. Claims paid may under-represent actual services rendered as incomplete payment of pended claims occurs. In general the provider effect is easier to address than the client effects.

The demand for prenatal care is based on procedures actually reimbursed for maternity services (prenatal care, delivery, miscellaneous maternity, and postpartum

[96]No definitive method exists to determine the full maternity care provider supply for Michigan. The Medicaid supply is generated from the unique provider enrollment files and the provider's paid claims for services. Utilization of medical care is determined by both the provider and the client. The amount of prenatal and other care utilized by the clients reflects the demand of the study population. Potential supply is the number of providers enrolled to accept Medicaid; whereas, the actual providers who cared for clients (as measured by paid claims) reflect the true supply. The potential supply is computed from the PMF and the actual supply is determined from the PC of the study cohort. The qualifications of the providers are determined to investigate a possible effect of specialty (Obstetrics and Maternal-Fetal medicine, Pediatrics and Neonatology, Family Practice, and all other physician specialties with board certification or eligibility self-declared) on the number of clients served.

visits); services which are generic such as outpatient clinic visit were not investigated as a potential prenatal care service. Regular office visits without paid prenatal care occurred to only 11 women over the cohorts. Given a stable supply and no increase in demand, the environment is favorable for an incentive.

The 1985-cohort clients and their providers serve as a baseline comparison group for the 1986 increased reimbursement intervention. The supply and demand was in balance for 1985-1986 but the practice environment may have changed.

Paid claims identify prenatal care procedure codes; these services are reimbursed at a higher rate than the general office visit, so prenatal care reporting is expected in lieu of the usual office or clinic visit procedure code. Either individual visits or a prenatal care package are authorized at the two levels of intensity--high risk and normal level. All claims with a noted diagnosis of pregnancy fall within the study. The provider access changes between 1985 and 1986 are based on adjusted reimbursed claims for the designated professional procedure codes to accurately reflect total state expenditures. (See Appendix E for the coding scheme and differences between the cohorts.) Provider billings identify the patient but the provider must be aggregated to be unique through combining all locations generated from claims for each provider regardless of the site of service. This approach relies on the paid claims to identify the number of service units.

Medicaid enrollment and the entry into prenatal care variable (from linked live birth certificates) offer a way to measure early access into prenatal care and its effects in the low-income population. Measures of prenatal care utilization (number of visits) are available from the birth certificate but are known to contain some errors but this measure surpasses the Medicaid paid claims data because only women with paid prenatal visits have a service date. Prenatal visit reporting by paid claims and birth

certificate have 20% concurrence in these Michigan Medicaid cases. Since low-income adults under-utilize health care services on all reported general health studies[97] there is a belief that this lower use pattern occurs in pregnancy care. Race and age factors influence health services usage.

Each Medicaid client with a linked-birth record has all pre-pregnancy and pregnancy paid claims investigated, along with any primary or secondary medical diagnosis qualifying medically as high risk, to assign medical risk status according to state policy. Then, the reimbursed level of prenatal care is compared to the client's documented medical risk level. Low-income women may have more chronic illness for their age, and may actually need more services than those women above a poverty income. If women have illness concurrent with their pregnancy this interaction may relate to poorer outcomes. Therefore, it is important to assess health status and the appropriateness of medical care received while pregnant. Women at high medical risk during pregnancy should receive care concomitant with their health problems if the theory that medical care improves maternal health holds. The first fiscal policy incentive addresses the physician's greater reimbursement for woman at high risk; the evaluation determines the extent of compliance in assigning risk status and if receipt of the appropriate level of care, based on medical diagnoses, effects outcome.

The Medicaid program authorized two levels of intensity of medical prenatal care to meet the individual needs of each maternal-fetal unit in 1983. Medicaid policy staff lacked an evaluation of this policy. A search of each woman's paid claim summarizes her medical diagnoses and then a dichotomous variable for the presence of medical risk in her pregnancy (using the criteria set by the Medicaid Policy Bureau)

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[97]National Center for Health Statistics, 1983 and 1985.

flags the presence or absence of conditions to compare with the procedure code selected for reimbursement of prenatal care. Since age is also a criteria for risk status it is computed from client demographic files and added to medical problems while aggregating risk level.[98]

The Institute of Medicine (1973) initiated another approach to appropriate level of prenatal care; this tactic and its modifications measure the process of care reported by vital records. For example, the reported initiation time and number of prenatal care visits for the period of gestation determine if the care is adequate, intermediate, or inadequate based on three fields of reported data. This approach is faulty because the process of care received depends on divergent actions. Both the client and provider are involved in first visit timing but the quality and medical intensity is determined solely by the provider. These formulas rely on complete and accurate reporting on the birth certificate but Michigan's Medicaid client data is not of sufficient quality to assess interaction so an index is not used here to measure adequacy of prenatal care.

This study assumes an acceptable measure of quality for the prenatal program implementation matches the level of prenatal care provided to the medical condition and health risks diagnosed for each client. Program failure either shows a mismatch between the level of need by medical diagnosis and the level of care (normal or high risk) paid. Since provider reimbursement is significantly higher for high-risk care, the

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[98]The appropriate intensity of perinatal care is expected to influence the outcome of the pregnancy. Diagnosis of pregnancy risk is determined by: 1) diagnosis of a major pre-existing disease or condition; 2) diagnosis of concomitant disease or condition during pregnancy; or 3) procedure codes indicating medical risk during pregnancy, as these appear on the Medicaid billing. Presence of these conditions determined by MSA (and under criteria of American College of Obstetrics and Gynecology) makes the dichotomy positive.

market incentive to provide the higher level of care exists. Medicaid policy reports indicate a low use of the high-risk procedure codes so the lack of billing a high-risk code does not rule out the possibility of a client receiving a care of higher intensity. A subgroup of those Medicaid women enrolled prior to pregnancy will be assessed for the appropriateness of care looking at entry time and level of care. When no prenatal care is received this is viewed as a system failure. Statewide, approximately 2% of all women who deliver a live birth receive no prenatal care according to the birth certificate system; this study population shows a similar aggregate level with no care reported.

Medical theory[99] states that prenatal care is a necessary but not sufficient condition for a positive outcome to pregnancy. Genetics, environment, and other health and lifestyle practices of the mother may mediate any positive benefits of prenatal care. The value of prenatal care was questioned during the 1980s[100] but always receives support because all data analysis show that women with no prenatal care have poorer outcomes than those with some care. To protect themselves against malpractice suits, physicians follow state or national standards for care and explain to clients that some pregnancy loss cannot yet be prevented.

The study tests the theory of medical effectiveness by considering pregnancy outcomes in relation to the client's level of medical risk according to the Medicaid Provider Manual,[101] and the timing of care. According to current health

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[99]Prenatal care is presented as a necessary but not sufficient process for a healthy baby. Obstetric standards of care are clear that prenatal care does not guarantee a healthy baby and mother (American Academy of Pediatrics and the American College of Obstetricians and Gynecology, 1988 and DHHS, 1987).

[100]OTA, 1988 and Institute of Medicine, 1985 and 1988, offer good reviews of the literature.

[101]Diagnoses reported by the physician are consistent with low medical risk and normal level of care or diagnoses indicate risks with care billed at the high-risk level.

paradigms[102] medically-provided prenatal care is desired for women and needed for high-risk women to have a healthy delivery. Furthermore, the initiation of care in the first trimester is a goal for the nation because it allows providers more time to intervene if a problem exists. It is assumed by inference that no prenatal care is associated with poor reproductive outcomes regardless of any underlying differences in the population of women who do not access prenatal care. The lowest levels of non-preventable deaths and undesired outcomes are set as goals based on attainment in other countries.[103]

Methods

Michigan Medicaid Record Linkages

All recipient identification and record linkage at MSA employed batch computer programs and file numeric or alphanumeric searches through the Honeywell mainframe system at DSS. This study began with the assumption that women with hospitalization for maternity conditions had viable and accepted pregnancies. The recipients who reached a stage of pregnancy requiring hospitalization for childbirth care indicated the demand for service during the childbearing period. Clients with alternate coverage for themselves may not have coverage for the newborn and these infant records were also investigated. Women with childbearing conditions and newborn infants (Major Classification of Disease 14-

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[102]Institute of Medicine, 1973 and 1985 and AAP-ACOG, 1988.

[103]The desired level of infant mortality is a rate of 6 deaths or less per 1,000 live births achieved by Finland, Japan, and Sweden in 1985 or attaining at least the Surgeon General's goal of less than or equal to 9 deaths per 1,000 overall. Infant mortality is composed of a neonatal mortality rate of 6.5 or less and a postneonatal mortality rate of 2.5 or less by 1990. The desired level of low birthweight is a rate of 4 per 100 live births or less achieved by many countries, or at least the Surgeon General's goal of 5% overall and 9% for blacks. At least 90 percent should have first trimester prenatal care according to the Surgeon General.

15 listed in Appendix F) had billings for Medicaid hospitalizations in the Episode-of-Care File (Diagnostic Related Group (DRG) Episodes of Care or EF).

Using SPSS-X and utility programs[104] from the Honeywell computer system at DSS, 133,864 unduplicated client episodes[105] off the EF are identified for the initial 23-months of DRG implementation in Michigan. When edited for DRG accuracy (age and sex edits), eligibility, and a paid claim for service, a total of 132,248 recipients were found in the study period as seen in Figure 4.2.[106]

There were 64,679 paid delivery admissions, 6,775 admissions for spontaneous pregnancy loss, 15,255 admissions for maternity-related morbidity and 66,334 newborn infant admissions (includes transfers and readmissions). The EF created the study sampling frame with all clients having a childbirth or newborn DRG processed between February 1, 1985 and December 30, 1986. All recipient records passing edits from this initial framework criteria had adjusted paid claims located for further analysis.

As briefly shown on the next page, the recipient number and dates of service from the edited EF linked with the Purged History Paid Claims File to capture all adjusted paid claims of clients from July 1, 1984 through the period June 30, 1987.

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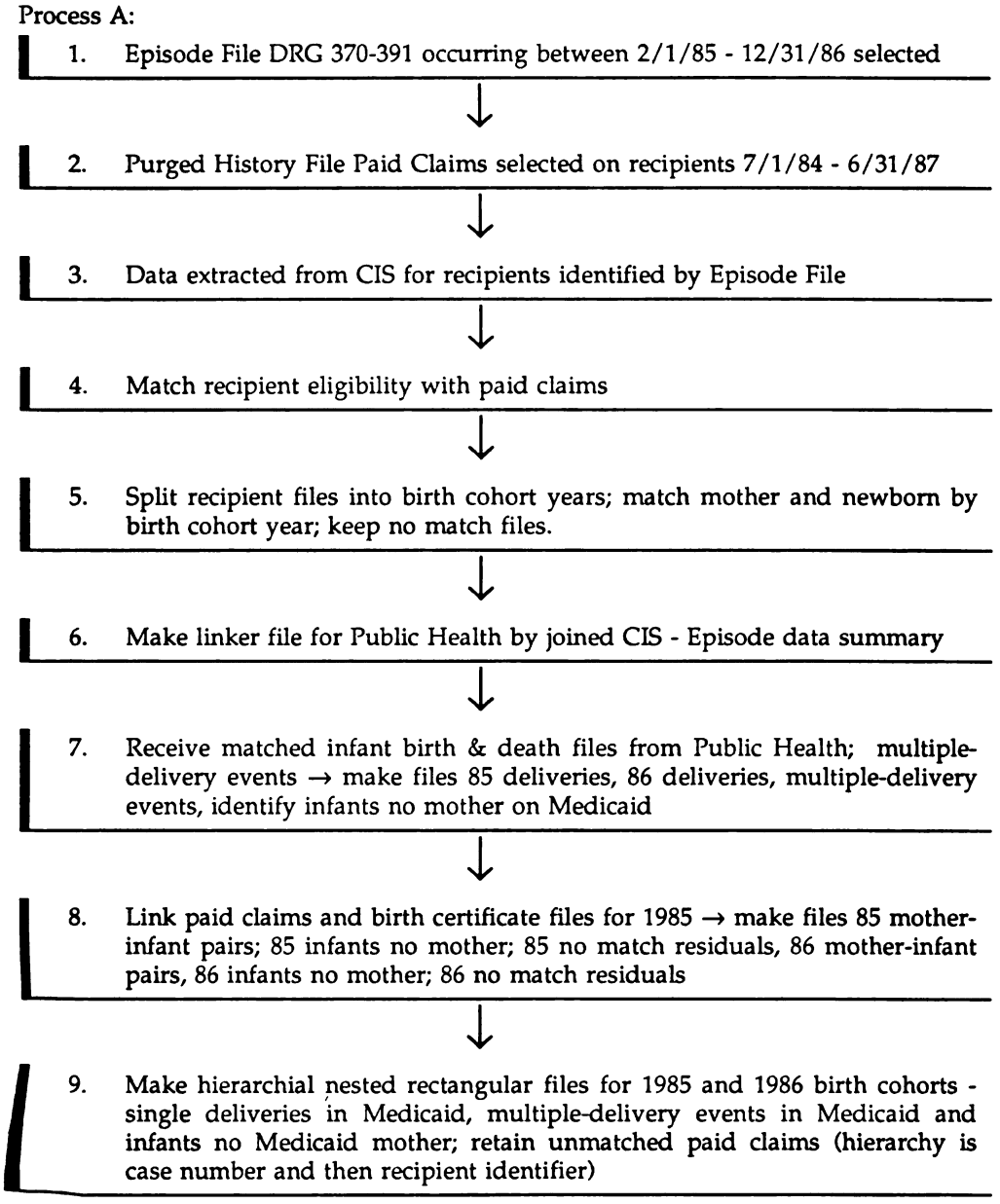
[104]The DSS computer system uses a special version 2.1 SPSS-X and has available several computer programs which perform typical and frequently used data functions (utility programs) for their Honeywell installation. Any other programming must be written for the system; this dissertation used COBOL.

[105]Infants and some women may be admitted to one hospital and transferred to another; the raw EF will show these as separate episodes if the provider number is different. Using the client identification number and the dates of service, the cases are unduplicated for an episode of care. Nested paid claims files allow use of all DRGs and claims data. The original episode DRG shows the initial entry hospital.

[106]A total of 159 infants born in January remained after initial file editing; since they did not fit the cohort specifications these cases are discarded.

Figure 4.2
DDS Data Processing Flow



Linkage between the recipients identified through the EF consists of a series of sorts, utility programs, and SPSS-X programming gathering data from the paid claims and from other systems at the Health and Welfare Data Center, DSS.[107] This compiler process was based on matching the eight digit recipient identification number (and check digit) in each system. The next record linkage matching identifies the recipient with the Client Information System (CIS). Utilizing the eligibility date at the initial EF admission and the recipient number as matching variables, the welfare case number and case suffix, along with the desired minimum demographics from CIS were merged to each paid claim. The recipient identification number (along with check digit and name, provider identifier, Episode DRG and Episode Julian admission date), case number and suffix, and selected demographics (date of birth, race, sex, county of application), seven periods of most recent Welfare eligibility, scope of service, program code, three periods of authorization, and the total number of eligibility and authorization periods formed the demographic data base. These variables have specific purposes either for verification or investigation. This basic information was affixed to each paid claim for the recipients within the childbirth and newborn categories having a hospital admission paid for services within the claims window. Three COBOL programs, SPSS-X, and existing utilities at DSS prepared the variables into a desired record structure.[108]

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[107]This was a memory intensive process requiring five tape drives to repeatedly sort and search the 13 reels of adjusted paid claims; the job ran on scheduled priority over several weeks until completion.

[108]The extrapolated paid claim process chosen utilized IP History File and Current File records H, L/J to capture the provider type, provider identifier, procedure code, primary and secondary diagnosis, surgical procedure, discharge status, amount paid (hospital or other), DRG, and claim references.

The next record preparation was making birth cohort year Medicaid linker files for vital records matching. After utility sort, an extrapolated 77 element record served as a matching file base for linkage with the state birth file.[109] These items provided the linkage back to the DSS files and also a selection of linkage and verification variables for the record matching process. This process generated separate files for linked mother-infant records for 1985 and 1986, infant records without a Medicaid mother identified in each cohort year, women having a delivery DRG admission but no infant found each year, and all other women (no delivery admission or no linkage with vital records).

Performance of the vital record linkage (birth and birth-infant death matched file) was conducted at Michigan Department of Public Health (MDPH).[110] The mother-infant subfile for 1986 was matched first and then the process altered slightly to enhance linkage of the 1985 Medicaid mother-infant file. After these linked record processes the two birth cohort year infant files (unlinked to a Medicaid mother) were processed with the birth files. After each birth file linkage, a linkage was made with the MDPH birth-infant death file. The modified linker files containing the matched birth and infant death data next ran through a series of sorts, merges and COBOL programs needed to generate the study files. Data from the birth record was integral to the evaluation process so the pregnancy could be dated and expenditures and client health status by period investigated.

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[109]Appendix H contains the layout of the MSA-generated subfile used to link vital records to the study cohorts.

[110]MDPH utilizes the Michigan Technical System (MTS), IBM at University of Michigan for vital records work. Linked files returned to MSA for matching and record design conforming to a collapsed structure. All final files and data analyses were performed by the 3380 IBM at Michigan State University based on individually developed COBOL and SPSS-X programs for record collapsing and SPSS-X versions 3.1 or 4.0 for statistical analysis.

Record Design. The first COBOL manipulation dated the pregnancy via birth record information for all linked mother-infant pairs. When the gestational age on the birth certificate was questionable[111] the program utilized the group mean. This dating allowed linked records to have program costs for the period prior to pregnancy, the pregnancy, delivery day to 60 days postpartum, and up to six months after delivery, placed for each mother and infant. Episode file cases which did not link to vital records were kept as unlinked infants and unlinked mother files.[112] Figure 4.3 provides an overview of the total file disaggregation.

Linkage Results. The batch computerized process at MSA identified over 95% of the original Episode-of-Care File client records through three other DSS file systems.[113] This process was complex, with significant programming and system costs. Each programming component was pretested, analyzed, and revised. As the

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[111]Computer generated gestational age from the birth file uses the first day of the last menstrual period (LMP) of the mother and the delivery date. When the day of the month is missing, the system generates day 15. Physician estimate of gestational age owes to a variety of clinical judgements such as physical exam, fundal height, circumstance, and ultrasound. If the difference between these birth file dates was greater than 3 weeks or missing, the group mean gestational age by LMP (39.3 weeks) was imputed to date the periods for expenditures. This system is not perfect but no practical alternate to allocate expenditures over four periods of time existed based on the volume of paid claims involved and the lack of pregnancy dating within the DSS files. A total of 13% of the records had imputed dating to place the periods of pregnancy for paid claims. The gestational age data was not imputed for health analyses. Unpublished work by the MDPH, Office of the State Registrar and Center for Health Statistics (OSRCHS) indicated that the LMP date was more valid than the physician estimate for general birth files. This view was confirmed in the Medicaid data set.

[112]A total of over 1.3 million paid claims were processed for this group and reside on 4 sequential volume tapes. Analysis to date provides only aggregate expenditures, LOS and client counts by DRG.

[113]File interfacing required coordinated effort, technical skills, endurance, and administrative priority. The technical assistance of Mark Yaeger, Section Supervisor and Jan Robertson, Senior Programmer in the Office of Support Services and the efforts Esther Reagan and Vernon Smith, MSA Bureau of Policy, and Kevin Seitz, MSA Administrator, made this effort possible.

final program was tested and used three administrative difficulties were noted: 1) duplicate episodes from transfers or readmissions occur,[114] 2) some client records contained an infant DRG and also a mother DRG claim associated with the same recipient number, joining of records occurred, making mother match with mother case,[115] and 3) sometimes the case number and suffix was the same for different members of the family and more than one family member delivered.[116]

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[114]When a hospital transfer occurred for a different level of patient care and the claim records for an individual client contained a different DRG and hospital, a second case was built. These duplicate clients were removed in subsequent file linkage steps.

[115] The age editing applied only to the EF and was not repeated for the paid claims file leaving a small number of records in which mother linked to her own identification number with a baby DRG (10 occurrences in 1986 and 11 in 1985). This is the incidence of non-compliance with Medicaid policy in which all newborns are to have their own identification number for Medicaid.

Another minor problem in the transition phase included 159 infants born in January 1985 with hospitalization continued after February 1; all of these cases were dropped from the study after record linkage from MDPH confirmed the birth date.

[116]Based on the linked birth certificate process, the Medicaid error by case number mismatched only 14 mother-infant pairs (error rate 0.0002%). Even with additional sorting and checking the process is not exact since about 500 women per year will not have a professional charge for delivery, yet there is a hospital bill for the delivery. The error rate is well within tolerance.

Dating the antepartum hospital admission to a birth date was problematic. Most women are not in the hospital longer than 24 hours before delivery but 10-20% of Medicaid women have antepartum hospitalizations. This period identified most pre-admission deliveries in the program development test phase. The paid claim does not contain the delivery date (only begin and end dates of admission) and if the baby's date of birth falls within an acceptable range of admission date for mother, the two are paired within the same case number. Based on program testing, delivery within 19 days at the same hospital, was compatible with births so this limit was built into the COBOL program. Infants could be joined to the wrong mother in error when two women in a case (with the same case suffix) delivered within this 19 day window. A total of four false matches occur from this problem. Two sisters had same-sex babies within the same week in a Muskegon hospital; all recipient case numbers and case suffix were the same. These infants were misplaced in linkage with aunt versus mother. The other family had a similar case mix with mother and teen daughter delivering in a close period. The only way to eliminate this false linkage is with name verification and verification of the provider professional charge for the delivery and the date of birth of the infant. These cases were 2 of the 14 errors in linkage identified through the birth file. The errors were minor, considering the volume of records matched and may accounted for the suburb linkage with the birth

Medicaid Providers for Prenatal Care

The provider demand and supply phase of record building occurred at the Michigan State University (MSU) mainframe using SPSS-X 3.1, the systems sorting program, and COBOL programming. The paid claims of all women were searched for prenatal care and delivery professional procedure codes with dates of service from 1984-1987 and resulted in a 68 field file shown in Appendix G. A MSA-prepared shortened Provider Master File offered the unique identifier and provider identification number for each provider with office location, billing address, provider type, three specialty codes, and the provider site enrollment beginning and ending dates. The collapsed maternity PC subfile and the limited PMF went through a series of sorting programs which affixed the unique provider identification number on each claim in the subfile. The first result identified the unduplicated women having a maternity professional service or therapeutic abortion admission in each study year and the second file generated the unduplicated number of physicians and other providers who received payment for prenatal, delivery, and other maternity professional services by date of service and payment. Eight major steps detailed for this process appear in Figure 4.4;[117] the process identified 29,974 unduplicated women in the 1985 cohort and the 32,778 unduplicated women in the 1986 cohort. The client aggregation process identified 71 women who did not link with birth records for either of the two years, yet had professional delivery procedures paid in

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file (other Medicaid-vital records work did not pre-link mothers and infants in Medicaid prior to going through the vital records system).

[117]Step 6 repeats using the unduplicated recipient identification number to sort data to obtain the unduplicated number of clients. The results of the provider aggregation are presented in Chapter 5.

Figure 4.3
DDS Recipient Study Cohorts

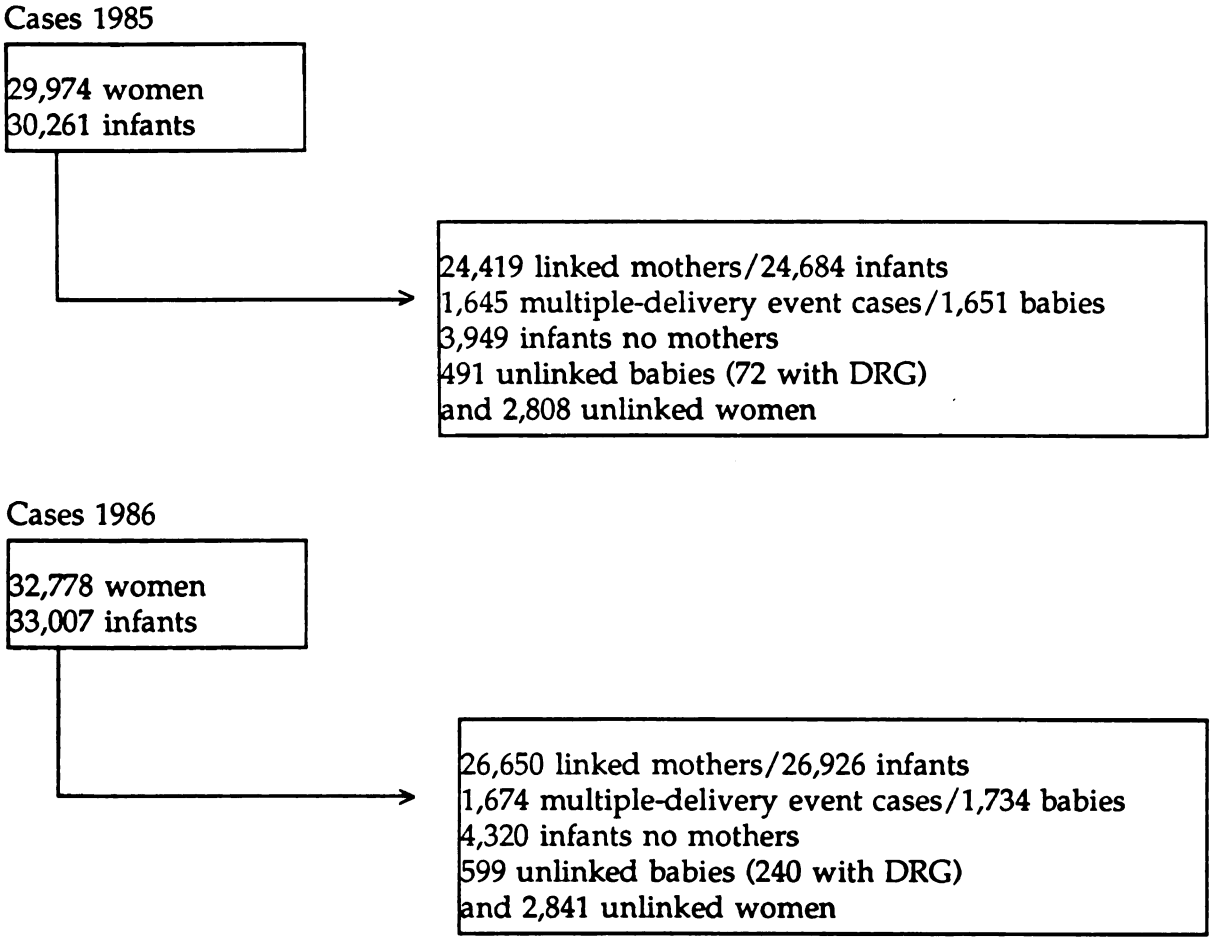

Figure 4.4 Provider Supply of Maternity Services for the Cohorts

Step 1	Convert procedure codes for maternity professional services to flag variables in each of three file types (linked single delivery, unlinked and linked multiple deliveries). Calculate delivery date based on the end date of service for the procedure.

↓

Step 2a	Combine client paid claims for maternity services with the provider file based on the provider identification number on the paid claim into a nested file sorted by provider identification number and record type.
b	Merge the record types into a single client level record sorted by end date of professional service.

↓

Step 3a	Sort the linked file by recipient identification number and delivery date and then create files for each year (1984, 1985, 1986, 1987 and no delivery). Delete 1984 records.
b	Merge the multiple delivery linked file into the appropriate year.

↓

Step 4a	Move records with 1985 deliveries in the 1986 files and validate delivery. Edit for postpartum care or multiple deliveries as appropriate.
b	Sort the unassigned delivery cases by the end date of service for the other procedure codes and place in appropriate files.

↓

Step 5	Sort all records with appropriate 1985 or 1986 procedure codes for maternity care by unique provider and recipient identification, making provider files and recipient files by year.

↓

Step 6	Sort providers by unique identifier, service county and provider type and aggregate on unique identifier and service location by year. and Repeat process selecting only those with prenatal care procedure codes.

↓

Step 7	Sort providers by unique identifier and first county location and aggregate by year.

↓

Step 8	Obtain counts of unique providers by year with aggregate procedures.

both cohorts. In addition, ten women had one linked birth record and one unlinked delivery. These women indicate reproductive failures for the 23-month period. Provider supply indicated that some providers served clients out of more than one county but few providers operated in more than two counties.[118]

Vital Records Linkage

In addition to the linkage of women with maternity care in Medicaid and their infant through the DSS case number, client records linked to birth and birth-infant death matched files went through a different process at MDPH. Unlike other work in the field, such as the Bureau of the Census, Bilheimer, or Beuscher, the MDPH process was an exact interactive name linkage which did not rely on existing programs including a soundex package. A batch and interactive relational data base management system (MICRO, MTS) served as the search tool; after the initial exact match, the files were used interactively to visually facilitate record matches. New programs were written to conduct actual matches.[119]

In both years, the Medicaid mother-infant files had over 97% computerized match with the state birth file and a total match over 99.7%. The infant in Medicaid (no linked Medicaid mother) files had a 93% computerized match and a total match over 99% each year. The procedures used for the 1985 file are described in detail in

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[118]Provider aggregation uses the lowest provider code type, i.e., MDs or provider type 10, with other locations of the provider, such as a public clinic, hospital or outpatient clinic collapsing to allow counting only once as an MD or DO (provider type 11). The difference between county counts and unique providers reveals the number of providers serving clients from office locations in more than one county; in 1985 there were up to 154 providers in more than one county. These provider numbers underwent more aggregation so the total number of unduplicated across counties could appear in Chapter 5.

[119]Thu Le, Ph.D., Statistical Services Section, Office of the State Registrar and Center for Health Statistics developed the MICRO programs for batch processing and subsequent interactive methods.

the Appendix H since they represent the recommended procedure when record linkage relies on a matched name linkage. Analysis of record linkage criteria via electronic match indicates considerable difficulty with alpha linkages, with about 6% of records having a discrepancy in the last name of the infant between the Medicaid record and the birth file and 3.5% have first name discrepancies. For matched records, only 0.1% of records have errors in sex and date of birth between the two files.

The 2% of pre-linked Medicaid mother-infant records that do not link electronically have similar kinds of errors as those requiring relaxation of linkage criteria, but errors occur in combination. In DSS- and MDPH-linked files, the mother's maiden name is the last name of the baby for 58% of the cases and about 51% of these records name both parents on the birth certificate. In other analysis of the mother files where the link was not made with the birth certificate, only 42% of the babies linked via the mother's maiden name. This would indicate that some fetal deaths probably occurred in this group of unlinked mothers. Record-linked verification of vital records for these Medicaid pairs is described in detail in Appendix H. A total of seven false matches occurred in the system recommended. Under one percent of mother-infant, or infant only, 1986 records were unlinked with the birth file.

Validation. Data preparation and the amount of time required for linkage varies within the systems. At DSS, we did not track production time and cost attributed to the process due to the episodic nature of the runs and the long period of time involved from the request start to job completion. The current DSS system of interactive client validation requires special terminal access and is more cumbersome than the public health system used for this project. Based on the time it takes to

search cases the decision at DSS was only to validate a random sample of test cases and outliers or exceptions. The decision to use only electronic digit matching was supported as the only feasible method based on the quantity of data. The 23-month cohort cases linked with over 8 million paid claims for a period up to nine months prior to pregnancy and 1 year after delivery or birth.[120] As described in the previous section, mothers and infants do not always share the same sir name, thus, a name linkage between the pair in a case would not be complete. In addition to a lack of complete data the name linkage is more memory intensive and fraught with greater human error opportunities.[121] Using the recipient identification number from PC to link with the case number in the CIS system builds a common identifier for mother and child where none exists within the Medicaid process. Many family members can appear in a case and name linkage would require date of birth edits to be free of duplication. The case number is the only feasible way to match family members in Michigan's Medicaid and DSS programs. Costs in CPU time and labor prohibit hand and eye interactive matching in Medicaid.[122]

After the linkage of the specially prepared file from Medicaid with the state birth file, the linked Medicaid-birth file records were linked to the frozen-matched

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[120]This type of match of hospital episodes with the PC history files takes about 3 weeks at usual priority because memory and sort space of this magnitude are available four nights a week and the 13 reels of high density purged history tapes are run through the sort one reel at a time.

[121]The DSS name field is 20 characters but the identification number is 8 digits and the case number is 9 characters. Alpha patterns require more sorting, buffer space, CPU time, and generate a matrix which is beyond the SPSS-X capabilities. The aggregate function in SPSS-X also requires a numeric fields for some functions.

[122]Programming in a relational data base requires skill as with any new system; utilization of an experienced programmer made file programming and creation only 10 hours. CPU processing of the 1985 linked file portion of vital record matching took approximately $700 of on-line time through MTS. The 2% final searches were very costly in person hours, approaching 80 hours of effort.

infant birth-death file.[123] This linkage indicated only two potential false matches between the birth-matched infant death-Medicaid files in 1986. During this period MDPH had another matching effort in process with DSS which accessed the state death tape to current and former DSS clients who died in the 1986 year. The methodology for the MDPH-DSS child mortality linkage was very different but served as a methodological validation for the dissertation. Based on matches from the frozen matched infant birth-death file, 14 Medicaid infant deaths were not identified but were found in the death tape for 1986. The dissertation data located the mothers of these 14 infants in either the multiple birth events file (not studied for the client phase of the dissertation) or the mother file that remained unlinked after the birth certificate merger.[124]

Linkage Conclusion. Based on the experiences of this pre-edited matching process, an interactive batch system offers great advantage when the record size becomes manageable. After achieving a 70% or better batch electronic record match based on infant name, interactive programming allows the analyst the means to search the remaining files for matching cases by setting and relaxing different parameters. Visualizing part of the records identifies common errors in spelling, name order, and letter or number reversals. The appendix describes the importance

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[123]The dissertation used all recorded vital record births (including late files and corrected records) but the matched infant birth-death files for 1986 and 1985 were constructed based only on state statistical files received on time in MDPH and were frozen (not corrected or amended at subsequent periods). This editing problem was corrected with the 1987 year when this file was no longer frozen and can be updated at any time with new information.

[124]Some reasons for missing infant death cases include: 1) last name differences between the files for the infant--the infant death certificate last name could be like the mother's maiden name or it could be totally different, or the death record might have the same birth date but no certificate of birth was found under the infant's name, or the data might be late arriving and would not appear in the matched birth-infant death file, or the birth, death, and Medicaid records could all have different names.

of using sufficient name characters to prevent false matches, especially in common names. Variability of record accuracy or the degree of match between systems is dependent on staff accuracy in hospitals and county DSS offices. Within the hospital system, a wide level in matched Medicaid records occurs--from a high of 100% record linkage to a low of 76.7% in a very large metropolitan hospital. This dissertation used all records meeting pre-selected criteria but the matching differential is important for other researchers who use sampling; in Michigan the largest facilities missed more cases but size was not the only criteria for record accuracy. Reducing false matches and the need for manpower-intensive hand searching requires trade-offs between precision and cost.

Based on the results achieved with pre-linked mother infant pairs in DSS, batch methods with some interactive searching appears sufficient for future Michigan DSS-Medicaid-vital records linkage. Within the pre-linked pairs from the Medicaid-DSS files matching was over 97% by computer and rose to over 99% with subsequent hand matching, but Medicaid records using only the infant name from Medicaid files (based on newborn hospitalization paid claim) yielded a 93% match by computer but still reached 99% when interactive searching and hard copy matching by hand was added.

Context of Administrative and Claims Files

Health Outcome Investigation

The SPSS-X hierarchial file structure served to condense paid claims (PC) data for further aggregation, processing, and analysis. Each mother served during pregnancy or added to Medicaid at delivery had expenditures prepared for the childbirth periods of care. The volume of individual paid claims necessitated that most claims be aggregated by period of time based on procedure codes. Pharmacy

PC were grouped into vitamin-mineral supplements and all others, laboratory PC identified ultrasound procedures, amniocentesis, and all other procedures, except for medical services (inpatient and outpatient), all remaining expenditures were aggregated and a summary for pregnancy appears in Chapter 6. Medical claims carried diagnoses as well as procedure codes and surgical procedures needed to identify the presence of disease and medical risks so these were individually noted in nested records. Paid claims, welfare characteristics from the CIS, and vital records offered an enhanced data base. Infants born to each mother in the study period had selected birth certificate and paid claims data summarized and set in a hierarchial nested format for health outcome by creating a birth occurrence file for each mother. Twins and other multiple gestations appeared under the mother. A total of 396 variables selected for single event deliveries collapse into a rectangular record for dissertation analysis. In this pregnancy outcome subfile the infant data is averaged for birth weight but death occurrences, expenditures, and hospitalizations are totaled for each infant and woman. All programming was completed at MSU on the IBM3090 using SPSS-X mainframe version 3.1. Some analysis occurred under SPSS-X version 4.0.

Analysis of each variable consisted of descriptive characteristics and regression characteristics (including correlations) prior to proposing edits. No data was discarded but edits within 3-4.5 standard deviations (SD) from the mean occurred for most health information except for diagnoses and procedures. The analysis used in the client portion of the evaluation is based on a minimum data set listed in Appendix G.

Limitations with Paid Claims

In order to assess quality of care, procedures and diagnostic codes must be available. Coding is not always as anticipated within the Medicaid paid claims and an understanding of community practice is often required to interpret the PC frequencies. An example using selected procedure code data from infants born to the 1985 women with a multiple gestation illustrates two limitations found in paid claims data for infant care from the Medicaid program during the study period. Table 4.2 presents data for the 594 infants born to 294 women having a multiple gestation delivery in the 1985 cohort.

One measure of preventive care for infants is the degree of completed immunizations. The procedure code found only 58% of twin and triplet babies had immunizations under Medicaid. If all deaths are removed, then about 57% of cases are counted. In Michigan, informal reports by pediatricians[125] indicate provision of general health services to Medicaid clients, not including immunizations, because the cost of an immunization is greater than the Medicaid reimbursement; these physicians refer to the local health department. At the health department immunizations are free to those who cannot pay; only a few local agencies bill Medicaid for the reimbursable charge. Although it appears that Medicaid infants have most inadequate immunization status, the data are known to be incomplete because of provider care patterns in the state. Even more disappointing than the immunization procedure code was the code indicating infant's initial doctor visit for which fewer than 10% had this service code identified.

[125]Baker, 1990.

Table 4.2

Selected Data for Multiple Gestation Babies[a]
Born to Medicaid-Covered Women, 1985 Cohort

Variable	Mean	Std.Dev.	Sum	Min	Max
Newborn LOS, days	24.65	34.9	7,242	1	211
Total Immunized, % [b]	3.4	2.1	419	1	12
New Infant Cases, % [c]	1.8	.78	47	1	4

[a] The data includes a set of quadruplets that were hebdomadal deaths, three triplet sets and the remainder are twins. There were 38 neonatal deaths and a total of 45 infant deaths.
[b] The number missing this information are 41.8% of live born multiple gestation infants.
[c] The number without an initial doctor code was 91.5% of these infants.

Some questions that need to be answered about the quality of health care and services for Medicaid recipients cannot be addressed with only paid claims data collected in the traditional manner.

Validity of Data

Variable comparisons between the birth file and DSS files indicate some minor data differences by record source. For instance, the birth date of the mother reported in welfare records created the study variables pregnancy age and delivery age. When truncated delivery age compares to the birth certificate age at last birthday, a small discrepancy exists and is more noticeable in older women. For all files, the error is under 1%. Gender agreement of the newborn shows a 1% difference between the files of these two state agencies.

Pregnancy Outcome Relationships. Although less than 4% of newborns in Medicaid had birthweight missing from the birth certificate, this variable has wide dispersion and 4.5 SD allowed most birthweights to be included making 180 grams

the lowest birth weight accepted. Values reported between 19-179 grams were set to missing. Unreasonable upper weights were not found. Gestational age under 12 weeks was not accepted for analysis; an attempt was made to accept gestations reported as 12 through 19 weeks. Postmaturity is known to occur but it is deleterious to the fetus; based on mean age and the possibility of a missed cycle before conception, up to 46 weeks gestation was accepted and higher values set to missing. In Michigan a live birth is a fetus of at least 400 grams, or a gestation of 20 weeks or more, or one that shows any signs of life. An additional edit to adjust for gross errors in low gestational age is described in Appendix H as a new variable called error.[126] The edited files still contains some measurement error in weight and gestational age but it is not systematically biased. The calculated gestational age at delivery was accepted but different arguments for feasibility were used in analyses, generally 20-46 weeks (feasible) was selected.

Incomplete data causes many problems in interpretation and some variables originally designated for analysis in the database are dropped when there is 10% or more missing data. For example, three such variables associated with pregnancy outcome are parity, pregnancy interval, and gravidity. Gravidity (the number of known pregnancies) was omitted because of the amount of blank data found. All

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[126] Data from reported gestational ages under 28 weeks were suspect for reporting error because of high survival rates. Cases with births reported before 20 weeks were dropped from these analyses since only 10 of the 60 reported cases died; obstetric literature does not report infant survivors under 22 weeks. In some cases weight was present without gestational age and in other cases there was no weight but gestation. Some children had both missing. A feasible relationship algorithm was applied to 33 weeks of age to attempt to remove erroneous gestational age for a period of weight. Gestations over 46 weeks were dropped. Weight and age relationships were applied which resulted in maintaining 76% of the original data for 20-30 weeks and 93% of the original data at 31-34 weeks. Less than 0.1% were edited from remaining categories of gestational age and birth weight since the range of possible weights is much greater.

women with data recorded for parity (number of previous life births) were reported to have at least one prior live birth (missing 2.0%) but when a comparison was made on birth interval (months between prior pregnancy and current pregnancy), 35% of the data is missing. It was unclear if the parity and gravidity definitions were reversed in some cases. Prior fetal deaths also present some problems as a risk factor because of incomplete reporting. In the single delivery birth file, 18% of women reported a prior fetal death (by date of delivery).

The literature speaks of prior reproductive performance being a factor in pregnancy outcome. Gravidity is expected to be at least 1 on a live birth certificate. Only 17.3% of all Medicaid infant certificates listed 1, and 33.8% listed 0. Gravidity was felt to be too inaccurate to use in any manner. Parity, or the number of prior live births, was listed as 0 in 44.6% of all infant certificates. It was difficult to validate the lack of prior live births. Prior spontaneous abortions was also incomplete since 6.8% of women having a neonatal loss had no data on spontaneous abortions. In the certificates of all Medicaid infants, black women had greater occurrence of 3 or more spontaneous abortions reported (5.6 versus 2.7%). The association with 3 or more reported spontaneous abortions and infant death was strong for non-blacks ($p = .00001$), but weak for blacks ($p = .0492$). Other variables in the birth file did not appear to discriminate on outcome between the groups of women served. Education was adjusted for age since one fourth of Medicaid mothers were teens. Age-adjusted education allowed high school graduation to be reached at 19 which is not uncommon in Michigan.

Visit Data and Entry Into Care. The paid claims file could not validate the quantity of prenatal visits or the date of entry into care recorded on the birth certificate, but it does reflect the error rate (false negatives) for those with no prenatal

care recorded who were covered by Medicaid for prenatal care. A total of 53 women out of 343 classified as having no prenatal care entry on their infant's birth certificate, had care paid by Medicaid. This is an overall error rate of 0.2% of Medicaid enrolled women or 15.5% of those classified with no care entry.[127] The location of these women found excess misclassification in Wayne (Detroit) and Oakland counties. Despite this misclassification of no prenatal care, Detroit and the other metropolitan areas had the highest proportion of Medicaid women receiving first trimester prenatal care.[128] Rural counties had fewer first trimester entry women than larger population counties. The women misclassified were disproportionally black (58.5% of cases).

Only 2% (290) of pregnant women enrolled in Medicaid had certificates of birth stating no prenatal care and also no Medicaid paid claims specific to FFS care. Without the linkage of the birth certificate and paid claims the number without reported prenatal care would be higher. When Medicaid paid claims are compared for the women with no reported prenatal care or having less than 5 reported prenatal care visits, 17.5-20.3% of those with low visits had 2 or more prenatal care providers, indicating potential error in birth certificate recording. If the prenatal package of care was billed, and the provider actually gave six or more prenatal visits, the birth certificate error for low-visit reporting can be 32 to 54% for Medicaid women during this time period. When no prenatal care entry was marked, error in birth certificates was over 15% for Medicaid women noted without care but with paid claims for

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[127]Unfortunately, the largest number of no care entry women fell into the non-FFS group. Many women added to Medicaid at delivery also showed no prenatal care on the certificate. See chapter 6 for further discussion.

[128]There was no racial difference in urban and Detroit access by race and for blacks the error most likely occurred in Detroit. For whites and other groups misclassification of no prenatal care most likely occurred in the urban, non-metropolitan counties.

prenatal care. The administrative files cannot provide definitive validation for all clients but point to problems which require further research on birth certificate validity when these types of records are used to evaluate programs.[129]

Paid claims do reflect some coding errors by the providers. In 1986 women had a mean of 5 prenatal visit claims (median 3) when there were paid prenatal visits but the range was 24 visits. When prenatal care was paid retrospectively,[130] the average was 2 paid visits. Most women had the prenatal package of care. Coding errors (<0.5%) were made in which the provider billed the package code, but charged the visit rate (and was paid for the visit).

Reliability of Visit Count or Package Use from Paid Claims. Program policy, as described in official manuals, did not clarify the requirements for providers to bill a prenatal care package. Women who entered care in the first trimester and stayed with the provider, or those having 12 or more visits, qualified for a package billing

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[129]Within the Medicaid women's paid claims the maximum number of prenatal care visits reimbursed was 49, and this woman had 49 on her certificate; higher values were presumed incorrect and were set to missing. Women at the low end of the visit scale appear to have a bias in reporting. The use of several providers with a hospital record only sent for the last provider, premature delivery without a record update or conference with the woman on visit number, or early premature delivery or long hospitalization are reasons suspected for discrepancies.

Michigan has only one known investigation of birth record validity which is unpublished. An interview with Sharon Van Putten, 1990, indicated that in Ottawa county, the local health department investigated a portion of their non-black live births with less than five prenatal care visits: 14% had adequate visits because of the premature delivery, 32% could not be located for interview and 25% were interviewed with 1% refusing interview. Of those interviewed, 52% actually had more visits than the minimum reported on the birth certificate.

[130]Retrospective care means that the claim was dated in the period after delivery. Over one-eighth of the women did not have an LMP calculated gestational age which agreed with the provider's estimated age at delivery ($\pm$3 weeks) this can mean that the delivery was actually shorter than 39.3 weeks and the prenatal care was provided during the period of pregnancy, or it could mean that the provider was billed retrospectively. Based on the paid claims records most of the prenatal care of enrolled pregnant women reflects the prior condition.

under typical guidance provided verbally in 1985. In later 1986, phone consultation generally said that women who entered care prior to the sixth month, and who were provided at least six visits, could have the package billed.[131] This later guidance was placed in the policy manual in 1987. No discussion occurred about how providers would bill with concurrent services from other providers. In about 85% of the cases only one prenatal care package is billed and no difficulty exists in interpretation of the procedure reimbursed. Visit estimates are difficult to formulate from the prenatal package, and in the absence of firm policy, are left unaddressed. Visit billing should occur when the prenatal procedure was delivered and the package of care was inappropriate. The nature of the paid claims process does not bridge gaps in assessment of the quantity of prenatal visits for most women. The distribution of prenatal services is as follows from paid claims: 20.3% of clients had only visits and no package of care; 39.7% of clients had only one package and no visits, 3.0% of clients had two package and no visits; and 1.6% of clients had three package and no visits; and 5.4% of clients listed both package(s) and visits.

Lack of Complete Paid Claims. Ambulatory provider PC provide data on 70% of the single delivery women with reported prenatal care, but almost all of the others have prenatal care reported on the birth certificate but lack a defined ambulatory coded service reimbursed by Medicaid.[132] Less than a quarter of these women received billed hospital prenatal care. Only a few policy changes occurred in

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[131]This was the operating policy of the MDPH Prenatal Postnatal Care (PPC) program from the 1985 year and is believed to impact Medicaid billing practices as a large number of 1986 clients had Medicaid coverage.

[132]The analysis of prenatal visits illustrates minor problems in measurement, for example, it seems unlikely that the 12 women with 16 or more prenatal visits reported in conjunction with third trimester entry into care have accurate information on the birth certificate. The distribution of visits is otherwise but case information did not show more than 20% concurrence between birth certificate and paid claims data.

the 1980s. Effective November 1, 1983[133] MSA issued its bulletin on high-risk pregnancies, education-cost reimbursement, and practitioner 18 day limitation. The prenatal high-risk eligibility was initially limited to medical criteria. In June 1985, MSA added several new medical criteria and age under 17 or a nullipara over age 35. In October 1987, the criteria expanded to include additional psychosocial risks. In October 1985 the coding of procedures for physicians and other professional providers changed from MUPC 4-digit coding to 5-digit HCPCS codes. Other insurers do not use a high-risk code so providers with few clients maybe unaware of these additional codes. Since the state's economy was better, it is possible that more women had alternate insurance for part or all of their prenatal care. No changes in collection of other third-party payers were made by Medicaid during this period. Third-party payment prior to Medicaid reimbursement began in 1972[134] with procedures set in place to cross-check coverage files between Medicaid and all third party-coverage. To assist providers in billing other carriers, people with other known insurance have the company and policy number listed on their Medicaid card. Hospital teaching programs had training reimbursement policies in effect both years so this should not have resulted in changes between the years.

One explanation for the continual lack of claims reimbursement in all cases is that the effort to rebill a claim may have been too costly for some providers to pursue collection.[135] During 1985-1987 substitutes displaced Medicaid prenatal care; some

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[133]Michigan. Medical Assistance Bulletin No. 5310.1-83-10, 1983.

[134]MSA, Phone Interview with staff at third party insurance recovery, 1991.

[135]For instance, between July 1, 1984 and June 30, 1985, the normal prenatal visit charge averaged $27.20, but the average Medicaid payment was $12.07. For the high risk prenatal visit, the average payment was under $21. Many physicians use a billing service and it might cost several dollars to rebill each claim. If most providers only have a few clients they may give up billing (an average of 3 visits), if they made a procedure code error and their claim pended. Sometimes the provider billed the

clients used the health department's PPC program because it provided prenatal care but it did not cover the delivery. PPC's increase of 2,600 cases explains only part of the difference in increased use of non-ambulatory care.[136] Hospital providers and non-billing physicians may account for a continuous 20% of clients. One possibility mechanism for future work is identification of a sample of physicians paid for delivery for women with birth certificate recorded care but not FFS-paid prenatal care to determine if the provider also rendered antepartum care and the disposition of the prenatal charge. This option would require another phase of research and was not feasible for the dissertation. Differences approximating 20% of women with non-Medicaid reimbursed prenatal care coverage continued in the latter eighties and the larger magnitude of unreimbursed care in 1986 appears primarily related to PPC substitution.

Medical Risk Determination. Two measurement constraints occur in documenting a client's medical risk: first, a medical provider must document one or more approved medical risk criteria (not including age) as a diagnosed condition treated under Medicaid, and the provider must be reimbursed for prenatal care. When the client does not seek physician care through Medicaid no diagnoses are possible. The paid claim records only two diagnoses and the provider may not choose one that qualifies for high-risk reimbursement even though the condition was

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delivery and prenatal care package with the same date of service, but neglected to provide the start of prenatal care in the remarks section. In this case, providers would receive payment for the delivery but the prenatal care claim would pend awaiting billing correction. Interviews with policy staff relate a belief that physicians give up in the billing process with Medicaid if hassled too much, especially if they use a billing service. Medicaid had no data for the period on the number of pended claims, the number of claims billed once but never paid for pregnancy, or the number of provider errors in billing because of old procedures codes.

[136]In the 1985 year, PPC served 1,409 Medicaid women who delivered and in 1986 there were 4,005 deliveries. The 1987 cases were 4,132.

present. Additionally, the act of billing for a high-risk service does not guarantee that the level of medical care actually rendered was more intensive. This evaluation assumes that reimbursed care providers did deliver a usual prenatal service at the level of care billed and reimbursed. If the provider delivered a more intensive service but did not bill the appropriate code they are assumed to be unaware of the fee differential. Coding errors are possible but are assumed to be within a 1% tolerance.

Summary

The Medicaid and DSS data used here indicated concurrence with other record sources suggesting error rates of less than 1%. MSA and DSS data elements were rarely unknown. Vital records data presented more gaps in data and potential measurement errors. Between the two departments, some discrepancies in name order and spelling occur, but overlapping variables generally concur within 1%. A lack of prenatal care entry, prenatal visit number, and gestational age concurrence were reviewed in detail with edits applied. Data elements indicating gross errors (>10%) in measurement were not used in analysis. The only systematic bias identified may be in women with unknown or no reported prenatal care; black women were grossly over-represented with no care (but paid claims) and white women had more missing information.

The quality of the data used for this study was carefully edited and reviewed. The study removes less than 5% of the original sampling frame billed for a study DRG by a massive process of case verification, unduplication, and inter- and intra-departmental linkage. All cohort cases with paid claims data are included in the provider participation study and cases with linked live births form the client

evaluation. Fetal deaths are anonymous and can not be linked unless indicated on the paid claim.[137]

Different methodologies illustrate that inter-agency record linkage is feasible and other state data sources can be used to validate some of the information from these records. The actual process of the file linkages within the departments offered administrative benefits for system edits, alterations in existing programs, creation of new reports and procedures, and enhancement of knowledge at the case level.[138]

[137]Fetal deaths were rarely identified on mother PC diagnoses. A study of expected Medicaid fetal deaths in 1986 appears in Appendix E.

[138]Medicaid created automated annual reports for maternity services and conducted a modified provider study of the second wave of targeted provider reimbursements. Public Health created new edits and processes for birth-infant-death reporting, allowed updating of the birth-infant death match file, and augmented the birth certificate with social security number and insurance status.

CHAPTER 5

Provider Incentives and Access

Introduction

The provider phase of the study investigates the implementation of two reimbursement policies; specifically, the effect of targeted increases to all maternity providers and the implementation of appropriate levels of prenatal care for medical risk based on differential fee reimbursement rates. The first policy incentive used by Michigan Medicaid was a differential remuneration which reflected the level of effort required for prenatal care services. The evaluation of this policy required data from paid claims and also additional health and demographic data. Based on the specific criteria required to assess policy compliance and annual differences, only those women served during pregnancy with a live born infant were evaluated for the level of care policy.

One necessary condition for a price effect to operate is stability in the supply curve. The state's women needing maternity services and the potential medical supply are estimated for Michigan and then for Medicaid. With the assurance that supply is stable, the second incentive--a substantial prenatal care fee increase and a more modest increase for delivery professional services--evaluates the number of providers rendering prenatal and other maternity care via paid claims. The baseline participation and the subsequent effect of a large targeted reimbursement increase are then explored. The discussion of the generalized effect of targeted fee increases is placed in a context which acknowledges other forces within the state.

Another component of the remuneration policies is the effect on client access and use of prenatal care. This study views these measures as policy outcomes which appear in the following chapter. Women with live births are studied to determine

whether changes occurred over the two years in the entrance time to enroll into prenatal care, the number of prenatal care visits used during pregnancy, the timing of delivery, birth weight stability, and death occurrences.

Nature of Problem

Physicians control the management of childbirth services in Michigan. As the physician's opportunity costs to practice obstetrics increased and the demand for services stabilized, physician behavior and concerns altered over the 1970-1988 period. Some current practitioners were leery of serving low-income clients who they felt were more likely to sue.[139] During the 1980s the costs of malpractice insurance for obstetric services increased two- to three-fold, depending on the location, practice risk, and provider record. A decreasing population growth rate and increasing abortion rate, which stabilized in the early 1980s, counterbalanced the decreasing obstetric supply. These factors lead to a crisis in obstetric care which permeated state government policy and budgetary concerns.

Only price, markets, and amenities can be changed by government as incentives or regulations. The Medicaid client's basic income, insurance, and health needs resist change. Outcomes of the medical care market are used services and the cost of care. Physician-supply theories of the 1970s[140] hypothesized that physicians responded to price. The state had three possible policy incentives; namely, increased reimbursement for service, relief from liability, or reduced taxes. It chose the first option.

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[139]Informal discussions with the Obstetric Access to Care subcommittee, Michigan Department of Public Health (1989).

[140] Rapaport et al. (1982) summarizes the major theories.

Rate History

In Michigan, two types of rate incentives were put into place in the 1980s to improve obstetric access for Medicaid women. The first change was directed at more than doubling the fee screen[141] for the high-risk prenatal client over the normal prenatal case. Medicaid used $2 million to improve statewide prenatal care access in the fall of 1983 by approving a differential rate of reimbursement to providers of high-risk women. The preferential rate was 65% higher than the normal-care fee screen and was available on both a per-visit and a package-of-care basis. This first remuneration is known as the prenatal level of care policy. Economic factors increased physician fees 5% in October 1984 and again in October 1985. The second targeted incentive provided a substantial increment in remuneration for professional prenatal care and delivery services compared to the Medical Care Consumer Price Index (MCCPI) for Detroit-Ann Arbor.[142] Other primary care service fees were not increased until 1987.

The Michigan legislature authorized increased reimbursement for government-sponsored prenatal care and delivery services through two agencies in the 1983-1988 period. The Michigan Department of Public Health received funds to cover the cost of prenatal care for low-income women in counties where the risk of infant death was

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[141]A fee screen is the maximum payment which is paid for a procedure within a specified service period. Charges made at a level below the screen are paid at the level charged, while charges which exceed the screen are capped at the screen in place on the service date. See Appendix D for the state's fee history.

[142]Between January 1985 and January 1986, the medical care index increased 6.9% overall, with physician services increasing 6.8% and medical care services 7%. The index was higher between 1986 and 1987, with the total being 7.5% and services increasing to 7.7%. The Detroit-Ann Arbor annual MCCPI increased 7.3% from 1984 to 1985 and 7.4% from 1985 to 1986 (US Department of Labor, Bureau of Labor Statistics, March 1985, 1986, 1987, Tables 1 and 16 A).

In the fall of 1985, providers of maternity care received a 5% increase and in 1986 fees were increased 13% for delivery and 47% for prenatal care.

greater than the state rate; it also provided coverage to uninsured low-income women. This program was called the Prenatal Postpartum Care (PPC) program.[143] Medicaid, the backbone of the maternity services coverage for poor women, had greater difficulty in garnering support for increased reimbursement levels. Major targeted increases were issued to providers in 1983, 1986, and 1987.

Prenatal Level of Care

The standards for high-risk prenatal care were set by the Medicaid Policy Bureau in the Michigan Medical Services Administration (MSA)[144] and were generally more conservative than the American College of Obstetricians and Gynecologists (ACOG) guidance on at-risk pregnancies.[145] The criteria of risk determination expanded twice.[146]

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[143]The PPC program evolved out of the state's Maternity and Infant Care projects and special funding to local health agencies started in 1983. It began slowly, and in 1985 had served a total of 3,585 pregnant women who went to deliver a live birth. In 1986 the number served through PPC increased to 6,856 live birth deliveries. 1987 was the last year of the program; only during this year were approximately 8,542 delivery services also reimbursed.

The PPC program was available to all counties and the 13 counties with the greatest problems had broad efforts to address infant mortality in 1985 and 1986. Other counties had some coverage for uninsured women who did not qualify for Medicaid. The local health departments arranged for prenatal care for presenting women who were below 185% poverty but not eligible for Medicaid. Local health agencies provided testimonials that their providers often participated in this program when they would not participate in Medicaid because there was minimal paperwork and the initial reimbursement was better. The MDPH has not confirmed county-level perceptions that new physicians began to participate in services to low-income women. Local agencies provided maternal support services including nursing, social work, and sometimes nutrition and health education (Interviews with MDPH staff, Mary Conklin, 1988 and Margaret McConnell, 1990).

[144]Michigan, Medical Services Administration (1983-1988).

[145]American Academy of Pediatrics and American College of Obstetricians and Gynecologists (1989).

[146]In the summer of 1985, these medically high-risk guidelines were slightly expanded in the medical diagnosis area and also included the social risk of being under 17 years old. The second eligibility expansion of medical high-risk was implemented in October 1987 and included social conditions to be addressed by allied health personnel (Maternal Support Services).

This first reimbursement incentive lacked formal evaluation for the first phase of implementation. The fee differential by level of care was in practice for 17 months or more prior to the initiation of this program evaluation yet the frequency of use appeared low despite reports of continuing increases in provider costs.[147] This policy approach targeted a resolution to a specific area of need and responded to a particular request from the medical society. This incentive required establishment of a new set of procedure codes unique to Medicaid, but offered 65% greater remuneration than the standard procedure notation for prenatal care.[148] The original purpose of this policy was to help private physicians offset the increased costs of malpractice premiums found in a higher medical-risk caseload. Since this process required documentation of medical and age status, the evaluation of this reimbursement strategy was conducted in the cohort of pregnant women who had a single delivery live birth and a non-hospital based medical care provider. Private providers sought better remuneration for high-risk clients to offset the greater practice costs; the proportion of eligible clients for this high-risk reimbursement was unknown at the beginning of the study. If the provider used economic incentives to select clients two

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[147]MSA, McCandless (1986) found only 1% of physicians payments for prenatal package-of-care billed high-risk and 3% of visits paid to physicians were at the higher level in an internal partial review of paid claim procedures in 1984-1985. Facilities had a greater proportion of high-risk care but their total volume was low.

[148]Medicaid high-risk fees for prenatal care required provider documentation of medical need by hand entry on the remarks section of the paid claim. The physician was required to describe how the client met selected medical diagnoses or increased medical risks by age (MSA, Medical Bulletin No.5310.1-83-10 (1983). The four specific prenatal care procedure codes were in effect from fall 1983 to October 1985 when Medicaid changed from the Michigan Universal Procedure Codes (MUPC) to a joint system with Blue Cross-Blue Shield known as the Health Care Procedure Code System (HCPCS). Providers who do primarily BCBS billing are more likely to bill the normal package of prenatal care since BCBS does not offer a differential for high-risk care. The procedure coding changes should have affected 1985 services to a greater extent than 1986.

findings should appear: 1) almost all eligible clients should receive high-risk services and 2) the volume of high-risk clients identified in 1986 would increase because the gross rates of remuneration were much greater.

Hypothesis 1: Provision of an appropriate level of prenatal care[149] through monetary reimbursement does not significantly differ between 1985 and 1986.

Implementation of Level of Care Policy

A total of 31,427 single delivery women or 68.5% of those with pregnancy period coverage had Medicaid paid non-hospital fee-for-service (NHFFS) prenatal care reimbursed under the investigated procedure codes.[150] These women form the basis for evaluating provider implementation of the appropriate level of prenatal care for professional services.

Despite greater reimbursement for high-risk care to high-risk clients there was no significant difference (chi-square 3.03, p = .082) in appropriate implementation[151]

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[149]The level of prenatal care refers to a medical categorization of high medical risk or normal medical risk based on the health status and selected sociodemographic conditions of the woman; Medicaid policy defined the criteria for high risk classification originally based on medical disease and conditions. Although the provider determines the level of medical care felt appropriate for each patient based on history, clinical findings, and other factors, this designation refers only to compliance with the policy designation.

Appropriate care is defined as receipt of the level of care supported by paid claims diagnoses; high-risk care for those at high medical risk and low-risk care for those with normal risk for the pregnancy. In October 1985, age criteria were added to the high risk designation so, both medical condition and age applied. Only 10% of women under 17 years of age had a medical condition that would classify them at high medical risk if the medical criteria alone were applied.

[150]Four procedure codes for prenatal care set fee screens for billing: normal-risk prenatal visit, normal-risk prenatal package-of-care, high-risk prenatal visit and high-risk prenatal package-of-care. The high-risk procedures were reimbursed 65% more than the normal procedures. See Appendix E for these codes.

[151]Appropriate implementation of the level of prenatal care procedure code means that women with diagnosed medical and other social conditions determined by MSA to indicate a high-risk pregnancy, and therefore require additional time on the part of a provider, were identified and provided to the client, and likewise, women whose health status and social condition (except for poverty) were not perceived to require

of the level of prenatal care policy; 11.6% of NHFFS providers to high-risk women had reimbursed care at the lower level in 1986, and 10.4% of NHFFS providers to higher-risk women in 1985 billed and received low-risk care reimbursement as noted in Table 5.1. At least 10% of the clients with NHFFS-reimbursed providers fit criteria for more reimbursement for prenatal care based on their medical diagnoses. Medicaid policy staff found the reported 88-89% implementation of appropriate billing and payment for medical conditions as good policy compliance by the providers.[152]

The number of women who qualified for high risk medical status was low; 12.7% by medical condition and 3% more solely by age risk (under 17 or over 35 with the first pregnancy). There was no significant difference by year in the number qualifying. Women classified at high medical risk did have a greater proportion with neonatal death, but the majority of infant deaths occurred to offspring of normal risk women. The medical risk criteria were not sufficient to identify problem pregnancy outcomes.

Another factor which might influence receipt of an appropriate level of care was timing of Medicaid enrollment. If women entered Medicaid during pregnancy

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more than normal prenatal care services, were billed for normal care. When a woman at high medical risk receives a procedure code at the low risk level, it is labeled inappropriate level of care. Without individual case audit there is no assurance that the level of care billed reflects the level of medical care received; providers may be unaware that the high-risk level of care procedure codes existed, despite MSA efforts to alert them to substantially enhanced reimbursement, and thus they only billed for normal care. Normal-risk care is not synonymous with an inferior quality of care.

[152]Medicaid staff in the Bureau of Policy did not have previous compliance information in this area. Compliance above 80% was set as acceptable prior to the analysis. Higher payment requires considerably more documentation, a deterrent in the provider claim process (interviews by group and individual meetings with MSA staff, 1988).

The state's largest carrier of prenatal and delivery clients, Michigan Blue Cross-Blue Shield, does not provide a prenatal care rate differential because of the difficulty of monitoring the claims process (interview with Frederick Sovereign, MD, Blue Cross-Blue Shield, 1991).

their health history may not be as complete as women with enrollment in Medicaid prior to the pregnancy, or they might experience a delay in locating a provider. Analysis of the 5,564 women with medically high-risk pregnancies found no significant difference (chi-square 1.539, p = .214) by enrollment period into Medicaid and the receipt of appropriate level of prenatal care.

Table 5.1

Level of Prenatal Care Policy Implementation[a] by Year

Level of Care	1985	1986	Row Total No.	%
High Risk with High Risk Care	7.3	6.1	2,129	6.8
High Risk with Normal Care	10.4	11.6	3,435	10.9
Low Risk and Low Risk Care	82.3	82.2	25,810	82.3
Column Total % No.	100 17,481	100 13,893	 31,374	100

Mantel-Haenszel chi-square 3.02, p = .08223.

[a] Since there was a significant difference (p <.01) in the number of women served by NHFFS prenatal care between 1985 and 1986 analysis of the entire cohort was made, but there was still no significant difference by cohort year in the level of care received. Over 41% of 1986 women were served by non-FFS providers in 1986 versus over 20% in 1985.

More black women were affected by changes in FFS provider type but the racial differences in receipt of appropriate level of care were not statistically significant. In 1985, black mothers had an appropriate level of prenatal care 90.3% of the time and non-black mothers obtained it 89.2% of the time. For the 1986 cohort, black mothers had the appropriate level of care 87.9% of the time and non-black had

it 88.6% with Medicaid covered prenatal care. Women in 1986 used more non-FFS options for their prenatal care but this did not alter the level of care classification.[153]

The null hypothesis is not rejected since a significant increase in remuneration did not alter the level of care classification.

Conditions for a Fee Incentive

By 1985, the Michigan economy was out of the recession and the welfare roles continued to decline. The legislature passed tort reform related to medical liability and gave additional powers to the Department of Licensing and Regulation to monitor the impact. Since the state's physicians continued to pressure the legislature and Medicaid about an obstetric supply crisis, an additional reimbursement incentive was authorized to go into effect on January 1, 1986.[154] This incentive raised the fee screens 47% for prenatal care and 13% for delivery. Medicaid paid for approximately 25% of live births and Blue Cross-Blue Shield (BCBS) covered about one-third of Michigan deliveries at this time. Michigan BCBS decreased the covered benefit in many of its more liberal plans and the traditional plan resembled the Medicaid prenatal reimbursement but was below Medicaid high-risk reimbursement.[155]

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[153]Non-FFS providers include hospital clinics in teaching facilities and other salaried hospital providers, HMOs, and alternate sources of care which did not bill Medicaid, such as the MDPH, PPC program. PPC served 1,409 Medicaid women in 1985 and 4,005 Medicaid women in 1986 and accounted for a large portion of the difference between 1985 and 1986 distribution of care.

[154]Physician associations, including the Michigan Chapter of ACOG and the Michigan State Medical Society, continued to seek liability reform, state-paid coverage, and increases in Medicaid fees.

[155]Reimbursement rates for traditional BCBS were not published prior to the fall of 1990 after rate increases in 1983, 1985, 1986, 1988, and 1990. By 1987, Medicaid prenatal care rates were not estimated to be substantially different from the major private sector's traditional plan, but delivery rates were more than 60% lower. BCBS had very low provider acceptance of their rates. A raise approximating 30% was issued in 1990 and considerable effort was made to encourage physicians to participate at these new BCBS rate levels. About 63% of obstetricians (ACOG members) agreed to participate at the BCBS rates for prenatal care and delivery.

The January 1986 targeted obstetric provider incentive policy was a preferential fee screen that increased the maximum payments for prenatal care and delivery services procedures in efforts to expand access to physician care. Average Medicaid payments for physicians for 1985 and 1986 are shown in Table 5.2.[156] Between 1981-1990 there was virtually no real increase in Medicaid general reimbursement rates (considering medical inflation) because the legislature approved only 0.5% to 5% increases annually, with rate reductions in 1980, 1981, 1989, and 1990.[157] However, increases targeted to providers of maternity care attempted to respond to increased provider practice costs. In the first part of 1985, there was a 5% increase given to the professional service procedure codes for maternity care. Beginning in 1986, Michigan Medicaid increased all of the professional provider's prenatal care procedure fee screens 47% and the delivery professional services by 13%. These fee levels rose again in the fall of 1987 in a second wave of efforts designed to improve prenatal care access and reduce infant mortality.

Provider Incentives

This phase of the study determines the short-run impact of increasing remuneration levels for selected procedures between the base year (1985) and the

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Medicaid fell behind Blue Cross in 1991 when all physician rates temporarily decreased 20% and delivery services fell more than 50% below the BCBS rates. July 1991 legislative and executive compromise restored the rate levels.

[156]Average rates are estimated from Medicaid paid claims for maternity services during 1985 and 1986. Michigan urban medical care costs were stable during 1982-1984, 7.3% higher between 1984 and 1985, and 7.4% more between 1985 and 1986. Professional physician services increased 6.8% in the US between January 1985 and January 1986 (Bureau of Labor Statistics, 1985 -1990).

[157]These rate increases were below the increases in the Detroit-Ann Arbor Medical Consumer Price Index (MCCPI) for 1985-1989.

Table 5.2

Estimated[a] Average Physician Maternity Care Payments in 1985 and 1986

Procedure	1985	1986
Cesarian Delivery	$ 345	$ 400
Vaginal Delivery	$ 205	$ 245
Normal Prenatal Package	$ 150	$ 225
High-Risk Package	$ 250	$ 380
Normal Prenatal Visit	$ 12	$ 19
High-Risk Visit	$ 20	$ 31

[a] Average of fees paid to physicians serving Medicaid clients.

subsequent year (1986). The incentive was 47% more for prenatal care procedures and 13% more for delivery procedures at a time of 7% medical inflation.[158] The balance between provider supply and consumer demand provides a market approach which allows price effects to be studied.

Aggregate Supply

The first indicator of provider supply is the pool of licensed physicians available in the state. Michigan has about one physician per 494 citizens. Between 1985-1987, Michigan's physician supply grew 2%, exceeding population growth. The increased number of licensed physicians available in 1986 reflects a slowed rate of growth from the 1984-1985 period when Michigan's population stabilized.

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[158]All data in this study relates to usual FFS providers, MD, DO, public clinic, outpatient clinic, hospital, and other ambulatory providers. Residents and interns do not bill Medicaid for care. Hospital charges are covered through educational institution reimbursements. HMOs were included as providers, but since they bill only on a per capita basis, paid claims by procedure code were not usually paid separately. HMO services to the Medicaid population were limited during this time period to Detroit and Kalamazoo. Bill Kellar, MSA, estimated the childbearing population covered under HMOs at 3%.

The Office of Health and Medical Affairs (OMHA) surveyed physicians with its 1986 license renewal.[159] From this statewide study, Michigan had 1,018 patient care physicians who stated their specialty was obstetrics-gynecology, 949 physicians declared a pediatric specialty, and 1,621 physicians recorded a family practice specialty. The total number of Michigan patient care physicians in 1986 was 18,734, or 97.5% of the licensed supply, shown in Table 5.3.

Table 5.3

Michigan Licensed Physician Supply By Category[a]

Year	MD	DO	Total
1985	15,964	3,142	19,106
1986	16,092	3,121	19,213
1987	16,245	3,255	19,500

a The specific number of licensed providers derives from a special tabulation of the Michigan Department of Licensing and Regulation, April or October annual report.

Aggregate Demand

During 1985 and 1986, Michigan was still in an out-migration phase and the 2.2 million childbearing age women declined by over 71,000. Reported pregnancies decreased 0.7% and live births decreased by 0.3%, according to the Michigan Department of Public Health's (MDPH) Office of the State Registrar and Center for

[159] The Michigan Department of Management and Budget, OHMA report (1990) is based on a survey of physicians with controlled substances licenses; this class represents 80% of the state's physicians. The survey defined a patient care physician as any physician who reported spending time in patient care in Michigan. This includes more than primary practice areas described by the AMA.

Health Statistics (OSRCHS).[160] The Michigan Department of Social Services (DSS) identified a decreasing number of clients over the 1985 and 1986 study years as displayed in Table Appendix I.1 showing Medicaid eligibility by program category at enrollment. The categories contributing clients to the pregnant women and newborn areas dropped 2% between 1985 and 1986. In comparison, the total number of people potentially eligible for Medicaid in Michigan decreased by almost 10% during this period (not shown). This drop in potential clients eligible for Medicaid in Michigan follows the caseload trend of the 1983-1989 period and is sensitive to recovery from recession. The actual number of unduplicated Medicaid recipients in fiscal year (FY) 1985[161] was 1,133,317 compared to 1,119,724 in FY 1986, for a decrease in caseload of 1.2%, but with a corresponding increase in expenditure of 16.5%. Although the total caseload dropped, the mother and child Medicaid eligible increased significantly from about 66% eligible in 1985 to 72% in 1986. The actual number of unduplicated Medicaid recipients in FY 87 increased 0.4% to 1,125,047.

The major source of maternity and newborn clients come from the Aid to Families with Dependent Children program (AFDC) users of Medicaid; this category measured 921,660 in FY 1985 and dropped insignificantly to 920,239 in FY 1986. Medicaid recipients went up again in FY 1987, but not in the AFDC area (decreased 1.2%).[162] Although Medicaid eligibles decreased, the actual AFDC users of Medicaid

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[160]MDPH, OSRCHS noted that births for Detroit were undercounted in the 1985 official statistics due to a hospital strike in a major Detroit hospital. A supplemental file for these cases is used in the dissertation to more accurately reflect the status of births and deaths. If these births are incorporated into the data, the change in live births to Michigan residents is about 1.4%.

[161]In Michigan, the fiscal year (FY) runs from October 1 to the following September 30. FY 85 includes the period October 1, 1984 through September 30, 1985.

[162]The data for this section used internal agency reports (Michigan, MSA, Office of Program Policy, 1986-1988 and MSA, Nancy Duncan, 1989).

between the study years did not change significantly until 1987. Aggregate demand decreased in 1986 with only small increases in medically needy categories of program Q and L.

In summary, Michigan's vital records indicated a decrease in pregnancies and births for the general population, and welfare data showed a decrease in the both the total number of people estimated to be eligible for Medicaid and those who used Medicaid between the two years. From the overall aggregate data Michigan would expect no change to slightly fewer pregnancies in 1986 than 1985, all things being equal, a prediction based on the decrease in the AFDC and Q program categories (over 85% of the pregnant women fall in these two categories).

This chapter describes the effectiveness of remuneration policies on improving access to maternity care. Participation of providers was determined from the provider enrollment and paid claims files.

> **Hypothesis 2:** Targeted increases in reimbursement for professional maternity care services, and specifically prenatal care, do not improve the supply of medical providers who serve Medicaid women.

The hypothesis was tested in two parts; first by investigating the proportion of Medicaid enrolled and reimbursed maternity providers each year and second by determining the number of Medicaid enrolled and reimbursed prenatal care providers annually. Subcategories of providers (clinical providers and only physicians) are also explored.

FFS physicians have free choice concerning the type of clients they serve. The vast majority of Medicaid providers of childbirth services had only a small number of Medicaid clients in the caseload; no dramatic increase in the number each would

serve was expected among currently participating physicians.[163] Deterrents to accepting Medicaid clients in Michigan included an undocumented perception that Medicaid clients sue more often than middle-class clients, and that other clients would be offended to have them in the practice.[164]

Study Population Selection[165]

During the 23 months of investigation, over 66,000 women experienced a childbirth hospitalization (DRG 370 through 384) based on paid claims history file. All women with paid professional maternity services are included in the maternity-care provider-supply phase of the study. The delivery year was established from the linked records by the birth date on the birth certificate. Paid claims from the calendar year of birth are identified and indicate payment to a physician, clinic, or other provider for prenatal care, medical services at delivery, postpartum care, or miscellaneous maternity codes in the single delivery linked file. The unlinked records (women had paid claims but the event did not link to a birth certificate) used the same procedure for establishing the prenatal, delivery, and postpartum services available over the study period, but the delivery date was estimated using the end

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[163]Physician surveys at the national and state level indicated that obstetric providers were the least likely specialty to participate with Medicaid, and when they did participate, the average percentage of the caseload represented by Medicaid was 10% (ACOG, 1985 and 1987; MSMS 1985, 1987; MDPH, 1989 and Mitchell, 1984 and 1990).

[164]Discussion from physician providers to state staff during the Obstetric Access to Care Committee meetings, Lansing, 1988-1989.

[165]Clients with claims for maternity services were identified through the hospital Episode File (EF). This file was used to initially identify a childbirth event or newborn condition. All Medicaid recipients falling into the time period (February 1, 1985 through December 31, 1986) had their paid claims for the previous nine months (beginning June 1984) through the search date (June 1988) pulled. These paid claims were reduced to up to nine months before the first study pregnancy and six months past the last study delivery (8.3 million claims form the study general expenditures for recipients studied in the cohorts.) All paid claims with appropriate maternity procedure codes for professional services in the 1985 and 1986 years were used.

date of service and all selected claims in the calendar year of delivery were chosen for comparison. Women with multiple-delivery events[166] are included only once each year, placing the index delivery as the last in the calendar year for the paid claims provider analysis. The 62,752 clients with paid maternity claims formed the special records study for the frequency of unique provider participation in prenatal and delivery professional services to the women.[167] The number of providers performing prenatal care services for each year was studied.

Providers and Clients Enrolled in Medicaid

Medicaid-enrolled providers are the potential suppliers of medical care to Medicaid women. The following sections address those physicians and facility staff who actually provided maternity care as measured through the paid claims process.

Actual Maternity Providers

Overall, there were 3,242 unduplicated physicians and facility staff providers of Medicaid maternity procedures in 1985 (11 months). In 1986, despite a 47% increase in the remuneration screen for prenatal care and a 13% increase in delivery reimbursement rates, only 3,164 providers were paid by Medicaid for similar procedures in 1986. Thus, in the aggregate, there was a decrease of 78 paid Medicaid

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[166]Multiple-delivery events refer to women who had two or more different deliveries during the study. This is not to be confused with a multiple gestation delivery in which there was one delivery event but the pregnancy contained two or more fetuses (e.g. twins). For this phase of the research, the last delivery of the calendar year is the study case, or the index delivery. Each cohort year is processed separately, so the multiple-delivery events women who had a delivery both years, appear in each year but are only counted once a year.

[167]Each Medicaid recipient's paid claim carried with it the provider identification (site of service) number, the procedure code, end date of service, and total paid by Medicaid. These selected claims per recipient-provider were then merged with a selected subfile of the PMF to determine the unduplicated number of providers attributed to each woman and the service location of providers who received reimbursement for professional maternity services.

maternity providers from the previous year in 1986. Table 5.4 shows the provision of procedures by physicians and facility staff for various services. The significant difference in the frequency of using prenatal visit procedure codes in 1986 did not differ by the type of physician. In 1985, 37% of maternity providers were reimbursed for prenatal care visits, but only 9% had paid claims for normal prenatal visits in 1986.[168] Providers paid for high-risk prenatal packages and Cesarian deliveries increased in 1986, as shown in Table 5.4.

Table 5.4

Maternity Procedure Codes by Number of Reimbursed Providers, 1985-1986

Maternity Procedure	1985 Period	1986 Period
High-Risk Visits	32	17
Normal-Risk Visits	1,211	293
Postpartum Visits	1,515	1,406
High-Risk Package	267	387
Normal-Risk Package	1,572	1,538
Cesarian Deliveries	2,075	2,204
Total Maternity	3,242	3,164

Physician Providers

Despite efforts to accommodate the cries for better reimbursement from the medical societies, 2,022 prenatal providers in 1985 decreased to only 1,829 in 1986, indicating a significant negative decrease in supply to Medicaid. Paid claims show an

[168]One reason that visits may have dropped is that the cost of resubmitting a pending claim for a prenatal visit might be too expensive for the net return. The drop in visit billing was only temporary because Medicaid's assessment of 1988 prenatal care found that 34% of clients had visits paid.

aggregate 9.5% loss of prenatal providers in 1986. This decline indicates that the 4.8% gain in general Medicaid enrollment of physicians experienced in 1986 did not translate into increased access to prenatal care for the caseload. Of the total Medicaid prenatal care providers, about 95% were physicians each year. In 1985, there were **1,985** prenatal care physician providers, which decreased to **1,736** physicians in 1986. The 1986 reimbursement increases did not improve either the clinical pool or the physician only providers for prenatal care or maternity services overall. There was a significant increase in the proportion of providers billing high-risk packages; Medicaid placed an emphasis on having hospital providers use the high-risk code in 1986.[169]

Provider Caseload Averages

In 1985, the **3,242 paid maternity providers** saw a mean of 18.28 ±42.3 clients, a mode of 1 and a median of **7** maternity clients. The distribution is skewed, with a small number of providers having large caseloads of Medicaid clients. The comparison with 1986 claims found **3,164 maternity providers** saw a mean of 21.19 ±52.8 recipients, a mode of 1 and a median of **7**. The 1986 maternity supply reflected no change in the median number of patients served and three more patients added to the arithmetic mean. The large-volume providers added clients and one new large volume clinic participated in 1986.[170]

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[169]Kellar interview (1989).

[170]In 1986, the number of providers paid for caring for one patient increased to 16.8% from 15.6%. Thirty-four providers achieved the 99th percentile, with 212 or more clients in 1986.

Procedures reflect only paid claims. The procedure codes for these services changed effective October 1985 from MUPC to HCPCS. This change may have created some billing difficulties because of invalid coding, but these problems should have occurred during 1985. A records review sample indicated that 17 women had their high-risk prenatal care coded under the old system in 1986 and the provider still received payment, but other errors may not have been caught.

There was no significant change in the average number of maternity clients served per provider between the years (recall that 1985 cohorts represent only 11 months of deliveries). The caseload average increase was not clinically significant and generally reflects a reduction in providers serving only a few clients annually and a slight gain in caseload among others. The average monthly distribution of study clients seeking and receiving care from paid providers was 4,278 in 1985, dropping insignificantly in 1986 to a monthly average of 4,259 clients. The difference in pregnancy experience may be due to a slight improvement in the economy which reduced the female caseload in Medicaid, an artifact of the paid-claims process for these procedures, increased enrollment in HMOs or the PPC program, or simply following the general Michigan population trend for fewer recorded births in 1986.

Not all providers of maternity services were reimbursed for prenatal care. In 1985, a total of **2,022 unique hospitals, physicians, public clinics, and others rendered prenatal care;** this represents 62.4% of maternity providers. These prenatal-care providers had a mean caseload of **23.3 ±50.1 pregnant clients and a median caseload of 9** clients in 1985. The total high-volume maternity providers[171] contain the high-volume prenatal providers. Only **1,829 unique providers** were reimbursed for prenatal care in 1986; their mean caseload was **27.9 pregnant women with a median of 11.** Since there were fewer providers in 1986 and the proportion of them who rendered prenatal care decreased to 57.8% of maternity providers, the average number of pregnant clients per provider increased by two clients per year. A further refinement of provider participation is limitation of providers only to ambulatory

[171]High volume is defined as the 99th percentile; this represented service to 176 prenatal patients or more by 22 providers (clinic sites are included) in 1985. The prenatal care mode was 9.8% of providers serving only one Medicaid patient for prenatal care in 1985.

settings. This approach was used with the linked single-delivery women. Clinical providers are primarily ambulatory physicians. In 1985, 3,203 clinical providers[172] received paid claims for maternity care; 85.1% (2,726) conducted deliveries and 61.97% received payment for prenatal care in 1985. For 1986, the paid clinical providers of maternity care dropped to 3,129. This aggregate loss of 74 clinical providers consisted of 93 DOs who did not receive payment for services, 20 new MD providers, and one new public clinic provider. In 1986, more of the participating providers performed deliveries for a total of 88.78% (2,778) of providers, but only 57.39% received payment for prenatal care despite the higher reimbursement. The mean number of prenatal patients per clinical provider increased by 4 to 27.9 in 1986 (the same as all providers).

The medical care services of the Consumer Price Index increased 7.0% between January 1985 and January 1986 and the respective physician services increased 6.8%. The medical-care services inflation between January 1986 and January 1987 was 7.7%.[173] The 1986 13% increase in delivery professional service remuneration was double the annual inflationary rate and the 47% increase in prenatal care was a significant enhancement to providers after medical care inflation. Despite receipt of the requested remuneration enhancement for prenatal care, the number of Medicaid providers declined. Although the increase in delivery charges was more modest, the number of providers paid for vaginal deliveries decreased 2% and the number reimbursed for surgical deliveries increased 6.2%. The type of delivery performed by providers reflects a statistically significant change ($p < .001$) in the number performing operative deliveries in 1986, whereas the decline in vaginal deliveries was not

[172]A clinical provider is a physician, public clinic, or outpatient clinic; other health professionals or sites are not included in this definition.

[173] US, Department of Labor Statistics, 1986, 1987, 1990.

significant for providers. The reduction in reimbursed packages of prenatal care was a modest 2%, but the visit procedure codes dropped significantly. Provider billing practices may have changed toward greater use of the package of care, or the different configuration of providers in 1986 may have been less frequent users of prenatal visit codes instead of packages. There appears to be a substitute effect in the usual clients served under Medicaid who had their prenatal care billed as visits; prenatal care alternatives in 1986 included expansions of the PPC program and managed care. The PPC effect would not include delivery coverage and thus the decline in total maternity providers of 2.4% is the best estimate of a reduction in maternity supply. Managed care was not aggressively pursued in 1986, so little effect is attributed to this alternate. It appears that the PPC-type of client was more typical of second trimester or later enrollment into prenatal care which would require billing visits.

As shown in Table 5.5 a significant change in osteopathic physician suppliers (12% decrease) occurred that was not balanced by the 0.9% increase in MDs. About 0.4% fewer Medicaid women had a DO in 1986 versus 1985, whereas the MD client share increased 0.7% in 1986. Almost 4% more DO providers (3.6%) listed an obstetric specialty in 1986 and 1.6% more MDs listed an obstetric specialty. It appears that when DOs remained as maternity providers they were more likely to be trained in obstetrics. Analysis of the participating caseload by provider type in Table 5.5 shows the distribution of clients and reimbursed maternity providers. The number of clients served by each provider type increased in 1986 so the significant loss of DO providers was spread among other types of FFS providers including hospital providers. Osteopaths have the lowest caseload (13.6 and 16.5) of maternity providers which typifies the general office practitioner. Fewer hospital-based providers received reimbursement in 1986 and this is probably associated with billing changes versus a

decrease in hospital providers. The hospital clinic participation shows that outpatient care sites were not using the prenatal codes for billing.

Table 5.5

Study Period Maternity Caseload by Major Provider Type

Type of Clinical Provider	1985 Client Load			1986 Client Load		
	Mean	Std.Dev.	No. Providers	Mean	Std. Dev.	No. Providers
Public Clinic	23.75	±44.0	75	22.01	±48.5	76
Hospital base	19.29	±66.8	131	26.6	±140	128
MD	17.9	±33.6	2,227	20.49	±40.8	2,247
DO	13.55	±22.8	769	16.49	±29.0	676
Hospital Clinic	26		1	259.0	±342	2

The specialty of the provider also affects the volume of patients served. Medicaid-paid obstetric specialists accounted for 34% of reimbursed maternity providers each study year; in 1985, the 771 obstetricians served an average of 33.6 clients ±45.4. For 1986, 757 obstetric specialists served a mean 37.84 ±56.7 clients. The obstetrician specialist participation rate would be 74.4% based on the OMHA census of all available obstetric specialist patient-care physicians.[174]

Contrary to the desired policy effect, a 1.8% loss occurred in paid obstetric providers with a large reimbursement increase for maternity procedures. Following this pattern for participation, but with a contrast in total caseload, board-declared family practice specialists numbered 438 or 13.5% of the maternity providers in 1985,

[174]This proportion of obstetric specialists compares favorably to the 73% who responded on the 1984-85 national provider survey conducted by NORC that they accept some Medicaid clients (Mitchell, 1990).

and 405 or 12.8% of providers in 1986, but they saw only an average of 11.7 clients per provider in 1985 and 14.25 clients per provider in 1986. Using the 1986 data from the Office of Health and Medical Affairs (OHMA) Physician Census, only 25% of the state's family practitioner specialists provided maternity care to Medicaid clients. Almost a third of maternity providers (32% in 1985 and 31% in 1986) had no specialty declaration in the Medicaid provider system; these providers saw a client population of 23.2 clients ±36 during 1985 and 27.59 ±49 in 1986. Hospital-based providers, other outpatient service providers, non-physician providers, as well as any physicians in residency who "moonlight" are under this designation.[175]

Although Medicaid offered a substantial fiscal incentive to render maternity services in 1986, Medicaid-participating physicians and other providers decreased maternity care; maternity providers decreased from 10.26% of the full-enrolled Medicaid providers (31,569) in 1985 to 9.74% of the enrolled providers (32,485) in 1986, but this decline was not statistically significant. The overall providers potentially available for Medicaid increased in 1986 but the maternity providers decreased for Michigan Medicaid.[176] No significant change in the number of

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[175]This group does not include general practice physicians since Medicaid has a specialty code for them even though they are not generally considered medical specialists by medical societies.

[176]The total percentage of Medicaid maternity providers was calculated by totalling the physicians, outpatient clinics, and public clinics available for the year and comparing the unique number of providers reimbursed for the selected maternity procedures. Another method to look at provider supply determined those providers expected to provide maternity services--those board eligible or certified in either obstetrics/gynecology or family practice, or those who self-declared these specialties between 1972 and 1983. As seen in Table Appendix I.4, the number of potential obstetric specialty providers dropped between 1985 and 1986, and further declined in 1987. New providers did not replace those who left between 1984-1987. The specialty pool of obstetric providers were only a portion of those who served maternity cases. Based on the large number of "other specialty providers" (many general practitioners) this method was dropped as a comparison.

reimbursed providers of maternity care occurred or the type of provider reimbursed, when a monthly average was used to equate the 11-month study period in 1985 to the 12-month period in 1986. In the aggregate, the number of clinical prenatal-care providers decreased by 9%. In 1986, 1,736 prenatal care providers were physicians (94.9% of the total paid prenatal care providers), indicating that no significant switch occurred in the kind of practitioner (physician, clinic, or other type) providing prenatal care.

Change was evident in the kind of physician providing services between the two years. This discontinuity in osteopath services illustrates that other factors affect the decision to continue specific services.[177] Although malpractice premiums increased significantly in the 1980s, the difference for 1985-1986 was not as great as other annual changes. Osteopaths offer a significant provider pool for less-populated areas; lower DO participation in Medicaid in 1986 and a return in 1987 may relate to

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Paid claims analysis of a policy effect has one drawback. There is no data available to account for those providers who billed once, were questioned as a pending claim, and never resubmitted a bill; the denominator now represents a conservative number of Medicaid providers of care.

[177]Data from the state's obstetric access surveys would support that the volume of prenatal clients seen by DOs is less than those seen by MDs; the average DO having an obstetrics component to practice served 11 clients in 1985.

The increase in malpractice premiums altered the opportunity costs of conducting any obstetric services. The cost of liability insurance for obstetrics with under 40 cases a year exceeds $300 per client. The typical DO did not see this volume of prenatal clients. The choice for providers with a low volume of pregnant clients is either to practice without special obstetric liability coverage or to pay the large premium. Conventional business practices influence this decision, so providers with a desire for a low-obstetric volume either choose to stop obstetrics or to continue without specialized insurance. If the average obstetric liability policy was $13,000 for a low-risk provider, then, eight full-pay clients would be needed just to cover the policy's cost. The opportunity costs to practice obstetrics outweigh the benefits even in the full-pay situation with this level of caseload. It is not surprising that 12% of DOs left the obstetric practice area based on opportunity costs. The Medicaid Master File indicated that total DO enrollment decreased in 1986 and returned in 1987 (See Table I.4.)

the PPC program substitute and not an artifact of medical malpractice premium costs. Another factor in declining numbers of obstetric providers is earlier retirement from obstetrics. For maternity providers, the median was 4 years as a Medicaid provider (1972-YTD) both years, but in 1986 the mean length of participation was 5.78 ±4.88 years, and a mode of 1, versus the mean of 5.51 ±4.78 years and a mode of 13, in the base year of 1985. Longer standing (and older) providers left to be replaced by fewer new practitioners. The general shift of seasoned providers leaving obstetrics showed in those providers who left maternity services; the physician choice to practice obstetrics is not related to Medicaid clientele.

It appears from this Medicaid paid claims analysis that current practice has more effect on participation than the fee ceiling for the procedure. Analysis of the paid maternity procedures reflects more the specialty of practice and current physician culture than the economic incentive. The change in reimbursement screens for prenatal care and delivery services showed no improvement in the clinical provider supply in the first year of implementation based on the unduplicated providers who actually billed and received payment from Medicaid for maternity services.

> **The null hypothesis was not rejected.** Other data from DSS supports the argument that another significant reimbursement increase targeted to maternity services also had no effect in gaining new providers but merely kept current supply.[178]

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[178]See the reference for the Office of Support Services, Medical Policy Bureau, Michigan Medical Services Administration 1988-89 study described later in the chapter.

Provider Location

Counties differ in their maternity provider supply as they do for total population and Medicaid cases. All counties except Keweenaw served Medicaid clients. No county exceeded a full standard deviation at the mean for average Medicaid clients per provider. Selected data by county appears in Appendix I; these data identify differences within the state. Since Medicaid-structured managed care options in Wayne county, outstate areas[179] offered a Medicaid substitute, and HMOs were only available in Wayne and Kalamazoo counties it was impossible in this phase of research to adequately present differences in reimbursement incentives between metropolitan, urban and rural counties.

Provider Continuity

Considerable continuity existed between enrolled providers in both study years (30,888 or 93.1%).[180] Physician enrollment showed 94.2% of DOs and 93.2% of MDs enrolled for both study years, and 94% (2,747) of the providers were available as specialty providers. DO specialists were more likely be available both years than MD specialists ($p = .037$). The change level of provider enrollment was 2% annually; 2.1% of providers enrolled in 1985 were not present in 1986 and 2.4% of 1986 providers did not participate with Medicaid in 1985. Eleven clinics (some are physicians using the clinic provider code versus their private practice location) were designated as obstetric-gynecology or family practice clinics; one was new in 1986. Michigan's enrolled clinical providers are significantly FFS oriented during this period in contrast

[179]All counties except Wayne, which includes Detroit, are referred to as outstate Michigan. The MDPH, PPC program did not operate in Wayne county with any significant numbers at this time.

[180]The gamma between years was .906 with a t-value of 15.5 and a Pearson r of .77.

to many areas of the country which relied on local or state public health clinics to deliver much of the prenatal care to low-income women. It is estimated that at least one-third of the Medicaid clients who received prenatal care could have had a clinic as a provider.[181]

Managed Care Impact

The impact of HMO use and other managed care alternatives to the FFS physician is not known. During the study years, Medicaid HMO use was limited to Kalamazoo and Wayne counties and included only a small number of Medicaid cases. In 1986, delivery paid claims identified 1.6% of pregnancy claims with an HMO, and at delivery 328 women (1.4%) who listed an HMO provider for the pregnancy period converted to a Physician Primary Sponsor Plan (PPSP) postpartum. Based on the claims count, an estimated 3.3% of 1986 delivery women had an HMO provider. Physician Primary Sponsor Plans associated with 3% of the 1986 delivery women in the period before pregnancy and their use increased to 5.3% of cases in the delivery to 60-day period. It appears that some 10% of women in managed care have partial expenditure data and health outcome data available in the dissertation period. HMO expansions began in 1987 and should significantly impact future analysis, especially with AFDC clients. The total number of public clinics have increased but those specific to obstetrics did not appear to be increasing substantially. The PPC providers

[181]Medicaid offers a general clinic visit procedure code similar to the general office visit code. This dissertation effort searched the paid claims file for prenatal care, primary and secondary diagnoses from office visits, but did not conduct the same process for hospital clinics. Based on the volume of clients with prenatal care reported on birth certificates but no paid non-hospital fee-for-service (NHFFS) prenatal care, this source of care could be important for future work. Eleven women in the FFS prenatal care system had only general office visits coded for prenatal care.

were generally physicians in private practice who saw clients in their office or started a new clinic for the PPC program.

Alternative Explanation

The decreased provider participation described in this chapter may relate to several factors which cannot be determined by examining administrative and paid claims files. These could include an increase in the number of providers who did not bill for services, use of a Medicaid substitute, a reduction in billed versus paid rate, a decreased social commitment to serve Medicaid clients, or a general trend for a portion of practitioners to stop all obstetric service.

A new substitute (the PPC program) for Medicaid became available in 1985 and lasted through 1987. The participation of Medicaid MD physicians in maternity services did not significantly differ between the study years; DO participation in Medicaid dropped suddenly in 1986 and returned in 1987. The proportion of paid maternity providers who rendered prenatal care decreased from 62.4% to 57.8% ($p = .025$) of reimbursed maternity care providers. This diminished supply of prenatal care providers could owe to displacement to the PPC program since no significant change in maternity provider participation occurred.[182] The total number of women with delivery professional services (30,222) did not significantly differ ($p = .9$), based on a monthly average between the study years.

[182]PPC did not cover delivery in 1985-1986, so physicians would have to use Medicaid to cover delivery fees; the 1986 enhancement was a 13% increase in reimbursed professional services for delivery.

Confounding With PPC[183]

The Michigan Department of Public Health made funds available to local health departments to expand prenatal care access to low-income women who did not qualify for Medicaid in 1983. By 1985, the department formalized this effort into the PPC program. A detailed discussion of the PPC program appears in Appendix J. To summarize, the PPC advantages to providers were 1) a local contact person, 2) little paper work with fast turnaround in payment, 3) greater reimbursement for most clients, 4) fewer service contacts required for a care package, and 5) in some counties, payment, or arrangements for coverage, of a portion of medical liability insurance. The three disadvantages of the PPC program were a limit on laboratory tests and other diagnostic procedures, difficulty with inpatient care coverage including no coverage for delivery services (until 1987), and very limited coverage for pharmaceuticals. If the client was medically high risk, these problems, coupled with the greater frequency of hospital admission during pregnancy, made it necessary to rely on and utilize Medicaid if the client qualified. The PPC program offered physicians faster payment time with little documentation and better reimbursement for the care of low-risk women (or the same rate for high-risk women) when they had six or more prenatal visits in 1985. By 1986, the reimbursement for Medicaid high-risk care or single-visit services was substantially better in Medicaid, but the majority of low-risk care was paid at a higher rate through PPC. In 1987, the Medicaid rates were better than PPC, but Medicaid clients were still a large part of the PPC caseload. Within the Medicaid childbirth cohorts, the PPC program might be credited with a transfer of client billing which could account for up to 31% of the 1985 women who

[183]The Prenatal Postnatal Care program (PPC) sponsored by the MDPH operated from 1985 to October 1987.

did not have Medicaid reimburse their prenatal care and 40% of the 1986 women.[184] Since the PPC clients enrolled in Medicaid were likely to be hospitalized and deliver with Medicaid reimbursement (or had self-pay or uncompensated care), the maternity provider participation captures all participating PPC-physician providers who accepted Medicaid for delivery payment. The majority of the women enrolled in Medicaid during pregnancy, but not having Medicaid FFS reimbursed prenatal care, were not served by PPC, so other alternates to payment must be considered. The most likely alternative is outpatient clinics that did not complete the procedure code for prenatal services but rather billed the general outpatient services procedure.[185]

When delivery is averaged on a monthly basis, the net decrease in maternity providers is not statistically different between 1985 and 1986. A rate increase at twice

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[184]In the single-delivery event file, 4,531 women with Medicaid enrollment in 1985 did not have NHFFS reimbursed prenatal care. In 1986, this situation doubled and 9,929 women did not have Medicaid NHFFS prenatal care, although only 2% had no reported prenatal care. The 1985 cohort had no significant difference by length of enrollment in Medicaid (started during pregnancy or were already enrolled in the period preceding this conception) and their prenatal care reimbursement source. In 1986, two percent more women ($p = .00077$) with prior Medicaid enrollment had their prenatal care paid by Medicaid than women who enrolled during pregnancy. This shows an advantage to women with established Medicaid care providers. The Medicaid women not served by PPC or FFS care most likely used hospital clinics.

[185]The paid claims linkage showed only two hospital clinics billing Medicaid for prenatal care but many more were known to have a routine prenatal clinic. The actual count of hospital-based clinics was not available within Medicaid. The only other administrative-data base of possible assistance was the MDPH annual Facility Licensure Survey. The state's hospital licensure survey does not computerize data on clinical services of the facilities. In 1987, hand entries were available on the raw forms, but no survey was conducted in 1986, leaving void a comparison. There is no similar data available for 1985. Administrative files available at this time cannot explain where these women received their prenatal care but the impact was greater in 1986 than in 1985. MSA's report of maternity care procedures for calendar 1988 indicates that 23,320 women had reimbursed prenatal care and 28,269 delivered under Medicaid. This difference between clients served in the antepartum period and those at delivery was at a proportion similar to the 1985 level even though Medicaid eligibility expanded. Medicaid total caseloads were lower in 1988 than during the 1985-1986 years. Data for 1990 still show similar caseload increases for delivery.

the inflation level did not alter the Medicaid provider pool. By January 1988 Medicaid increased prenatal care reimbursement rates 108% and delivery fees 64%[186] from the 1985 levels; the prenatal care rates were competitive with standardized plans. Despite this substantial increase in reimbursement, MSA found no increase in providers in their study of prenatal providers during the October 1987 - December 1988 period.[187]

Expenditures for Maternity Procedures

Table 5.6 presents the 1985 baseline[188] year and the 1986 higher provider reimbursement year caseloads of clinical providers with the mean payment received by each category of clinical provider. Hospital rates for professional service were the lowest but experienced the largest increase between the years.[189] Although the incentive for delivery professional service was small, increased numbers of providers reported operative delivery procedures and fewer providers billed for vaginal methods.[190] This change might indicate that a physician with only one-to-three clients per year was more likely to perform the operative procedure in 1986 as part of his on-call status at the hospital, or that more surgical deliveries were billed by

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[186]Unadjusted for inflation. The Detroit-Ann Arbor medical care inflation was 7.3% between 1984-1985, 7.4% between 1985-1986, 5.5% between 1987-1988, and 4.9% between 1988-1989.

[187]The Office of Support Services and the Medicaid Policy Bureau conducted a review of prenatal care providers for the last quarter of 1987 and 1988 based on paid claims. This study did not unduplicate providers across counties. Refer to page 128.

[188]The base year of 1985 was the best available for program stability. The initial provider reimbursement incentive began in October 1983. The 1984 year stabilized the population in need. Caseload was stable in 1985-1986. New coding (normal level codes were the same as BCBS) was initiated for physicians in October 1985.

[189]Hospitals received a clinic fee in addition to this professional service fee.

[190]The hospital admissions by DRG for operative deliveries increased by two percentage points between the years indicating that the procedure was increasing at a similar rate as the general population.

teaching hospital professionals, or that more women had some insurance to cover delivery or that the medical provider was less likely to bill for a vaginal delivery. Another partial explanation is that the majority of providers who ceased providing Medicaid maternity services did not perform deliveries or did very few vaginal deliveries annually. Other forces seem to be at work besides the economic incentive of an increased reimbursement rate.[191] The total cost for all maternity claims for cohort women was $3.39 million dollars more in 1986, or an average increase that was 22% greater as noted in Appendix E.

Table 5.6

Maternity Providers Caseload and Average Payments for 1985 and 1986

Provider Type	1985		1986	
	Women No.	Mean $ Received	Women No.	Mean $ Received
MD	21,084	365.98	23,466	438.61
DO	5,715	375.13	6,143	458.01
Hospital Base	1,710	9.14	1,622	18.68
Outpatient Clinic	28	33.84	22	50.42
Public Clinic	657	262.58	662	354.80
All Providers	29,974	340.24	32,775	414.61

Longer Term Impact of Fee Enhancements

As this investigation was in progress, pressure to evaluate obstetric access to prenatal care led to an internal Medicaid (MSA, Bureau of Policy) analysis of 14 months of aggregated paid claims for prenatal care and delivery service. This

[191]The discrepancy between the enhanced delivery remuneration and common rates from other carriers was greater for deliveries than for prenatal care.

analysis was conducted after substantial additional increases in remuneration for prenatal care and delivery professional services. The administrative study used paid claims procedure codes and provider service numbers for physicians and public clinics.[192] The results indicated that a clinical provider pool of **less than 1,885 paid prenatal and delivery providers** after subsequent fee-screen increases and the implementation of less restrictive eligibility.[193] If 145 physicians are estimated to serve clients in more than one county based on the dissertation's 1985 and 1986 data (143 and 146 duplicated physicians in more than one county with 10 providers in more than two counties), then an estimated 1,740 unduplicated physicians rendered Medicaid prenatal care and delivery services in late 1987 and 1988. This number is very close to the 1,736 unduplicated physicians who delivered reimbursed prenatal care in 1986. The Medicaid investigation of paid claims indicated that further significant increases above inflation did not increase physician- or public clinic-provider supply. The extent to which altered reimbursement schedules maintained

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[192]The internal Medicaid study utilized the theory and assumptions developed for the dissertation, but providers were limited to physicians and public clinics. Hospital sites and staff were not included. The study did not link provider identification numbers with the PMF to develop a unique and completely unduplicated listing of providers; it unduplicated physician providers within counties by hand matching provider names associated with different site-identification numbers. This internal study therefore slightly overestimates individual physician participation statewide and underestimates real obstetric supply because hospital sites are omitted.

[193]Expanded services became available for social support during this period and basic pregnancy eligibility was relaxed to 100% PL with no assets test from January to October 1988, and then OBRA 86 expansions started in the last quarter of 1988. The expansions allowed clients with incomes to 185% poverty level, without an assets test, to receive Medicaid coverage for pregnancy.

The MDPH's PPC program was converted to Medicaid at this time and did not offer a substantial substitute for providers. Under 150 women were still served by MDPH because they did not qualify for Medicaid coverage, yet were below the poverty limit.

physician supply is unknown because the MSA procedure study did not assess the characteristics of the prenatal care and delivery providers.

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Summary

The conclusion is that Medicaid clinical providers do not serve prenatal clients based solely on the fee reimbursed and new providers do not become active participants in Medicaid prenatal care primarily because of reimbursement rates. The null hypotheses are not rejected since increased remuneration did not increase supply or improve the level of care assignment. Michigan physician enrollment in Medicaid was high despite reimbursement levels which did not keep pace with inflation. Providers in the FFS sector had considerable latitude in selecting clients and using professional judgement; the standards applied in Michigan Medicaid resembled state and national expectations for all women. Obstetric specialty participation was better than the reported national average (Mitchell 1990) and was in exact proportion to obstetric supply estimated for the state (Office of Health and Medical Affairs, 1990). Despite national and state physician surveys that indicated fees significantly affect their decision to accept Medicaid clients, Michigan obstetric providers participated in Medicaid for fees significantly below charges in the early 1980s and significant increases in remuneration in 1986 did not increase their participation.

Data on the physicians paid by Medicaid for prenatal care in late 1987 and 1988 (when the reimbursement for prenatal care moved to 108% of the 1985 level) found that providers of prenatal care did not show a longer term positive impact of increased targeted reimbursements. By 1988, Medicaid coverage was slightly better than the traditional Blue Cross-Blue Shield plan for prenatal care assignment, but was far lower for delivery coverage. Fee reimbursements for delivery were a fraction of the professional reimbursements of most plans, yet this phase of maternity care did not decline during 1986-1988 despite an inferior level of reimbursement by Medicaid in comparison to other assignment rates. Delivery is a time of greater risk for

complications and thus, malpractice, yet participation did not decline; one must conclude that reimbursement fees do not drive participation in Medicaid.

Delivery participation in Medicaid may be better than prenatal care participation because of several non-financial factors; specifically, 1) delivery has greater ease in billing since the procedure codes are the same as used for Blue Cross-Blue Shield, whereas pregnancy has additional Medicaid codes; 2) the claim requires no special remarks and the service date is the day of the procedure, in contrast to prenatal package of care billing; 3) the reimbursement is sizeable and therefore more likely to be billed by the provider, especially in comparison to a prenatal visit; and 4) providers who perform deliveries are more likely to be full-service providers of maternity care, whereas 15% of prenatal care providers do not conduct deliveries.

The Michigan State Medical Society and the American College of Obstetricians and Gynecologist's Michigan chapter first sought a 65% differential between normal-risk and high-risk prenatal clients to address increases in medical liability premiums. Levels of care were implemented at a satisfactory effectiveness. High-risk reimbursement did not alter the outcome of the pregnancy. As premiums continued to increase annually, organized medical groups and MDPH pressured for continued fee increments well above inflation. These significant increases for maternity providers did not yield the expected benefits. The risk of problems associated with the labor and delivery process is much greater than attributable risk through

provision of antepartum care and despite very low levels of reimbursement delivery providers did not decline as much as prenatal care providers.[194]

This study documents that reimbursement-rate increases did not increase the supply of maternity providers to Medicaid in a state with a history of good provider participation, adequate medical and obstetric physician supply, and a stable-to-declining Medicaid caseload. Other sociological factors may relate to physician participation in prenatal care and delivery more than financial incentives.

Some physicians use the provider enrollment category of public clinic which indicates a willingness to care for Medicaid clients at settings away from their private office (hospital-based or community clinic); site of care for participating physicians requires further investigation. Likewise, some physicians participate in maternity services at delivery but not during the antepartum period. Perhaps one factor affecting physician willingness to render care at delivery is the length of association with the client. Two opposing situations exist. First, the provider could know the client as a continuing patient or a new antepartum patient with private insurance, but her financial situation changes by delivery necessitating Medicaid enrollment for hospital care and delivery. This type of provider situation is based on client selection and the provider accepts Medicaid in lieu of uncompensated care. The alternative to physician choice of client recognizes a social commitment to colleagues and the hospital in which the physician does his fair share of walk-in deliveries while on call at the hospital. In this situation, contact with the client is minimal in time and

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[194]Negligence or actual medical mismanagement is more likely in labor and delivery because of rapidly changing physiologic conditions of both mother and fetus. The antepartum period has routine testing procedures designed as defensive medicine to seek out and diagnosis problems early in pregnancy. Although expensive, these common protocols protect the provider from lawsuits related to neglect.

duration. Other possible explanations for delivery-only participation may be the technological challenge of the labor and delivery management with a more vulnerable client. Procedural bias may occur in some cases of delivery-only participation; processing a claim for remuneration of delivery services may occur while the prenatal care charges pended due to incorrect completion of this portion of the claim. The provider may accept the delivery payment and forgo the pending pregnancy claim because the administrative procedures are perceived to be more costly than the remuneration.

Broader investigations of actual physician motivators to client selection and volume are needed in face of the altered practice environment of the 1990s. The PPC program substituted for Medicaid with some physicians and other physicians appeared not to bill. A new complication to using price to stimulate supply of providers occurred since this research period; Medicaid enhancements offer care for pregnancy services, but since December 1988, Medicaid no longer offers the same choices to terminate the pregnancy. In 1989, the Michigan birth rate increased 6.1% but the obstetric suppliers did not increase.

CHAPTER 6

Outcomes of Women Served During Pregnancy

Introduction

As the twentieth century progressed, physicians, hospitals, and biomedical technology became more involved in the childbirth process. Medically-directed prenatal care became an American standard, and more visits with more sophisticated and frequent tests, are widely accepted as necessary for all pregnancies. With the increased sophistication of prenatal care came increased costs for these services and pressure to move them under the coverage of third-party payers. In the early 1970s, prenatal care was still an out-of-pocket cost for most families, but by the end of the seventies most insurance plans covered prenatal care. As childbirth evolved from a natural, family situation to the leading condition for female doctor visits and hospital admittance, health care costs escalated. Medicaid programs faced difficulties in accessing services for their caseload. The problem of provider access stimulated several strategies rooted in fiscal incentives for providers. This chapter summarizes findings specific to the second dissertation research question: **Do targeted reimbursement increases for prenatal medical care services affect the Medicaid clients' access to care, utilization of health services, and health outcome experienced?**. Six specific hypotheses utilized client-paid claims and linked vital-record data from women covered under Medicaid during a single delivery pregnancy to address these issues.[195] A total of 45,887 women enrolled in Medicaid over their

[195]As described in Chapter 4, the effects of reimbursement are tested on those women enrolled in Medicaid during pregnancies which resulted in only one live delivery event during the 23 cohort months (February 1, 1985 through December 1986). Women who experienced two or more live birth delivery events are excluded from the analysis because of the difficulty of assigning expenditures between the pregnancies. The hypotheses address the effects of Medicaid prenatal care policies;

pregnancy delivered a live birth during the study months. Access to care, measured as entry period of pregnancy when prenatal care began, was the first policy effect studied on the clients. The second impact addressed use of prenatal care as reflected in the number of prenatal visits. The third major policy effect was health outcomes--the evaluated outcomes were premature delivery, low birthweight, and occurrences of hebdomadal or neonatal death. These policy effects were studied by the baseline year and the year with the substantial provider increases.

The level of medical care provided to Medicaid women who met high-risk criteria for their pregnancy was assessed. Enrollment in Medicaid prior to the index pregnancy was also studied as a possible factor related to access and use of prenatal care. Each hypothesis investigated is described with relevant findings and related points of interest in the following sections.

Access to Prenatal Care

Hypothesis 3: Targeted increases in reimbursement for maternity services by ambulatory medical providers (NHFFS) do not improve access of women to prenatal care.

This hypothesis was analyzed by comparing both the average gestational age of pregnancy at enrollment into prenatal care and the difference in the proportion of women who entered prenatal care in the first three months of pregnancy between the 1985 and 1986 cohorts.

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thus the 10% of women added to Medicaid at delivery are not included since they did not seek or require Medicaid, or were not eligible for Medicaid during their pregnancy.

Medicaid-covered women entered prenatal care on average at three months of gestation (mean 3.1 ±1.7 in 1986 and 3.1 ±1.6 in 1985), with a mode of two months both years. Unknown entry (1% of cases) did not change over the years. There was no significant difference between the years overall in average entry time into care.

The null hypothesis is not rejected for average entry time into prenatal care; significantly improving provider reimbursement did not effect on the average gestational age at which Medicaid women enrolled into care in Michigan.

When access to prenatal care was defined as a percentage of women with first-trimester entry into care, the 1986 cohort reflected a decrease in early enrollment, from 68.6% in 1985 to 66.9% in 1986. This significant difference was the same for both the non-hospital fee-for-service (NHFFS) women and for those with hospital and not specifically billed (non-FFS) pregnancy care. Prenatal-care providers in Medicaid decreased in 1986, which delayed early entry into care for about 2% of the caseload.

Access to prenatal care measured by the proportion with first-trimester entry into prenatal care rejects the null hypothesis since access to early prenatal care in the year of better reimbursement significantly decreased ($p = .002$) early care and this was an unanticipated inverse relationship.

A 47% increase in provider remuneration for prenatal care services had no beneficial effect in stimulating earlier access to medical prenatal care with a stable Medicaid and statewide demand for prenatal care. As a stimulator of access to care, a significant provider rate incentive failed. Higher provider reimbursement made either no difference or had a negative impact. Based on other forces operating in the state (increased movement to clinic care, age of providers, percent of operating costs

allotted to malpractice premiums, and DO attrition from obstetrics), client factors were assessed for their importance in early entry into prenatal care.

Three factors made a significant difference ($p < .001$) in first-trimester entry into prenatal care among women with NHFFS reimbursed prenatal care providers: specifically, 1) the woman had concurrent illness during pregnancy (73.1% had early entry without medical risk[196] and 76.6% had early care with designated medical risk); 2) the woman was 17 years old or older (68.5% of women 17 years or older had first-trimester access versus 50.9% for young teens); and 3) the woman was black. Over 70% of black women with paid prenatal care procedures entered prenatal care in the first-trimester both years; non-blacks had reduced early entry in 1986--67.4% versus 65.6% respectively. This change in non-black access may be related to the loss of DO providers or to an increase in the use of clinic care, or both.

Utilization

Hypothesis 4: Targeted increases in provider reimbursement do not change the use of the reimbursed services by women.

The utilization measure of the average number of prenatal care visits remained the same in both years. Women averaged 11 prenatal-care visits (1986 mean of 11 $\pm$3.7 and 1985 mean of 10.93 $\pm$3.7 visits). The delivery mean was 39 weeks gestation which would relate to one less prenatal care visit than expected by the Michigan average visits for gestational age (12 visits with average delivery at 40 weeks gestation).

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[196]Predetermined diagnoses established by Medicaid policy as being medically high risk for the client population.

Another approach to measuring use was to determine the proportional difference in women with a low volume of prenatal visits (between one and five prenatal care visits reported) during pregnancy. In 1985, 7.7% had low visits and in 1986 this decreased to 7.0% (not statistically significant).[197]

The null hypothesis was not rejected because increased payment was not associated with a change in the average number or proportion of visits.

Significant increases in provider remuneration did not alter use of prenatal care. On average, Michigan Medicaid clients had an expected number of prenatal visits for their gestations. A positive relationship existed between more prenatal care visits (six or more) and total medical services (chi-square 71.2, $p < .0001$), indicating that users of other medical care were also likely to use more prenatal care.

Prenatal care entry time, prenatal visit frequency, and premature delivery are inter-dependent. Specifically, early delivery reduces the number of prenatal visits a woman can make for care. The standard ACOG[198] prenatal care plan provides one visit every four weeks until the 32nd week, then visits every two weeks until the 36th week, after which weekly visits are recommended.[199] Table 6.1 controls for prenatal

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[197]Special efforts were made in identifying records in Detroit during the 1985 year. The intensified effort was not done in 1986 and may account for slight differences in prematurity and, therefore, fewer visits.

Prenatal provider categories revealed differences in the rate of low numbers of visits; 6.3% of women with NHFFS prenatal care and 8.4% of non-FFS women experienced low visit numbers in the study period.

[198]American College of Obstetricians and Gynecologists (ACOG), 1985.

[199]If a woman started in month two or week ten, she would make five visits through week 30. If prenatal care did not start care until week 12.5, she would go through week 32 with five prenatal care visits. Even with a first-trimester start, women with pre-term infants born before 33 weeks would have adequate prenatal care at five visits. Women who start prenatal care in the fourth month could have the fifth visit at week 34 and would not be returning for another scheduled visit until week 36.

visit frequency and looks at entrance time and prematurity; 28% of Medicaid-covered women deliver before 37 weeks and have fewer than six visits. Premature deliveries with first-trimester care enrollment make up 10.8% of the low visit group and 8.8% of the six or more visit grouping. All infant deaths that occurred to women with first trimester-entry and 6-12 prenatal visits delivered before 35 weeks. (Fisher Exact Test $p = .000001$.) The situation was the same for second-trimester entry and 6-12 visits (Fisher's Exact Test, $p = .0042$). Given the time to make six or more prenatal visits, early entry into care made no significant difference in premature delivery. The number of visits made is dependent on the duration of gestation.

When a comparison is made by gestational age and neonatal death, the occurrence of death by late prematurity (35-37 weeks) is the same at 0.3% and term delivery prevalence of neonatal death is 0.2% of cases. Non-blacks have an excess of deaths born at 31-34 weeks (2.6% versus 1.6%) as is commonly seen in NNIC survival data. Survival at 20-30 weeks is more similar by race. Deaths to infants born at less than twenty weeks likely contains some measurement error, especially for non-blacks as the expected survival is greater than clinically anticipated. The black-white differences disappear when death is adjusted for gestational age at birth in the Medicaid population. The perplexing question is why black Medicaid women are more likely to have early premature infants than their peers. Based on more recent

literature[200] and this data, it does not appear that participation in early prenatal care prevents prematurity.

[200]J. Martin Tucker et al. (1991) studied over 13,000 indigent women at the University of Birmingham Hospitals who had singleton births or fetal deaths (70% black). Data were analyzed from 20-36 week gestations to identify 11% premature delivers by this criteria. Their rates were 11.2% for black and 10.6% for whites (no statistical difference). Although incidence was similar, blacks had more fetal distress requiring a preterm delivery ($p = .02$). They found only 2.6% of the births, or 23.2% of premature births, occurring at 34 weeks of pregnancy or less, potentially preventable. State of the art treatment is estimated to have only a marginal impact on the problem of prematurity; 18% of these deliveries followed late identification of preterm labor and 5.2% resulted after failed tocolysis. The authors conclude they do not expect a significant reduction in preterm births in the near future.

Table 6.1

Gestational Age by Entry into Prenatal Care

Part A: Less Than Six Prenatal Visits

Gestation at Delivery	Entry Time into Care			
	1-3 Months Col. %	4-9 Months Col. %	Row Total No.	%
12 - 36 weeks	43.8	24.0	889	28.6
37 - 46 weeks	56.2	76.0	2,219	71.4
Column Total % No.	100 719	100 2,389	3,108	100

Part B: Six Or More Prenatal Visits

Gestation at Delivery	Entry Time into Care			
	1-3 Months Col. %	4-9 Months Col. %	Row Total No.	%
12 - 36 weeks	12.1	11.8	4,874	12.1
37 - 46 weeks	87.9	88.2	35,530	87.9
Column Total % No.	100 29,108	100 11,296	40,404	100

With less than 6 visits the chi-square with entry time is 105., p = .00001 and the Gamma is .42287 (t-value 9.439) but when there are six or more visits, no significant influence of entry time is noted (chi-square .704, p = .40.).

Number of Missing Observations: 2,375.

The risk of having a premature delivery when the mother entered prenatal care in the first trimester is twice as great as when the woman enters at the fourth month or later, and has less than 6 visits. (Odds 1.94; 95% CI 1.71-2.2).

Neonatal Death by Level of Prenatal Care Received

Hypothesis 5: Medically high-risk women do not show reduced neonatal death occurrences when they receive high-risk care during pregnancy in comparison to high-risk peers who use only normal-risk care.[201]

The overall incidence of neonatal deaths to women with paid prenatal care (NHFFS) did not differ between 1985 and 1986; as a group, 0.6% experienced deaths each year. High-risk women with high-risk prenatal care and gestations of 20 weeks or more experienced 0.8% neonatal deaths and high-risk women who had normal prenatal-care payments had 0.9% with neonatal death. Only 0.4% of Medicaid women without medical-risk criteria had a neonatal death, as seen in Tables 6.2 through 6.6. Women with an unknown level of pregnancy care (because they received non-FFS prenatal care) had a 1% occurrence of neonatal deaths.

Neonatal deaths to high-risk women did not significantly differ by the level of medical care, thus the null hypothesis was not rejected.

Low risk women did not differ significantly from the entire caseload. Women who received non-FFS prenatal care had significantly more neonatal deaths (chi-square difference = 19.88, $p < .001$) than the overall pregnant women enrolled Medicaid caseload.[202] When the women are separated by ambulatory providers receiving payment (Tables 6.3 - 6.5) in contrast to those with prenatal care providers who were hospital-based or did not bill Medicaid or had no prenatal care, neonatal losses were 45% higher in the latter group.

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[201]This hypothesis is conducted on the full cohort of women to increase the statistical power. No significant difference in deaths occurred by cohort.

[202]Chi square differences for proportions of independent sub-groups were calculated after Fleiss (1981, p 138-142).

Table 6.2

Neonatal Death Occurrences to Medicaid Pregnant Women by Gestational Age at Delivery

Status	Age at Delivery								
	20-25 wks	26-31 wks	32-33 wks	34-35 wks	36 wks	Term	Post Term	Row Totals	
								No.	%
No Death	62.8	90.1	98.5	99.2	99.8	99.8	99.7	43,689	99.4
Died < 28 days	37.2	9.9	1.5	.8	.2	.2	.3	281	.6
Column Marginals No. %	239 .5	830 1.9	909 2.1	1,998 4.5	1,882 4.3	30,156 68.6	7,955 18.1	43,970	100

Table 6.3

Neonatal Death Occurrences to Medicaid High-Risk Pregnant Women Receiving High-Risk Care

Status	Age at Delivery								
	20-25 wks	26-31 wks	32-33 wks	34-35 wks	36 wks	Term	Post Term	Row Totals	
								No.	%
No Death	70.0	81.8	97.1	99.1	99.0	99.6	100	2,020	99.2
Died < 28 Days	30.0	18.2	2.9	.9	1.0	.4		17	.8
Column Marginals No. %	10 .5	33 1.6	35 1.7	111 5.4	98 4.8	1384 68.0	366 18.0	2,037	100

Table 6.4

Neonatal Death Occurrences to Medicaid High Risk Women Receiving Normal Risk Prenatal Care

Status	Age at Delivery								
	20-25 wks	26-31 wks	32-33 wks	34-35 wks	36 wks	Term	Post Term	Row Totals	
								No.	%
No Death	42.9	88.5	98.9	98.6	100	99.8	99.8	3,263	99.1
Died < 28 Days	57.1	11.5	1.1	1.4		.2	.2	30	.9
Column Marginals No. %	21 .6	78 2.4	87 2.6	147 4.5	144 4.4	2,153 65.4	663 20.1	3,293	100

Table 6.5

Neonatal Death Occurrences to Medicaid Low Risk Women Receiving Normal Risk Care

Status	Age at Delivery								
	20-25 wks	26-31 wks	32-33 wks	34-35 wks	36 wks	Term	Post Term	Row Totals	
								No.	%
No Death	71.2	92.3	99.3	99.4	99.9	99.9	99.7	24,726	99.6
Died < 28 Days	28.8	7.7	.7	.6	.1	.1	.3	93	.4
Column Marginals No. %	66 .3	325 1.3	409 1.6	1,020 4.1	943 3.8	17,492 70.5	4,564 18.4	24,819	100

Table 6.6

Neonatal Death Occurrences to Medicaid Pregnant Women in the Non-FFS System

Status	Age at Delivery								
	20-25 wks	26-31 wks	32-33 wks	34-35 wks	36 wks	Term	Post Term	Row Totals	
								No.	%
No Death	61.3	89.3	97.6	99.2	99.7	99.8	99.7	13,680	99.0
Died < 28 Days	38.7	10.7	2.4	.8	.3	.2	.3	141	1.0
Column Marginals No. %	142 1.0	394 2.9	378 2.7	720 5.2	697 5.0	9,127 66.0	2,363 17.1	13,821	 100

Of the NHFFS high-risk women with high-risk prenatal care and known gestational age, 0.98% had a neonatal death and over 70% of the deaths were in premature deliveries. When high-risk women (3,435) were paid as normal-risk prenatal care, 1.0% experienced a neonatal death and 80% of these deaths occurred in premature deliveries. The association between prematurity and neonatal mortality was statistically significant for high-risk women despite the level of care coded (gamma -.87).

Low-risk women receiving normal-risk prenatal care had only 0.47% neonatal deaths and the majority of them were to those with premature delivery; prematurity was statistically significant with $p < .00001$ and gamma -.59. When the level of prenatal care was unknown because of non-FFS care, 1% of these mothers had a neonatal death; 81% of the losses were with premature deliveries (Mantel-Haenszel chi-square 1054.83, $p < .00001$). Over 72% of all neonatal deaths occurred to those with premature delivery.

When high-risk women were studied in more detail there was no difference in outcome with the presence of concurrent disease, but those with computer-documented medical conditions had a higher percentage of deaths than those documented by hand. A total of 432 computer-documented high-risk women had providers reimbursed for high-risk prenatal care, but despite the accurate level of prenatal care, 1.6% of these high-risk women had neonatal deaths. In contrast, 3,440 women designated medically high risk had providers reimbursed for low risk care; 1.0% of these high-risk women with potentially low-risk prenatal care had a neonatal death. There were fewer neonatal deaths to women with reimbursed high-risk care but without computerized documentation. One could speculate that these women had less serious medical disease since their diagnoses required a selected

subclassification of risk versus a more pervasive disease, or that age alone had less impact on mortality.

Cohort Outcomes by Year

Hypothesis 6: The health outcome of pregnancies does not change with higher targeted provider reimbursement.

Hebdomadal loss,[203] or infant death in the first week after birth, reflects the mother's experience during pregnancy more than deaths in later periods of infancy; this early status usually combines with fetal deaths for the perinatal mortality rate. As described earlier, the perinatal mortality rate is not valid in Michigan nor is it available for Michigan Medicaid women. Hebdomadal deaths occurred at the same rate each year--0.5% of women experienced them when birthweight was known and 0.8% of all women covered under Medicaid experienced first week infant death. Tables 6.7 and 6.8 describe the hebdomadal status by birth weight for each cohort; very low birthweight is closely associated with early death. The same association for neonatal deaths and prematurity exists (not shown) by cohort year. Hebdomadal deaths occurred significantly (Mantel-Haenszel chi-square 9.2148, $p = .0024$) more often in the non-FFS group (0.7%) than the NHFFS group (0.4%). They were more frequent in blacks in the non-FFS group, but not at a significant level ($p > .1$).

Hebdomadal deaths of singleton infants did not significantly different by year, controlling for birthweight and prematurity; the null hypothesis was not rejected.

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[203]The hebdomadal period is the time following birth to the seventh day, or a death in the first week of life. This period is as close to perinatal death (death of a fetus after the twentieth week of gestation through the first week of life) as is reasonable, based on Michigan data.

Prenatal provider types (NHFFS or non-FFS) used by Medicaid women, controlled for mother's race, show increased occurrence of early infant death among the non-FFS clients (Tables 6.9 and 6.10). The difference in clients with infant loss attending non-FFS prenatal care was not related to race as both blacks and non-blacks had double the occurrence. This difference in loss by type of provider is of concern.

Neonatal deaths occurred to 8.3% of black multiple gestation, low-weight live birth women, 1.0% of black multiple gestation, normal weight live-birth women (91% prematures), 4.6% of black single gestation, low-weight live-birth women and 0.2% of black normal-weight, live, single-delivery women. For non-black Medicaid-covered pregnant women, the outcomes were similar: 8.4% neonatal deaths occurred in the multiple gestation, low-weight live-delivery women, 0.7% neonatal deaths in multiple gestation, normal-weight live births (100% prematures), 5.0% death occurrence in low birth-weight singleton-delivery women, and 0.2% of non-black normal-weight, live-single-delivery women. Prematurity was a significant factor by chi-square after Mantel-Haenszel ($p = .000001$) or Fisher's exact test ($p = .015$), respectively.

Cost Effectiveness

Hypothesis 7: Actual aggregated paid claims for pregnancy, labor, delivery, and postpartum care will not show a cost-effectiveness ratio favoring enhancements.

Cost effectiveness investigates the savings in terms of human life, or number of deaths averted by the policy. There was no difference in the number of neonatal deaths in the year of enhanced Medicaid maternity payments; the null hypothesis is not rejected.

Table 6.7

Hebdomadal Status of Pregnancy-Covered Medicaid Women by Birth Weight Group in 1985

Hebdomadal Status	Birth Weight Category in grams						
	< 750 Col. %	750-1499 Col. %	1500-2499 Col. %	2500-3499 Col. %	3500+ Col. %	Row Total No.	%
Died < 7 days	60.8	11.4	.9	.1	.1	107	.5
No Death < 7 days	39.2	88.6	99.1	99.9	99.9	21,730	99.5
Column Marginals No.	74	254	1,704	12,765	7,633	21,837	
%	.3	1.2	7.8	58.5	32.2		100

Mantel-Haenszel chi-square 612.77, p = .00001.
Gamma .86560, t-value = 8.92654; zero-order gamma .88079; first-order partial gamma .88141.

Table 6.8

Hebdomadal Status of Pregnancy-Covered Medicaid Women by Birth Weight Group in 1986

Hebdomadal Status	Birth Weight Category in grams						
	< 750 Col. %	750-1499 Col. %	1500-2499 Col. %	2500-3499 Col. %	3500+ Col. %	Row No.	Row %
Died < 7 days	70.7	10.5	1.1	.1	.1	121	.5
No Death < 7 days	29.3	89.5	98.9	99.9	99.9	23,475	99.5
Column Marginals No.	75	238	1,832	13,818	7,633	23,596	
%	.3	1.0	7.8	58.6	32.3		100

Mantel-Haenszel chi-square 1227.79, p = .00001.
Gamma .89459, t-value = 9.78950.
Number of missing observations: 454.

Table 6.9

Black Medicaid Pregnant Women Infant Outcomes at One Week by Prenatal Care Payer Category

First Week Status	non-FPS	NHFFS	NHFFF[a]	Row Total	
	Col. %	Col. %	Col. %	No.	%
Died < 7 days	1.2	.5	.6	136	.8
No Death < 7 days	98.8	99.5	99.4	16,667	99.2
Column Marginals No. %	6,746 40.1	9,699 57.7	358 2.1	16,803	100.0

Mantel-Haenszel Chi Square 19.85, p = <.00001. Gamma .36477, t-value 4.27.

Table 6.10

Non-Black Medicaid Pregnant Women Infant Outcomes at One Week by Prenatal Care Payer Category

First Week Status	non-FPS	NHFFS	NHFFF[a]	Row Total	
	Col. %	Col. %	Col. %	No.	%
Died < 7 days	0.8	.4		153	.8
No Death < 7 days	99.2	99.6	100.0	28,931	99.2
Column Marginals No. %	7,714 26.5	20,798 71.5	572 2.0	29,084	100.0

[a] These are retroactively paid Medicaid clients; either outstanding medical bills existed at Medicaid enrollment or there was an imputed gestational age for billing which was too early for the actual delivery.

Mantel-Haenszel chi-square 20.433, p = <.00001. Gamma .3496, t-value 3.99.

Expenditures For Pregnancy Services

Women who had Medicaid coverage available during pregnancy (N = 45,887) used substantial amounts of non-medical services during their pregnancy period. The services used by women and related mean expenditures appear in the two-part Table 6.11. Part A lists the ambulatory services used in the 1985 cohort pregnancies and Part B provides the same data for the 1986 cohort. In 1986 there was a large increase in emergency room use by these women. One could speculate that the greater use of non-ambulatory or un-reimbursed providers might mean that patients had limited access to providers and had to seek care for problems at the emergency room when the clinic or office was not open. No claims analysis mechanism can differentiate the true reason for this increase. The number of ultrasound tests was unlimited and without prior authorization in this period.[204] The difference in ultrasound and radiology may reflect a greater reliance on outpatient radiologists than office based ultrasound in 1986. Once again, no real explanation of these differences lies within the paid claims records.

In 1985, an average of 23.1 non-medical service claims were paid. In the period prior to pregnancy, an average of 12.27 claims were paid in this category and in postpartum the number also averaged 12.95 ±11. During pregnancy, the number of non-medical services used almost doubles. Pregnancy expenditures are 15.3% of the total expenditure of a woman served through the full childbirth period in 1985 and

[204]The MSA altered the use of diagnostic and limited follow-up ultrasound in May, 1988. Only enrolled provider specialists, with licensed equipment could be reimbursed. When a pelvic ultrasound is conducted as part of the pregnancy termination process it can not be billed as a separate professional procedure charge. Use of more than one diagnostic and limited follow-up procedure in a year requires additional documentation.

17.47% of the total costs in 1986.[205] Mean expenditures are based only on users of the service. A total of 10.6% (2,814) of women with paid delivery in the 1986 single-event linked file were not covered by Medicaid during pregnancy; this level resembles the 1983 delivery enrollment described by Howell et al. (1988).

Four-and-one-half percent (4.5%) of women added at delivery had FFS expenditures covered by Medicaid prior to pregnancy but not during pregnancy, and 53% of women enrolled at delivery stayed on Medicaid after 60 days postpartum. Of the 2,385 women enrolled during pregnancy but showing no medical paid claims, only 23% had paid laboratory services, the most typical other service used.[206]

Delivery to 60-Day Expenditures and Infant Payments

In the period of pregnancy through 60 days post delivery, 98.2% of the women had identified paid claims for care and 0.65% of them had neonatal losses. A total of 1,030 women had no ambulatory FFS paid medical expenses from delivery to 60 days postpartum. This latter 4.2% included women with other insurance or services not billed or reimbursed.[207]

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[205]The pregnancy expenditures as a part of total childbirth expenditures are increasing. In 1983 Howell et al., (1988)(p. 83) indicates that prenatal costs were 10.5% of costs through one year postpartum. The dissertation total period expenditures are from pregnancy through six months post delivery.

[206]When prenatal care and other medical procedures were extracted from the paid claims, hospital-based providers (code 30) were not summarized since the investigator believed that these services would be done under the outpatient provider code. Other claims processing subsequently identified that hospital-based providers do identify prenatal care and about 1300 of these cases are estimated with service in the hospital. The expenditures for such care appears under the total amount paid for the client since this was calculated from all paid claims during the period.

[207]Medicaid estimates that 4% of pregnant women have other insurance which covers all or part of their costs (Reagan, Esther. Interview).

Table 6.11

Part A: Ambulatory Services Usage by Women In Pregnancy For Single-Delivery, 1985

Service	Expenditures Mean	Std.Dev.	Total Spent	Number Served	% Use When Medical[a]
Dental	$56.52	±92	$188,226	3,330	15.1
Home Health	$184.36	±217	$9,771	53	0.2
Lab	$99.03	±127	$1,944,791	19,638	89.1
Ambulance	$79.67	±46	$94,016	1,180	5.4
Pub. Family Plan.	$16.74	±11	$2,025	121	0.5
Prescriptions	$38.96	±81	$513,263	13,175	59.8
Vitamins	$17.13	±11	$204,711	11,950	54.2
Pub. Sub. Abuse	$312.87	±263	$2,503	8	.0
Emergency Room	$63.00	±38	$46,939	745	3.4
Radiology	$47.36	±70	$440,383	9,298	42.2
Ultrasound	$67.15	±42	$869,719	12,952	58.8
Medical Care	$543.18	±1180	$11,968,462	22,034	

[a] The percentage is calculated based on those receiving paid medical care during pregnancy.

Table 6.11 (continued)

Part B: Ambulatory Services Usage by Women In Pregnancy For Single Delivery, 1986

Service	Expenditures Mean	Std.Dev.	Total Spent $	Number Served	% Use When Medical
Dental	$60.70	±88	$261,697	4,311	18.1
Home Health	$276.46	±487	$20,458	74	0.3
Lab	$115.53	±146	$2,524,121	21,849	91.7
Ambulance	$84.09	±54	$121,100	1,440	6.0
Pub. Family Plan.	$15.41	±10	$2,188	142	0.6
Prescriptions	$41.85	±88	$620,974	14,837	62.2
Vitamins	$17.53	±12	$241,028	13,749	57.7
Public Subst. Abuse	$300.89	±221	$8,124	27	0.1
Emergency Room	$73.63	±50	$297,750	4,044	17.0
Radiology	$88.79	±86	$1,605,766	18,085	75.9
Ultrasound	$39.46	±28	$101,440	2,571	10.7
Medical Care	$618.85	±1148	$14,750,902	23,836	

Delivery hospitalization coverage for 24,190 women averaged of $2,438 per case with a median of $2,156 in 1985. Delivery to 60-day expenditures for professional services were a mean of $348.00 ±277 or a median of $269.[208] Medicaid maternal childbirth expenditures for these women were $151,800,979, or a mean of $3,368 ±2021 per woman. Mean expenditures for women with a neonatal death occurrence were $4,437 ±2787, in contrast to an average expenditure of $3,361 ±2013 for women whose neonate lived for at least the first four weeks. Maternal Medicaid expenditures were more in 1986 ($p < .00001$) as expected, based on the increased

[208]Although Medicaid hospital claims reflect only the mother, physician services during the first two months of life may include infant services as the mother awaits the infant's Medicaid card.

prenatal care remuneration (+47%), delivery reimbursements (+13%), and hospital DRG fee screens (raised 3.6% from October 1986).

Baby expenditures were found for 91.6% of the women cases and averaged $3,213 with a median of $1,562. The total expenditures for infants were $71,897,527 in the 1985 cohort. In 1986, baby expenditures had a mean of $3,147 ±5761 and a total $84,712,605 for a 97.7 percent of those single-delivery event linkage. In 1986, the total baby medical services averaged $2,961 ±5517 and reflect adjustments for hospital overpayment to the special nursery facilities in 1985.[209] Non-medical services studied averaged $230 for 21,779 cases. Infant expenditures were available for all but 4% of enrolled women cases. Mean infant expenditures for the first six months of age were $4,399 ±8997 for a total of $193,829,057. As described earlier, an error in infant reimbursement rates for newborn DRGs in 1985 caused MSA to adjust infant-paid claims for hospital care in 1986, so cohort year comparisons are not valid. The combined expenditures for mother and baby during the study totaled $358.3 million or an average of $7,809 per case.[210]

Despite early and frequent prenatal care, some Medicaid women and their children had large expenditures for health care. Women with high-risk prenatal care had higher expenditures. When the infant died within the first four weeks of life, the combined expenditures were more than 2.5 times as great as when the baby lived at least the first month. The average combined expenditure for a neonatal death case to a mother with normal-risk prenatal care was $19,263 ±19,575 versus $7,598 when the offspring lived past the 27-day period. The women who received high-risk prenatal

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[209]Expenditure differences for infants relate to alterations in hospital reimbursement and not with alterations in prenatal care.

[210]The case includes any paid claims for women from pregnancy through 60-days postpartum and infant expenditures for the first six months of life.

care and experienced neonatal loss showed average combined expenditures of $20,524 ±19,357. When the offspring of women who received high-risk prenatal care lived past four weeks, the average case expenditure was $9,869 ±11,710.

In the group of women enrolled in Medicaid with non-FFS childbirth expenditures the infant mortality rate (IMR) exceeded 77. Further research should be done to determine the outcome and situations related to women in this category.

Does Prenatal Care Affect Pregnancy Outcome?

Hypothesis 8: The prevalence of neonatal death does not change with different amounts of prenatal care.

Women who do not have reported prenatal care have more poor pregnancy outcomes but the validity of their lack of prenatal care must be questioned. The birth certificates from these 45,887 deliveries indicate that only 343 women had no prenatal care and 13 of them noted early infant deaths. However, 53 women received NHFFS prenatal care Medicaid services, so their birth certificates with no prenatal care designated erred; four of these women had hebdomadal deaths. The remaining 290 women with Medicaid during pregnancy but non-FFS prenatal care had birth certificates with no prenatal care reported; eight had hebdomadal deaths. Over 99% of the enrolled Medicaid women did have some prenatal care. Those women without prenatal care must be different in some way from the other women.

Black women have been associated with more poor outcomes in pregnancy. Table 6.12 shows that 0.8% study women experienced neonatal losses. In 1986, 1.0% of black Medicaid women and 0.7% non-black women experienced neonatal loss[211] and in 1985, 0.9% of black women and 0.6% non-blacks had neonatal losses. The

[211]Neonatal loss is the death of one or more live-born infants in the period after birth to 28 days.

ethnic distribution between the cohorts was the same both years (36.7% black in 1986 and 36.5% black in 1985). Tables 6.13 and 6.14 show the expected racial disparity in birth weight and indicate that no difference occurred within the study years.[212] A tendency existed for high-risk women who received Medicaid reimbursed prenatal care to have fewer low-birthweight deliveries. This can be accounted for in two ways; significantly more black women had non-FFS Medicaid deliveries in 1986 and the number of infants without linked vital records was slightly greater in 1986.[213]

Table 6.12

Neonatal Status of Pregnant Medicaid Women by Cohort Year

Neonatal Status	Cohort Year			
	1986 Col. %	1985 Col. %	Row Marginals No.	%
Died First 28 Days	.8	.7	353	.8
Not Neonatal Death	99.2	99.3	45,534	99.2
Column Marginals No. %	23,847 52.0	22,040 48.0	45,887	100

Chi-square 2.421, p = .11971.

[212]Note that both black and non-black mothers with single Medicaid deliveries had fewer low-weight babies than the total Medicaid-covered infants illustrated in Appendix K. This difference typifies all comparisons between specific pregnancy-served populations and more general populations.

[213]Recall that 240 cases were unlinked in 1986 versus only 72 in 1985. Births requiring hand matching and vigorous searching are more likely to display early death and also be lower weight.

Table 6.13

Birth Weight by Race, 1985 Cohort of Medicaid Women Covered in Pregnancy

Birth Weight Class	Racial Group			
	Black	Non-Black	Row Marginals	
	Col. %	Col. %	No.	%
Under 2500 Grams	13.0	7.1	2,039	9.3
Not Low Weight	87.0	92.9	19,956	90.7
Column Marginals No. %	8,027 36.5	13,968 63.5	21,995	 100

Mantel-Haenszel chi-square 208.338, p = .000001.
Gamma 0.32089, t-value, 13.49.

Table 6.14

Birth Weight by Race, 1986 Cohort of Medicaid Women Covered in Pregnancy

Birth Weight Class	Racial Group			
	Black	Non-Black	Row Marginals	
	Col. %	Col. %	No.	%
Under 2500 Grams	13.2	6.7	2,156	9.1
Not Low Weight	86.8	93.3	21,647	90.9
Column Marginals No. %	8,736 36.7	15,067 63.3	23,803	 100

Mantel-Haenszel chi-square 287.247, p = .000001.
Gamma 0.3614, t-value, 15.73.
Number missing in both tables: 89.

Prematurity Influences on Death

Reducing prematurity will eliminate most neonatal deaths among the Medicaid population, but prenatal care and current medical services do not appear to provide the solution to premature delivery. When neonatal deaths are studied with prematurity or prematurity and birthweight controls, no significant racial gap in deaths exists. The black-white mortality gap at the neonatal level seems to be associated with prematurity, with significantly higher prevalence of neonatal loss among low-income black women than low-income white and other minority women in Michigan's Medicaid served population.

The works of Alexander, Shiona, and others[214] discuss black-white differences in birthweight and prematurity but neglect to account for large differences of both hebdomadal and neonatal deaths by prematurity rather than race. When controlled for poverty (Medicaid coverage represented incomes of less than 60% poverty level for grant client and under 69% poverty level for others), prematurity explains why early entry, but lower prenatal visit numbers account for greater deaths. The more immature the infant, the lower the birthweight, and the higher the mortality rate. Women with earlier delivery have fewer prenatal care visits because insufficient time occurs to make more visits. Another bias found in some women with premature delivery is hospitalization to prevent active labor from commencing which results in a cessation of formal prenatal care visits, thus lowering the total number recorded. Women who deliver prematurely also have less time to gain weight during their shortened gestational period, which results in a lighter maternal weight gain. The

[214]Alexander and Cornely, 1987 (p. 243-253); Shiono and Klebanoff, 1986 (p. 1317-1321); Gortmaker, 1979 (p. 653-660); Tyson, 1990 (p. 195-204).

effects of prematurity must be more carefully addressed in U.S. health care recommendations.

The present medical care system does not provide the answer to the problem of premature delivery among the Medicaid population living below poverty. Medicaid pregnant women with high medical risk status had 7.2% of premature deliveries result in neonatal death in both racial groups. Deliveries among high medical risk pregnant women that reached 37 weeks gestation resulted only in 0.4% neonatal deaths for black women and 0.2% neonatal deaths in non-black women. High medical risk black women had premature deliveries 22.9% of the time and high medical risk non-black Medicaid-served women had a prevalence of 14.1%. The level of prenatal care reimbursed did not affect the number of neonatal deaths to medically high-risk women when controlled for prematurity. Even when meeting medical risk criteria and poverty levels, non-blacks still have about two-thirds of the premature deliveries of black high medical risk women. Prematurity is the factor responsible for poor infant outcomes in the US and our current classification system for risk misses most women who deliver prematurely. Within Medicaid, 17.9% of low-risk women in the NHFFS group had premature deliveries. The medical care system and our current approaches to the social system do not provide the mechanisms to reduce the incidence of prematurity in the population.

Table 6.15

Neonatal Death Experience of Non-Black Mothers in Medicaid During Pregnancy by Gestational Age at Delivery

Neonatal Status	Gestational Age at Delivery						
	1-19 Weeks Col. %	20-30 Weeks Col. %	31-34 Weeks Col. %	35-37 Weeks Col. %	38-46 Weeks Col. %	Row Total No.	%
Died	33.3	27.8	2.6	0.3	0.2	148	0.5
Alive at 28 Days	66.7	72.2	97.4	99.7	99.8	27,509	99.5
Column Total % No.	100 6	100 248	100 856	100 3,268	100 23,279	27,657	100

Mantel-Haenszel chi-square 1362.65, p <.000001. Gamma .86036, t-value 9.4128.

Table 6.16

Neonatal Death Experience of Black Mothers in Medicaid During Pregnancy by Gestational Age at Delivery

Neonatal Status	Gestational Age at Delivery						
	1-19 Weeks Col. %	20-30 Weeks Col. %	31-34 Weeks Col. %	35-37 Weeks Col. %	38-46 Weeks Col. %	Row Total No.	%
Died	70.0	22.6	1.6	0.3	0.2	141	0.9
Alive at 28 Days	30.0	77.4	98.4	99.7	99.8	15,903	99.1
Column Total % No.	100 10	100 248	100 993	100 2,919	100 11,746	16,044	100

Mantel-Haenszel chi-square 1033.29261, p <.000001. Gamma .87675, t-value 10.17234.
Number of missing observations: 2,186.

Summary

There was no positive effect of a provider-fee increase on client access and use of prenatal care services. Medicaid women had sufficient prenatal care without the 47% reimbursement increase; the increase did not improve their situation but maintained it.[215] Early prematurity (eight months or less) is the underlying cause of excess neonatal death among the Medicaid-covered women's pregnancy outcome. Very small and premature infants are more common in blacks and the black first-week deaths are greater because they experience more premature deliveries and more multiple gestations. Early infant loss (hebdomadal death) has the same prevalence by race when controlled for birthweight and plurality of Medicaid-covered women. First-week deaths are 4% if low birthweight[216] (86-89% prematurity) and 0.1% if normal birthweight. There is no black-white mortality gap with these controls. In Medicaid-covered pregnant women, occurrence of a neonatal death does not differ by

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[215]Sufficient prenatal care looks at the average reported entry time, the average number of visits and the average gestational age at delivery to indicate that these measures agreed to indicate sufficient access and use of services. A more traditional measure of prenatal care adequacy, such as the Kessner Index (Institute of Medicine, 1973) or one of the modifications (Alexander, 1989) would be inappropriate for this population because of the degree of missing data, errors and bias in reporting. A total of 9% of the birth certificates did not concur within three weeks between the LMP gestational age and the estimated gestational age of the doctor and a further 4% had no reported LMP age on the certificate making gestational age an unreliable variable when missing. With those listed as no prenatal care visits, 53 cases had paid care but there was no mechanism to validate that the 290 women reported with no prenatal care in the non-FFS group actually did not seek care. Women with no care reported were more likely to be black and there was more missing care among whites.

[216]Birthweight is more completely reported than gestational age, so these calculations include some outcomes which are dropped when further controls are added for premature delivery. Plurality is the number of fetuses in the gestation. These women usually had two or three fetuses in the multiple gestation but one set of quadruplets was found in the live births. Singletons relate to only one fetus in the gestation.

race when controlled for the number of fetuses, prematurity, and birthweight (poverty is already selected).[217]

There is no significant effect of prenatal care visits or entry time into care when appropriate controls are made for premature delivery and multiple births. Gestational time period governs both fetal growth (as measured by weight) and risk of death; early entry into prenatal care does not protect pregnancy outcome. Actually, women with first-trimester entry are more likely to deliver early than those who wait until later in pregnancy. Those women who do not enter prenatal care are social outliers (they were only 0.6% of the Medicaid population served when partially validated).

In singleton neonatal death events following a pregnancy with a low number of prenatal care visits, 97.4% were premature when care began in the first-trimester and 70% were premature when care began at four months or later (prematurity chi-square by Fisher's exact test is significant at $p = .013$). Neonatal deaths occurred less often to those women with later entry into prenatal care since these infants survived the highest risk periods of prematurity.

[217]Neonatal death was studied to increase the statistical power when premature delivery was added as a control factor. More missing data are found in the gestational age variable than in birthweight.

CHAPTER 7

Conclusions

Discussion of Supply, Access and Utilization

The Michigan Medicaid program achieved a cooperative relationship with providers and enrollment remained high despite decreased remuneration between 1970-1983. Increased costs for malpractice insurance precipitated targeted increases for obstetric care; these two fiscal incentives are studied. This research found no positive effect of a provider fee increase on obtaining additional prenatal-care providers or in client access and utilization of prenatal care services. Medicaid-served women, on the average, had sufficient prenatal care without the 47% professional reimbursement increase; increases did not improve the situation but maintained it.[218] Several aspects of both clients and providers are studied.

Level of Care

In the fall of 1983, Medicaid offered providers a fee differential when they provided prenatal care to high-risk women. After 17 months or more of operation this policy evaluation showed that providers did not all take advantage of increased

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[218]Sufficient prenatal care looks at the average reported entry time, the average number of visits, and the average gestational age at delivery to indicate that these measures agreed with each other, and sufficient access to prenatal care and use of services occurred in Michigan when Medicaid had approximately 32,000 pregnant women enrolled. A more traditional measure of prenatal care adequacy, such as the Kessner Index (Institute of Medicine, 1973) or one of the modifications (Alexander, 1989) would be inappropriate for this population because of the degree of missing data and errors and bias in reporting. A total of 9% of the birth certificates did not concur within three weeks between the LMP gestational age and the estimated gestational age of the doctor and further, 4% had no reported LMP age on the certificate, making gestational age an unreliable variable when missing. Within those listed as no prenatal care visits, 53 cases had paid care but there was no mechanism to validate that the 290 women reported with no prenatal care in the non-FFS group actually did not seek care. Women with no care reported were more likely to be black, but there was more missing care among whites.

remuneration opportunities. Data on 31,427 women[219] with a single study live birth and linked records were used to study the implementation of the level of care policy. Overall, 82.3% of clients were low risk and received the normal level of prenatal care and 6.8% received the high-risk level of care reimbursement according to paid claims. The level of care policy implemented at an 89% effectiveness level since 10.9% more women qualified as high risk but their provider billed normal-risk care. A non-significant decrease ($p = .08$) in appropriate implementation occurred in the intervention year (1986) and, contrary to policy expectations, the difference was in clients who would be reimbursed at greater amounts.

Based on this study, neither the level of care policy enhancement for high risk nor the 1986 targeted-fee increase stimulated providers to classify all eligible medically high-risk women appropriately; in fact in the ambulatory fee-for-service clients about 1% fewer high-risk women had their prenatal care reimbursed at the higher rate in 1986, despite the provider's increased fiscal incentive to appropriately classify clients.[220] Client enrollment time was not a factor as 5,564 women with Medicaid before the pregnancy did not have an improved level of care classification in comparison to newly enrolled women.

Medical Risk and Provision of Appropriate Level of Care

High-risk women who received the appropriate level of medical care for their medical risk were not less likely to have a neonatal death than high-risk women who received the normal-level of non-hospital fee-for-service (NHFFS) paid prenatal care. High-risk occurrences of neonatal death were 0.8% in women with high-risk care and

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[219]Only women served by ambulatory providers were assessed in this phase; hospital providers were not included in the level of care assessment.

[220]The average difference in physician payment for a package in 1986 was $155 by risk level.

0.9% in those with normal-risk care and known gestation. Women with normal medical risk had 0.4% loss but this group is the majority of women. The high-risk criteria does not adequately identify those Medicaid women at increased risk for infant death. The null hypothesis was not rejected; higher payments for prenatal care to medically high-risk women did not lower neonatal death occurrences in this population. The numbers investigated are small and further research may be indicated although most deaths are associated with early delivery.

Cohort Health Outcomes and Expenditures

There was no significant difference in prematurity, low birthweight, hebdomadal loss, neonatal loss, or total infant deaths to the offspring of Medicaid women between 1985 and 1986. The reimbursement to providers did not impact these health status measures among women served by Medicaid during pregnancy. Early death is associated with prematurity. Among Medicaid clients with pregnancy care teenagers under 17 and black women are the subpopulations at higher risk for preterm delivery.

The fiscal policy was not cost effective since there was no reduction in infant death or the precursors to early death. Prenatal and delivery care averaged $3,368 for a woman and infant-care expenditures averaged $4,399. Cases with a neonatal death cost more for the covered mother and over 2.5 times more for the infant in women with prenatal care. Despite Medicaid coverage cases with an infant loss have higher expenditures.

Women with Medicaid coverage during pregnancy do achieve early infant death rates similar to the state's overall population. The postneonatal mortality is much higher and similar by race; fetal death rates are estimated to be greater in Medicaid. Infants added to Medicaid at birth have an infant mortality rate of 22.1

compared to 13.8 for those born to mother's with Medicaid coverage during pregnancy. The newborn population in Medicaid is not homogeneous.

Recommendations for Policy Action

As a result of data collation, editing, and analysis several areas in need of change became obvious to the researcher. Conducting policy research on prenatal clients and newborn infants is very cumbersome under the existing Medicaid system. The augmented state birth certificate[221] offers the state some assessment of health status for infants by insurance coverage as perceived by the hospital but it can not evaluate Medicaid prenatal coverage. Seven recommendations for state policy and procedure change are proposed.

(1) Both Medicaid (MSA) and the Department of Public Health (MDPH) must move to have complete fetal death reporting. MDPH can seek a rules change so fetal death reporting is tied to a name. Medicaid can tie reimbursement to reporting. The presence of accurate fetal death reporting allows a better assessment of both health and social efforts to reduce infant loss among low-income women.

(2) Continued efforts need to be made to improve the accuracy of reporting. MDPH should enhance the monitoring and accuracy of vital records with a program of quality assurance. MSA should continue to

[221]Michigan altered the state birth certificate in 1989 to include the mother's social security number and the expected payer of the delivery. The validity of this data remains to be assessed, but for Medicaid would include excess infant births compared to those with a mother served during pregnancy. If the data of the 1983-1986 caseload remains valid (with the expanded eligibility to 185% poverty and the removal of the abortion option) about 10% would have mothers added to Medicaid at delivery and 13% would be infants without a Medicaid-eligible mother. The birth certificate can not differentiate insurance eligibility periods.

improve the case-number designation and reporting of diagnoses and procedures.

(3) MSA should consider eliminating the prenatal package-of-care. At the current time, Medicaid continues to reimburse providers for a package of prenatal care after six visits are provided; women may have more than one provider. Based on the average number of visits for women who deliver prematurely, the need of some women to change providers, and the policies of other insurers to reimburse only one package-of-care per pregnancy, the recommendation is made to restructure prenatal-care reimbursement for providers to include only prenatal/postpartum visits.[222] Two intensities of prenatal care visits might be piloted: 1) extensive maternity visit (including physical and pelvic examinations, review of laboratory and other diagnostic findings, health history, and client discussion) and 2) monitoring prenatal visit (including items such as measurement of fundal height, girth, blood pressure, fetal heart tones, weight gain, diet review, symptoms, feelings, and urine screening).

This two-fold intensity system, more appropriate to current medical practice, negates the need for different levels of prenatal care payment. One postpartum visit at the intensive level is expected and should carry the same remuneration as a prenatal visit; the postpartum code would be used for such a visit.

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[222]Major providers such as Michigan Blue Cross-Blue Shield do not reimburse more than the value of one prenatal package of care for any pregnancy and they do not have a higher rate for clients with greater medical risk (Frederick Sovereign, 1991).

Women with medical diseases might require more intense services in contrast to the more typical monitoring sessions expected for normal risk. Limitations can be placed on the number of these visit types per pregnancy.

A special bonus might be piloted for women who retain the same provider over the course of pregnancy as a way to promote continuity of care. The visit screens should be competitive to encourage more private-sector participation; the continuation of special public health rebates might be investigated.

Women with designated medical risk conditions were 17.7% of all pregnant women, yet reimbursement of providers at a significantly higher rate did not reduce the occurrence of death among this population. Prematurity and early infant death are common outcomes for low-risk Medicaid women. Only young teenage mothers experienced greater prematurity but did not have greater death rates.

(4) Pilot new services for young teenagers. Only women under 17 years of age were more vulnerable to prematurity. Special medical and non-medical interventions might be tried with these young women to reduce premature delivery. In urban areas services might focus on the social needs of this group. Services could address locus of control, quality of life, and coping skills for the family, rather than the current health focus.

(5) A study of pregnancy outcomes should be conducted in the near future to reflect the traditional Medicaid caseload and the expanded caseload. Additional services available since 1987 should be included

in such an evaluation. Movement from about 60% of the poverty level to 185% represents a significant increase in Medicaid cost to both the federal and state governments. Maternal support services can cost Medicaid more than the physician-based prenatal care, or a more than doubling of the expenditures per case. The effectiveness of these new expanded benefits require study.

(6) Congress and states should re-evaluate minimum prenatal care services for low-income women as the major mechanism to reduce infant deaths. More investigation into the poverty versus health care effects seems appropriate.

A final recommendation is advanced. This research indicates the superiority of the outcomes of clients served in the traditional private sector practice over those served by hospital clinics and other non-FFS settings. It is not known whether this difference in outcome relates to the quality of medical care, the equality of social worth, the length of treatment provided, or differences in the social and health status of clients using different care options. Since this finding is not unique to the Michigan Medicaid population, it deserves further and immediate health-services research.[223] Until the associations related to this finding are more clearly elucidated, it is recommended that private practice options for prenatal care be the mainstream of services for Medicaid clients.

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[223]The 1988 National Survey of Maternal and Infant Health has noted this difference in outcome (according to Juarlyn Gaiter, Office of Minority Health, Centers for Disease Control, 1991).

APPENDICES

APPENDIX A

Vital Statistics

APPENDIX A

Vital Statistics

Table A.1

Selected US Infant Mortality Statistics

Year	Rates by Race			
	White IMR	Black IMR	White NNMR	Black NNMR
1950	26.8	43.9	19.4	27.8
1960	22.9	44.3	17.2	27.8
1970	17.8	32.6	13.8	22.8
1980	11.0	21.4	7.5	14.1
1985	9.3	18.2	6.1	12.1
1988	8.5	17.6	5.4	11.5

Source: NCHS, Vital Health Statistics 1988, Part B: Mortality, 1991.

Table A.2

Hebdomadal Deaths and Death Rates Michigan Residents, 1980-1989

Year	Total	
	Hebdomadal Deaths	Rate
1980	1,100	7.58
1981	1,111	7.90
1982	1,036	7.51
1983	910	6.84
1984	955	7.03
1985[a]	914	6.62
1986	920	6.68
1987	877	6.24
1988	898	6.43
1989	911	6.15

[a] In 1985 almost 1600 births were not reported in the normal statistical files; a sizeable number were from Detroit.

Table A.3

Infant Deaths and Rates[a] By Race, Michigan Residents, 1980-1989

Year	Total					
	Infant Deaths	Rate	Neonatal Deaths	Rate	Post Neonatal Deaths	Rate
1980	1,851	12.8	1,284	9.2	567	4.1
1981	1,851	13.2	1,821	8.8	570	3.9
1982	1,672	12.1	1,202	8.6	470	3.3
1983	1,573	11.8	1,067	7.7	506	3.7
1984	1,595	11.7	1,100	8.3	495	3.7
1985[b]	1,575	11.4	1,071	7.9	504	3.7
1986	1,565	11.4	1,079	7.8	486	3.5
1987	1,538	10.9	1,029	7.5	509	3.7
1988	1,542	11.0	1,068	7.6	474	3.4
1989	1,645	11.1	1,070	7.2	575	3.9

Year	White					
	Infant Deaths	Rate	Neonatal Deaths	Rate	Post Neonatal Deaths	Rate
1980	1,246	10.5	853	7.2	393	3.3
1981	1,261	10.9	864	7.5	397	3.4
1982	1,110	9.7	784	6.9	326	2.9
1983	1,048	9.6	701	6.4	347	3.2
1984	1,034	9.4	700	6.3	334	3.0
1985[b]	1,053	9.3	699	6.2	354	3.1
1986	999	9.0	668	6.0	331	3.0
1987	953	8.5	604	5.4	349	3.1
1988	923	8.6	626	5.6	326	2.9
1989	946	8.3	602	5.3	344	3.0

Table A.3 continued

Infant Deaths and Death Rates[a] By Race, Michigan Residents, 1980-1989

Year	Black					
	Infant Deaths	Rate	Neonatal Deaths	Rate	Post-neonatal Deaths	Rate
1980	582	24.1	413	17.1	169	7.0
1981	564	24.8	399	17.6	165	7.3
1982	548	24.6	409	18.4	139	6.2
1983	506	23.1	357	16.3	149	6.8
1984	541	23.5	389	16.9	152	6.6
1985 [b]	553	23.0	402	16.7	151	6.3
1986	553	23.0	402	16.7	151	6.3
1987	567	22.0	414	16.1	153	5.9
1988	571	21.9	429	16.5	141	5.4
1989	672	21.9	454	14.8	218	7.1

a Rate per 1,000 live births. These data are deaths reported from the calendar year and not cohort data.
b These data do not reflect the late file which was substantial for births and deaths in 1985 in Detroit.
Source: MDPH, Office of the State Registrar, Center for Health Statistics, 1991.

APPENDIX B

Key Elements Related to Prenatal Care

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Key Elements Related to Prenatal Care

Poverty or Social Class

Excessive morbidity and mortality across all ages occurs in poverty[224] groups; fetal and infant deaths are more than twice as frequent in low-income (or lower social class) populations in comparison to the general population (or highest social class). US work limits explanations of the societal forces responsible for differences in the use of prenatal care and the outcome of pregnancies. Early prenatal care enrollment and high visit utilization do not follow automatically with Medicaid access as Piper et al. (1990) showed for Tennessee.

Despite universal, government-sponsored health care, including a system of public health and primary care at each local level, infant mortality in the United Kingdom is not much better than in the United States. Britain has a long history of perinatal and health services research that becomes useful because of their investigation of social class. Europeans classify social strata by individual occupation; government primarily uses the occupational group of the family head. Most countries offer five or six subgroupings, going from highly-educated professionals to unskilled laborers. In United States, health analysis rarely relates occupational status with health status because Americans tend to deny a class society. Since 1950, data presenting health outcome by race, and in a more limited area by income and

[224]Berki and Parsons (1988) acknowledge the substantial improvement for the US poor in financial and structural access to health services in the last twenty years. Their analysis showed that blacks consistently used less medical care than others in the adult population. They posit that this gap is primarily due to lack of health care coverage and an absence of a regular care source for 20% of the population.

education level, are available. Rutter and Quine (1990) provided an excellent review of the British dilemma with infant mortality. Despite National Health Insurance, family allowance, and universal maternity services (with public health nursing, family physicians, midwives, and other educational supports), Britain's world ranking slipped in 1985. For over two decades, Britain noted considerable disparity in morbidity and mortality by social class. All infant health indicators reflect differences by social class (poor outcomes are 1.5 to 1.9 times greater in the lowest class compared to the highest class).[225] The magnitude of the difference in these rates was similar to United States white-black data except for neonatal mortality.[226] American performance was lower overall, but our white rate was equal to the British rate in 1985. Britain clearly shows that social class is a construct of biological significance.

Rutter and Quine posit that the most important aspect of social class for reproductive outcome is material deprivation (including culture and behavior). Deprivation increases the frequency of negative life events and the absence of social support. The altered stress levels are often found with decreased self-esteem, poor education and information, and depression. Currently British research is unable to clearly delineate which facets of material deprivation--culture of poverty or increased risk behaviors--are responsible for specific pregnancy outcomes.

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[225]Rutter and Quine described only minor improvements in UK rates for 1985-1986, except for postneonatal deaths which increased slightly in 1986. Infant mortality was 9.4 overall; among legitimate children it was 6.8 in the highest class compared with 11.2 in the lowest class; neonatal deaths were least divergent by social class, being 4.1 and 6.0 respectively, and postneonatal mortality was 2.7 compared with 5.2 from highest to lowest class.

[226]US infant mortality was 10.4 overall, 8.9 for whites, and 18.0 for blacks in 1986; rates for neonatal mortality were 5.8 for whites and 11.7 for blacks and 3.1 and 6.3 for postneonatal mortality respectively (NCHS, 1991).

Risk Behaviors. British data on maternal smoking are not dissimilar to the US; in 1984, 29% of pregnant women smoked: 13% in class I and 31.5% in class V. Smoking effects do not offer conclusive results when women quit early in pregnancy.[227] British heavy smokers concentrate in the working class. Likewise, in the US, smoking is more common among the low-income and less-educated women, but black, low-income women are less likely to smoke than poor-white women. In England and Wales, heavy drinkers are more likely to be in social classes I and II, and also to be smokers.[228] The roles of alcohol and diet are less clear in Britain than tobacco. Working during pregnancy was associated with positive pregnancy outcomes. Although the mechanisms for material deprivation are unclear (direct, indirect, or catalytic), they are associated with poorer pregnancy outcomes. One speculates that the US rate of infant mortality would improve with complete access to health care as found in other industrial nations, but that rate would not be better than already achieved by groups with access and utilization of health care during pregnancy. If social class assumptions hold, pregnancy outcomes of Medicaid clients would differ from other citizens based on social standing and not their use of prenatal care. The specific expectations by social class are increased fetal deaths,[229] low-birthweight, perinatal and postneonatal deaths, with the neonatal period least effected by social class and the postneonatal rates most class responsive. Data from the International Collaborative Effort on Perinatal and Infant Mortality (ICE) continue to

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[227]One study found no changes in birth weight, another a 68 gram gain in birthweight and a third, a 92 gram gain for singletons. The research could not determine if the weight gain with smoking cessation resulted from physiologic factors or buffered stress reduction.

[228]American data would probably agree if it were appropriately collected but vital statistics data rarely report alcohol use during pregnancy; when women admit to it they are more likely to be less educated and poor.

[229]Antonovsky and Bernstein, 1977.

show social class differences in low birthweight, fetal deaths, and perinatal deaths in Nordic countries and the United Kingdom. Socioeconomic differences are less apparent in Sweden than in the United Kingdom or United States.[230] [231] The 1990 WIC evaluation in five key states found a difference in program benefit by the poverty level of served recipients. In addition to the level of poverty, there was also a difference in ethnic distribution between the states.[232]

Unlike the industrial nations with the lowest infant mortality, the US decline in infant and fetal mortality is less continuous and decelerated more quickly and at higher levels than those nations with the best reproductive outcomes. Recently, substance abuse has been blamed for our lack of progress in infant mortality but this problem only increased significantly since 1985 in Michigan. More careful analysis of smoking affects shows the US weight decrease occurs only to term, low birthweight

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[230]During the American Public Health Association's Annual meeting in Chicago, October 1989, members of the ICE presented new international findings. Finn Kristensen showed that infant mortality, perinatal mortality, and low birthweight rates for Denmark slowed during the 1983-86 years. (4.8 LBWR and 8.2 IMR). Considerable variation existed by social class: LBW in the highest class was 3.7% but it was 5.8% in Social Class IV. Perinatal rates are different by social group but neonatal mortality was less marked. Eva Alberian released information on social class differences in infant mortality in the United Kingdom in the late 1980s. Differences by social class are still seen in the postneonatal period. Zetterstrom and Erickson showed clear differences in low birthweight, perinatal mortality, and infant mortality by social class during 1975-80. Similar class differences are found in Norway using the father's occupation to indicate social class. In Norway fetal death risk is 2.7 times greater when both parents have less than a ninth grade education. The perinatal mortality rate went from 1.3 to 3.1 by class but little difference is seen in neonatal mortality (3.7 to 4.0) which is consistent with other western European studies.

[231]As Kohler shows Japan (5.2), Sweden (5.9), and Finland (5.9) had the lowest infant mortality rates in 1986. Netherlands (7.8), Norway (7.9), Canada (7.9), Denmark (8.1), France (8.0) and West Germany (8.5) follow. The United Kingdom's rate was 9.6 and the United States rate was 10.4 with a white infant mortality rate of 8.9.

[232]Bilheimer found that Minnesota, the highest income state in the five-state WIC evaluation (eligibility set below 185% poverty but only 8% of their clients were black), showed the least program magnitude. The Carolinas had the highest level of black participation, the most restricted income levels, and the highest differences.

infants. Increased birthweight occurred only in women with education beyond high school and this association correlates well with a low prevalence of smoking in this group. Mean birthweight is otherwise stable, showing about a 40 gram (over 1 ounce) change over 10 years.[233] Black women are still less likely to smoke than white women, yet the prevalence of premature, low birthweight infants is higher among blacks.

Poverty and lower social class have not been systematically evaluated in the U.S. Medicaid clients in Michigan offer one way to look at the outcome of prenatal services in a population generally 60% below poverty. Low birthweight and premature delivery are more common in this group and associate with infant death. Future U.S. studies must address racism nd poverty.

[233]National Center for Health Statistics, 1988, p. II 106-107.

APPENDIX C

Medicaid Expansions By Congress: OBRA

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Medicaid Expansions By Congress: OBRA

Six Omnibus Reconciliation Acts by the Congress[234] gave state Medicaid programs the responsibility to provide prenatal care to low-income women and infants. Nationwide all women below the poverty level must be given prenatal care, delivery services, and infant care through Medicaid. Progressive states opted to expand coverage to the poverty level ceiling authorized--185% of the poverty level--prior to this time. Michigan was such a state. Although the increased use of adequate prenatal care was not expected to yield more than a 3-5% improvement in infant birthweight,[235] considerable efforts at the national, state, and local level

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[234]During the 1984-1990 years, incremental changes in prenatal care access are enhancing state efforts while building the federal governments' commitment for targeted health care, without ties to welfare eligibility on a nationwide basis. The Deficit Reduction Act of 1984 (DEFRA) required states to cover income-eligible pregnant women in unemployed two-parent families and income eligible children. The Consolidated Omnibus Reconciliation Act of 1985 (COBRA, or Public Law 99-272) expanded pregnant-women coverage to all who met the state AFDC income level, regardless of family structure or assets, and expanded coverage to 60 days postpartum for those added during pregnancy. (Program L in Michigan went from about 400 cases prior to this Act to 9,500 monthly by June 1989.) The Omnibus Reconciliation Act of 1986 (SOBRA, or Public Law 99-509) gave states the option to cover all pregnant woman and children to age six who fell below the poverty level. The OBRA bill of 1987 gave states the option to cover pregnant women and infants to age one whose income fell below 185% of the federal poverty level. Michigan implemented prenatal services at the 185% poverty level on October 1, 1988, as did nine other states. Michigan also covered all children below 100% of the poverty level with Medicaid to age three during this period. OBRA 1989 raised the poverty level for pregnant women and children under 6 to 133% for coverage by state Medicaid programs in 1990. OBRA 1990 requires coverage through age 18 for children at or below 100% poverty over the next 12 years of phased-in implementation, and it requires pregnancy coverage through 60 days regardless of a change in income and infant coverage for one year, based on the income level for pregnancy.

[235] State calculations made by the Office of the State Registrar and the Center for Health Statistics, MDPH, agreed with the national projection by the Institute of Medicine (1985)--adequate prenatal care to those without it should reduce low birth weight 3-5%.

promoted increased early access and more utilization of prenatal care. Black infant mortality rates are twice the white rate yet policymakers and national advocacy groups, such as the Children's Defense Fund and the Food Research and Action Coalition, expected prenatal care and WIC to close the racial disparity in birthweight and infant death. Likewise, Michigan policymakers anticipated reduced infant mortality, some reduction in black-white mortality, and reduction in low weight births from the variety of health interventions now sponsored under state and federal funding.

During the 1985-1986 period Michigan had access to care for women to 185% poverty level even though Medicaid coverage was still available to a below poverty-level group.

APPENDIX D

Medicaid Physician Fee History

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Medicaid Physician Fee History

Michigan began its Medicaid program paying usual and customary fees to physicians and continued to do so into the mid-1970s. As health care expenditures rose and the automotive industry slumped, the state could no longer support this level of expenditure, and fees dropped to 80% of charges by the latter part of the 1970s. By late 1979 the first decrease took place. As the state's welfare caseload and economic well-being shift, so do remuneration rates for physicians. In good economic times, inflationary factors and special adjustments appear, while in hard times, physician payment retrenches, as do other state services.[236]

The state's first across the board cut in physician fees occurred through a 1979 Executive Order of the Governor; fees were reduced 10%. As the recession added more clients to the roles, another fee cut went into effect on December 15, 1980. During the recession over 18% of the state's population was on some form of public aid but no further provider cutbacks occurred. There was no change in fees until October 1984 when primary care visits (includes prenatal care) increased 5%. A 5% inflationary increase also advanced in October 1985. In February 1987, there was an approximate 10% overall increase (4% inflation and 6% redistribution from Medicare B

[236]Physicians are not being unduly burdened, since the 1971-72 recession in the auto industry, the 1980-1982 recession, and the more recent slump; state employees have also suffered from a lack of pay raises and COLA indicators which meet national standards. There were periods of no increases, with the largest COLA being 4% in any year, periods of voluntary work reduction, layoffs, and more recently the August 1991 20%-pay cut in a two week period. Although the Civil Service Commission and the Unions negotiated a 4% pay raise for FY 1992, the Governor vetoed these portions of appropriation bills so departments need further layoffs to meet planned services and still honor legislatively authorized COLA. All employee increases are forsaken for FY 1993.

collections). In November 1987 there was a 3% inflationary increase. The legislature ordered a 1% reduction of all services for January 1988. In February 1989, the inflationary increase was only 0.5%. August 1990 saw a 2% inflationary increase. The Governor ordered a 20% fee reduction to all ambulatory providers effective April 1991. This cut was restored to providers, excluding laboratory, with the passage of the a budget agreement in July 1991.

In addition to the standard physician fee changes, targeted special efforts to improve access for clients occurred on several occasions:[237]

1) November 1983 - $2 million was used to offset malpractice increases by creating a fee differential for high-risk pregnant women which was 65% higher than the normal rate;

2) January 1986 - $3 million was dedicated to increases in prenatal and delivery care to offset increased malpractice insurance to those increased the most; 47% was given to prenatal care and 13% to delivery professional services;

3) September 1987 primary care office visits increased 20% and in November 1987, prenatal care was increased 20% and delivery services increased 30% to address infant mortality;

4) August 1990 - access to care improvement increases covered 15% increases in prenatal care, established patient limited and intermediate office visits, and preventive child exams.

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[237]This history was taken from MSA, McCardel, 1991.

APPENDIX E

Medicaid Procedures and Cohorts

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Medicaid Procedures and Cohorts

Maternity Care Procedure Codes

Prenatal and maternity procedure codes in Medicaid were 4-digit Michigan Unified Procedure Code (MUPC) numbers until October 1985 when they moved to the 5-character Health Care Procedure Coding System (HCPCS) jointly copyrighted with Michigan Blue Cross Blue Shield. The maternity codes for this study are as follows:

Prenatal visit	4851	T5906
Prenatal Package	4850	59420
High Risk Package	69520	X4854
High Risk Visit	69521	X4855
Postpartum	59430	
Miscellaneous Maternity	59899	
Vaginal Delivery	4842	59410
	4849	59899
Cesarian Delivery	4860	50500
	4863	59520
	4879	59540

Maternity Services

Over 61,000 women had paid-claims data which indicated that they received maternity professional services in 1985 or 1986. Additional women received care which was not billed, not reimbursed, nor associated with these procedures.[238]

1985 Cohort

In the 11 months of 1985, 29,974 women received paid professional maternity care. The maternity services provided to these women indicated that 91% had a delivery in 1985 and 3% had a therapeutic abortion (often called spontaneous abortion or miscarriage) and no delivery.[239] Medicaid paid a total of $10 million for the specific maternity professional services of those who delivered. This was an average of $369.21 ± 163 per woman in calendar year 1985.[240] The average client who delivered had 2.04 ±1 maternity professionals paid. Medicaid delivery providers were 65.8% obstetric specialists (certified or eligible), 0.8% pediatric/neonatal specialists,

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[238]The procedures included here are professional prenatal care, a postpartum visit, and delivery services. Only the professional provider expenditures are counted since the policies relate only to ambulatory care. Hospital inpatient services are significantly greater.

[239]Delivery in this record means that a professional provider procedure code for a delivery was billed to and paid by Medicaid with a service date in 1985.

Over 46% of the women with spontaneous hospitalized loss had some prenatal care (22% had packages, 24% received one or more visits). Ambulatory professional services for maternity care for those who did not show a professional delivery payment or an abortive loss totaled $160,251 (N = 1,623 women had some prenatal care reimbursed in 1985 but no 1985 delivery).

[240]These expenditures only represent the costs reimbursed for the specific prenatal care, postpartum visit, and professional delivery service charges to providers from February 1, 1985 through December 31, 1985, with one exception. If the delivery occurred in December, a postpartum visit in January or February 1986 was allowed and included as a means to complete the maternity professional care in the fee-for-service area. These do not include other service expenditures related to prenatal care (laboratory, ultrasound, etc.) nor do they include any inpatient care procedures except for the physician(s) delivery service itself.

and 15.1% family practitioner specialists. The remaining delivery specialists were not trained or certified in the maternal and child health (MCH) areas.[241]

Operative deliveries were similar to the level of frequency in the Michigan general population, with 25.8% of the paid delivery procedures specifying Cesarian section (C-S) delivery. Of 1985 deliveries, 79.6% had Medicaid reimbursed prenatal care procedures (51.6% normal-risk package, 2.1% high-risk package, 0.3% high-risk visit(s), and 25.6% normal-risk prenatal care visit(s); 37.7% had separate postpartum-care visit(s), and 0.2% had miscellaneous maternity codes. In 1985, 2.39% (651 women) showed two different deliveries in the 11 month period.

1986 Cohort

In 1986, all paid claims for maternity procedure codes identified 32,778 women. Fifty women used out-of-state providers and 0.91% used maternity providers in two or more counties, occurrences not significantly different from provider distribution from the previous year. The professional services indicated that 92.2% had a 1986 delivery ($\underline{N}$ = 30,222). Medicaid compensated $13.38 million for the professional services to delivering women, or a mean of $442.89 ±194, indicating that aggregate maternity professional service expenditures were 20.1% greater in 1986 than the 1985 baseline year. The mean cost per client in 1986 was $74.37 more than in

[241]Specialty was extracted from the Medicaid master file of providers and affixed to each claim based on the provider identification number. Both board certification and board eligibility were accepted to indicate the specialty. Other providers with a specialty designation were grouped together under "other" and those without such a designation were left as no specialty. In Medicaid, a general practitioner code exists under the specialty headings. This class of provider is traditionally not viewed as a medical specialist under other systems as they did not take a special residency and pass a certifying exam; in Medicaid, this group falls under other specialists. Those most likely to have no specialty include hospitals.

1985, or a 22% average increase in expenditures for professional care. Hospital providers had the greatest percent increase over the two years, but public clinics had the greatest absolute dollar increase in remuneration for maternity procedures.

In 1986, there was no change in the proportion of pregnancies resulting in a hospitalized abortion; 3.2% of women fell into this category, but only 23.4% showed FFS paid prenatal care. Over 5% of the study women showed two deliveries in the year, and 7.8% had no delivery. Some of the undelivered women from 1985 subsequently delivered in 1986. There was an increase in the volume of professional charges for operative deliveries such that 27% of procedures indicated a C-S.[242] An unexpected and significant decrease in the proportion of women with paid prenatal care procedure codes occurred with only 63.76% of the women having a delivery showing paid prenatal care under the specific procedure codes. Reimbursed prenatal care was more likely to be under the package format in 1986 (5.1% had the high-risk visit code, 52.9% had normal-risk package, 5.7% had normal-risk prenatal visit(s) and 0.0% had high-risk visits). Separate billing of a postpartum visit increased to 42.6% of delivery women in 1986. The number of clients did not change significantly when adjusted on a monthly basis.

Fetal Deaths

Over 11,000 Medicaid women appeared in the paid claims file but were unlinked with an infant in Medicaid. In the 1986 year Medicaid records linked mother and infant but vital records did not match 240 of these infants and a total of 1,392 mothers had a paid delivery but no infant was found in Medicaid or the birth

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[242]The general C-S rate continued to increase in 1986, so this level was not significantly different from increases experienced by other insurance payers.

file. An estimated 2.5% of these infants (35) might represent errors in case number linkage. Of the remaining 1,356 mothers without a linked birth certificate 1% might be placed for adoption. As few as 10% to a maximum of 28.9% are estimated as ever married and thus would not link between maiden name on the birth certificate and name on Medicaid.

The state reported a total of 865 deaths in 1986 via the Michigan Inpatient Data Base (MIDB) and 30.2% were Medicaid insured and 6.3% had no insurance listed. If all of these are Medicaid, 316 fetal deaths occurred to Medicaid clients. Women with live births experienced 32 other fetal deaths in 1986 according to linked records. The estimated Medicaid deaths are between 659 and 1,256. The best scenario accounts for 28% ever married who could not match a certificate, 1% adopted, 1% error, and 36.6% of fetal deaths reported as Medicaid (316 reported and 343 unreported fetal deaths). In the worse scenario the 1,356 women remained unlinked. There are no adoptions, 10% are ever married so 1,220 might have experienced a fetal death. If only the 30.5% reported in MIDB are assigned, 372 fetal deaths are known and 882 are unreported. By several means the estimated Medicaid fetal death rate in 1986 was 21.4-40.

APPENDIX F

Major Diagnostic Categories

APPENDIX F

Figure F.1
Major Diagnostic Category 15:
Newborns and Other Neonates with
Conditions Originating in the Perinatal Period[a]

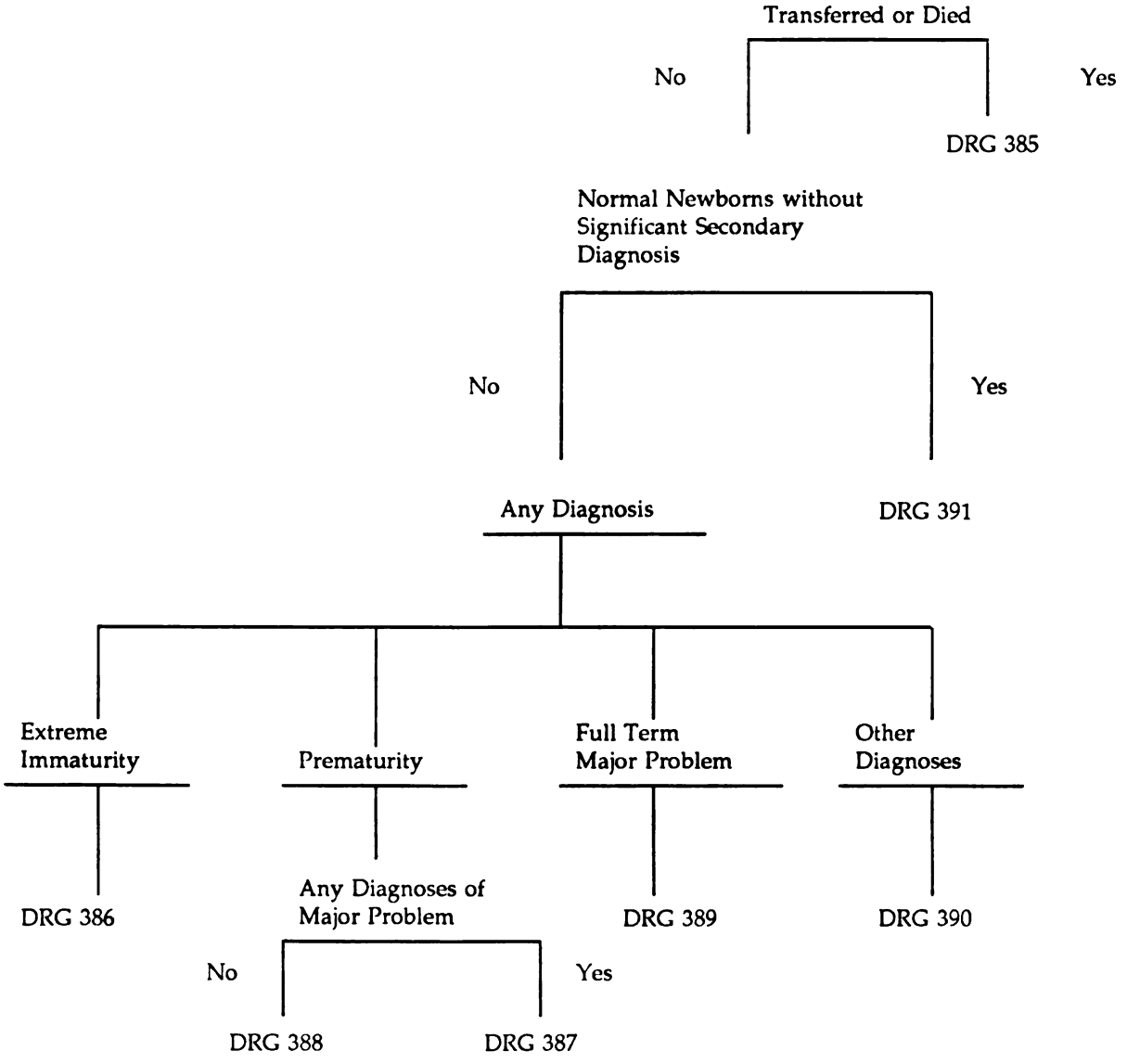
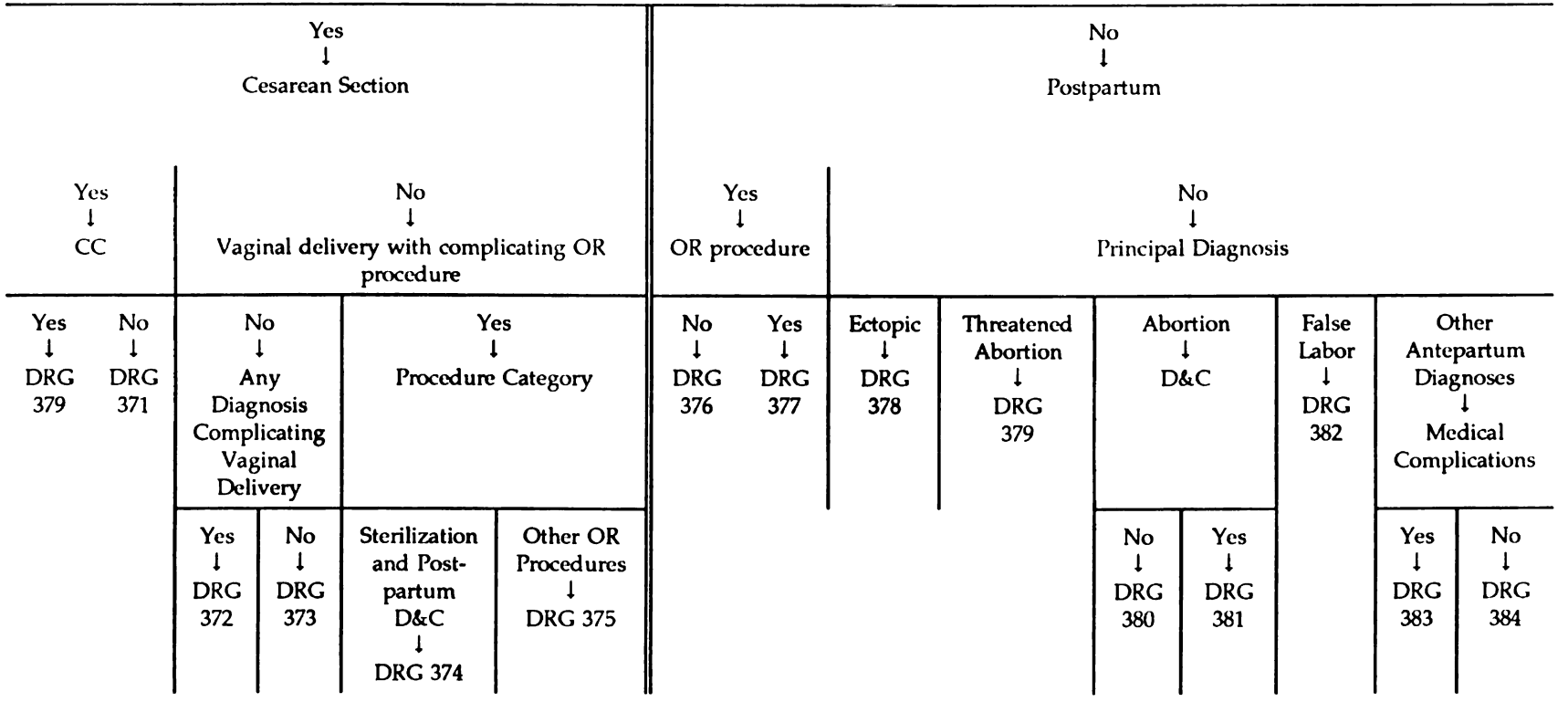


Figure F.2

Major Diagnostic Category 14: Pregnancy, Childbirth and the Puerperium[a]

Delivered this Admission



a Operating room procedures are interspersed in the above DRG's which include both medical diagnoses and surgical procedures. Adapted from MSA, Michigan Department of Social Services, 1986.

APPENDIX G

Variables for Client-based Analysis

APPENDIX G

Variables for Client-based Analysis

Medicaid-Vital Records Linker File

The purpose of the Department of Social Services-Medicaid linker file was provision of a few key variables for linkage and verification of vital records. This file layout was as follows:

numeric recipient identification number

sir name, first name, middle name *

case number

date of birth *

race code #

sex code *

social security number #

county at enrollment #

hospital identification number (delivery hospital) *

admission date #

DRG listed on Episode File

Julian admission date Episode File

The record presented the mother data first, followed by the infant data. This process was useful and allowed exchange between agencies without additional elements cluttering the basic variables needed to link files and identify cases.

* Matching variable

Validation variable

Medicaid Maternity Client - Provider Record Linkage File

Paid claims for women with linked infant vital records contained all medical procedure coded-paid claims. File aggregation reduced the paid claims record with some client information demographics (CIS information) to one flagged record per client-provider pair (by provider identification number and client identification number) for maternity services. The record layout follows.

mother birth year

mother birth month

race code

claim month and year end date of service

total payment to ambulatory providers

total hospital payment for therapeutic abortion

delivery is vaginal (0,1)

delivery is Cesarian-section (0,1)

high-risk prenatal care package (0,1)

normal-risk prenatal care package (0,1)

high-risk prenatal care visit (0,1)

normal-risk prenatal care visit (0,1)

postpartum visit (0,1)

other maternity service (0,1)

therapeutic abortion, no D & C (0,1)

therapeutic abortion with D & C (0,1)

recipient identification number

provider identification number

This record allowed woman data to be collected and summarized with minimum file sizes.

The provider record maintained the same core information as the women record but also added the following information from the Provider Master File extract tape:

unique provider identification number

provider type (MD, DO, Hospital, outpatient clinic, public clinic)

service county of provider identification number

count of women served

presence as a obstetrician specialist (0,1)

presence as a pediatric specialist (0,1)

presence as a family practitioner specialist (0,1)

presence as another specialist (0,1)

Client Evaluation Data Set for Single Delivery Events

Dependent Variables

As previously mentioned the dependent variables used in this study and their source of information are listed below.

Live birth - birth of a viable infant which remains alive at one year. This data is from the state's vital records.

Infant death - death during a period of infancy as determined in the state's birth-infant death matched file for the cohort infants. Hebdomadal death, neonatal death and infant death are assessed with pregnancy outcome related to the two earlier periods.

Birthweight - weight of a live born infant in grams and is sub-classified: Very Low Birthweight (under 1500 grams), Low Birthweight (under 2500 grams), and Normal Birthweight (over 2499 grams). Data are from the state's birth file.

Prematurity - calculated gestational age which corresponds with delivery of a live birth and is subclassified: Early Premature (less than 34 weeks gestation), Late Premature (34-36 weeks gestation), Term (37-41 weeks), Postterm (42 weeks+), and Unknown (gestational age was not provided or was infeasible). Data are from the state's birth file.

Independent Variables

Independent variables are numerous in all studies of pregnancy outcome. The selected variables were over 300 for the entire data set but only those used in the dissertation portion are described here.

Race of mother is collapsed as one of three groups: black, white and hispanic, and all other minorities from the birth certificate. Since there was little difference between non-blacks and other minorities most analyses use two groups--black and

non-black. Welfare race and ethnicity data available for these women and infants agreed with the birth file within 0.5%. These analysis use race of the mother from the birth file. Hispanic heritage was available in DSS and allowed special analysis of this minority.

Age was available as calculated from the DSS files and the delivery or pregnancy date, or used as age at last birthday on the birth certificate. Both sources were used in the study; concurrence was poorest for older women but was 99% similar between groups.

Categorical groups were created based on the DSS calculated age at delivery (under 17, under 20, 21-25 etc.,).

Age-adjusted educational level was created as a dichotomous variable to assess the effect of education, independent of Medicaid poverty status. High school graduation or equivalent was available from the birth certificate and was linked with the woman's age at delivery to assess whether the level of education achieved was low in relation to chronological age. Women aged 19 needed to achieve at least an eleven completed grades equivalent to be at an acceptable level.

High School Graduation was computed as a dichotomous variable based on the highest grade reported on the birth certificate.

Place of Residence appears on the birth certificate for almost all clients by county. Counties are also moved to a dichotomy based on 1985 and 1986 population; those counties with less than 100,000 residents were classified as rural and the remaining as urban.

Metropolitan counties serve as an additional subgroup for Wayne and Oakland counties (over 1 million inhabitants). Other analysis looked at the Detroit population specifically. **Detroit** residence appeared as a dichotomy.

Hospital of Delivery was used from the paid claim.

Hospital of Death was from the infant birth-matched infant death record.

Parents represents the number of parents named on the birth certificate.

Number of Babies lists the number of live births in the delivery event.

Weight represents the average birthweight of live births for the single delivery.

Month Care Started is the reported month of care initiation on the birth certificate. A code 10 means no prenatal care was reported.

Number of Visits is the reported number of visits for prenatal care on the birth record.

Plurality from the birth certificate indicates the number of fetuses in the event.

Apgar Scores at 1 and 5 minutes are birth certificate recorded measures of infant well-being.

Complications at Labor and Delivery are coded on the birth certificate for up to 5 conditions.

Error is an edit variable created to identify the most infeasible combination of birthweight and gestational age on the birth file and reset the data to missing when invoked. This process was created to identify low gestational age with large birthweight reflecting an error in one or both measures of fetal growth. The criteria used were a gestational age of 1-15 weeks and a weight under 401 grams, a gestational age of less than 24 weeks with a weight of 1,500 grams or more, gestational age between 24-27 weeks and a weight of 2,600 grams or more, or a gestational age of 28-33 weeks and a weight of equal to or exceeding 3,100 grams.

Medicaid Expenditures

Dates of service in Medicaid collapse into periods related to pregnancy in two ways. Women whose delivery had calculated gestational age and physician estimated

age on the birth certificate within a 3 week period of agreement used the calculated age to determine when pregnancy began. This marker was set and then a period of up to 9 months prior established as the **pre-conceptual period. Pregnancy** initiation was calculated backward from the day before delivery. The **delivery to 60 day postpartum** period was based on 59 days after delivery and **61-364 days** was computed for dates of service beyond the postpartum phase. All paid claims were grouped by these time periods for each women with an infant-linked vital record.

A total of 13% of women with linked a live born did not have comparable data available (unknown last menstrual period (LMP) or calculated gestational age did not agree with physician age ±3) on the gestational age at delivery on the birth certificate. The Medicaid mean of 39.3 weeks (unedited) was used to impute the periods of Medicaid paid claims for these cases.

Paid Claims Variables:

Diagnoses appear on each claim and all paid claims review for the presence of primary and secondary conditions and diseases. A dichotomy variable flagged related conditions including **Diabetes, Cardiovascular disease, Hypertension, Urinary tract infections, Sexually Transmitted diseases, Other infectious disease, Nutritional anemia, Other anemias, Renal disease, and medical risk conditions.**[243]

Specialty of the provider was placed on each claim but was not used in a specific way during this phase. Participation in the managed care options was also not studied separately during this phase.

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[243]Noted in the Physician Policy Manual to be high-risk conditions for pregnancy which required more intensive service and received a higher fee.

Summary of Services Variables. The total number (count or days of stay) and expenditures for each of the following service categories is captured for the pre-pregnancy, pregnancy and delivery-60 day period from the paid claims.

Prescriptions	**DRG 370 (C-Section and complication)**
Vitamin-mineral supplements	**DRG 371 (C-Section, no complication)**
Radiology	**DRG 372 (vaginal and complication)**
Emergency Room	**DRG 373 (vaginal, no complication)**
Ambulance	**DRG 374 (vaginal, sterilization)**
Laboratory	**DRG 375 (vaginal, other surgery)**
Substance Abuse	**DRG 376 (postpartum, no surgery)**
Ultrasound	**DRG 377 (postpartum, surgery)**
Dental	**DRG 378 (ectopic pregnancy)**
Home Health	**DRG 379 (threatened abortion)**
Family Planning	**DRG 380 (abortion, no D&C)**
	DRG 381 (abortion, D&C)
Medical Care (ambulatory)	**DRG 382 (false labor)**
Medical Care (inpatient)	**DRG 383 (complications pregnancy)**
	DRG 384 (other in pregnancy)
Non-physician or non-hospital	**Other Admissions**

APPENDIX H

Process for Birth File Linkage

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Process for Birth File Linkage

Considerable interest exists in processes used to link administrative, paid claims, vital records, and other files for health services research. The process used to pre-select Medicaid mother-infant pairs prior to birth file linkage is unique to previously discussed work. The approach used to match the birth files to these Medicaid cases represents a somewhat different approach and the Michigan Department of Public Health (MDPH) staff involved in the process documented record validation carefully. This detail is presented to assist other social science researchers who are limited to names as a primary variable for file linkage.

Record linkage of clients and vital records generally proceed with a set of matching variables and a set of verification variables. In Michigan the birth certificate statistical file does not maintain the name of the mother at the birth but rather her maiden name; prior to 1989 the record did not carry the mother's social security number. Michigan women often name their child with a different sir name and name linkage presents difficulties. The pre-paired, 77 element Medicaid file[244] offered an established set of mother and newborn to link with the birth file and then the birth-infant death file.

Staff in MDPH who wrote the linkage programs for this project used prior matching experience with local health department prenatal care records and the work

[244]Shown in Appendix G. Race and county of residence at DSS enrollment proved less reliable than anticipated for use as verification variables. Infant name, hospital of birth/delivery, mother's age, date of birth, and gender of infant serve as the main linkage variables. Social security number was used to hand verify matches with the paper birth records with the linked case.

of Buescher in North Carolina.[245] This Medicaid linkage offered new primary variables (hospital of birth and linked mother-infant names) and a new verification variable (social security number [hand check only]) to the previous Michigan process.

Vital Records Linkage

The 1986 birth file linkage began in an eight level process on the full 1986 birth tape.[246] The computerized match located 87.79% on the first level **(hospital of birth, last name [10 characters], first name [5 characters], date of birth, and sex).**[247] The subsequent levels relaxed the last name to 6 characters, the first name to 1 character, sex, last name to 4 characters and first name to an initial, last name to 2 characters with first name to an initial, last name to 2 characters with no first name, and finally no last name but first name. This process resulted in a 97.43% computer match (using interactive system after level I) but all levels saw false matches occurring when the last name was relaxed to four or fewer characters.

The experience gained in the first matching process refined the process for the next time period. The interactive system offers several advantages to the solely batch process. Of great assistance was the ability to visualize differences between the

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[245]Buescher (1988) used a 13 level system with a 6 character last name to link 12,159 Medicaid infants in 1987.

[246]The full birth file includes the state statistical file and the late file (records submitted after the date cutoff for state statistics).

[247] Medicaid has a 20 character name field which is separated by blanks as data is entered onto the client and claims files. Within the vital records system considerably more elements are allocated for alpha identifiers. The Medicaid constraints bounded the process with a maximum last name of 10 spaces, first name and middle initial of ten spaces. MDPH utilizes different schemes to break up the name. The base assumptions and field length differences must be identified in alpha linkage. Other alterations between the files which changed the reliability of variables where a maternal date of birth in Medicaid and a reported age at last birthday on the birth file; race in DSS is a combined racial ethnic history which separates out hispanics versus the state birth file race which offers only White/Hispanic but has many other groupings for different Asians and Orientals.

systems (DSS and MDPH) in the layout of names. Within DSS's paid claims file, recipient name is limited to twenty characters. Common problems related to name are misspelling, double names, and hyphenated names. Short last name or the use of Jr., III, etc., can allow rapid matches when these are the only identification variables of difference. At each level, only the previously unlinked records meeting the matching criteria are selected. Matching criteria used a conservative approach so this system minimized matched records and maintained the lowest degree of false matches. Validation of the match occurred as a detailed procedure through the Office of the State Registrar and Center for Health Statistics (OSRCHS).[248]

[248]Drs. Thu Le and Jose Saraiva conducted a careful documentation of the linkage results and validation through the vital records system. The following material is adapted from Dr. Le's technical notes on the project findings.

Table H.1

Electronic Matching Results for 1985 Mother-Infant Linked Pairs[a]

Match	Level	Criteria Used				
87.34%	1.	Hospital	Last name (10)	First name (5)	Birth date	Sex
1.89%	2.	Hospital	Last name (6)	First name (5)	Birth date	Sex
0.96%	3.	Hospital	Last name (6)	First name (5)	Mom age	Sex
2.91%	4.	Hospital	Last name (6)	First name (1)	Birth date	Sex
0.96%	5.	Hospital	Last name (6)	First name (1)	Birth date	
0.46%	6.	Hospital	Last name (4)	First name (3)	Birth date	Sex
0.86%	7.	Hospital	Maiden name	First name (5)	Birth date	Sex
2.52%	8.	Hospital	First name (5)	Birth date	Sex	
0.11%	9.		Last Name (10)	First name (5)	Birth date	Sex

[a] A total of 26,537 mother-infant linked records were sent from the Medicaid files to link with vital records; 26,000 or 97.98% matched.

Note: There were 7 false matches. The name variables refer to the infant unless otherwise noted. Criteria nine is useful for infants born outside the hospital.

Linkage Validation Scheme

A random sample of 100 records was obtained from the first level match; visual inspection of all variables found no false matches. Levels 2 through 7 and 9 were validated by visual inspection comparing the two sets of full names on both files; there were no false matches. Criteria 8 matched 669 records; 16 records had discrepancies in age of mother. Seven false matches occurred. The remaining 653 matches had differences in the last name between the two files.[249] Different last names accounted for 80% of the record discrepancies and the other 20% had misspellings between the files.

A 250-record random sample pulled from these cases verified mother's social security number (from DSS) with the birth certificate (paper copy). No false matches occurred. All matches are thus assumed to be true matches. Within the 1985 year,[250] the 26,537 Medicaid mother-infant linked records produced 26,000 (97.98%) true electronic matches, seven false matches, and 2.02% unmatched birth records.

The next level of matching was Interactive Searching with Visual Judgement. This electronic process searched records in the computerized birth file according to different criteria. For example, first name, month of birth, county of occurrence, and mother's age, selected one-at-a-time, narrow the search and locate matches. Visual scanning located 393 matches. All remaining records from the file were sent to the Certification Unit of the Vital Statistics Section. Hard copy record searching identified

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[249]In one file the newborn bears his mother's maiden name and in another file the infant has another name, commonly believed to be the father's name. This situation was frequent in other record linkages done at MDPH over the last few years; 100% verification of prior records found no false matches.

[250]The 1985 linkage included 159 cases from January which were subsequently dropped as not fitting the study birth cohort criteria (born after January 31, 1985).

67 additional matches. Out of this file 26,460 records linked with the birth file and 72 (0.27%) remained unlinked. The seven false matches were removed.

Table H.2

Analysis of Records Failing Electronic Birth Match, 1985 Medicaid Cohort

Problem Identified for No Linkage	Number	Percent
<u>Interactive Search and Select</u>		
Differences first name and birth date	14331	0.08
Invalid first name	11725	0.43
Differences last name and birth date	6113	0.36
Eliminated from the electronic match	32	6.95
Differences birth date and mom age	22	4.78
Differences first name and sex	10	2.17
Unknown birth date and mom age	8	1.73
<u>Hard Visual Match</u>		
Different first and last names in files	20	4.34
Late filing; not in computer file	18	3.91
Discrepancies in birth date; mom's age, and baby names too common to be identified in the computer file	15	3.26
Different last name, mom's age, and mom birth date	14	3.04

Summary

Pre-linked cases from Medicaid linked with an 88% exact match on the first level of linkage between agency files. Subsequent levels of computerized interactive searching allowed for all but 2% of records to link electronically. Unlinked records had similar types of errors which prevented record linkage but these occurred in combinations beyond the criteria set for a match. Common problems found in the Michigan agencies address constraints in primarily name linkage. This approach offers another method to link files.

APPENDIX I

Demand and Supply Supplement

APPENDIX I

Demand and Supply Supplement

Demand

Medicaid records do not describe client use by age or condition. Only aggregate analysis comes from the paid claims system. Recipient-level data require a merge with the Client Information System (CIS) from the general welfare caseload to determine any client demographics of Medicaid users. Absent this linkage, a crude estimation of expected change is presented.

State Fertility and Supply

The total number of pregnancies estimated for the state by the Michigan Department of Public Health was 211,202 in 1985 and 209,636 in 1986 based on 2.2 million women of childbearing age.[251] Utilizing the comprehensive Michigan Inpatient Data Base (MIDB) for this period the state estimated a total of 175,085 pregnancy-related hospital admissions,[252] with an estimated 167,854 admissions with indirect causes, postpartum admissions, and other less focused categories removed for 20% of estimated pregnancies. This base provides a crude 9 hospitalized

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[251] By state calculation 9.4-9.6% of Michigan women 15-44 became pregnant during the study years. An estimated 15% have a miscarriage (spontaneous abortion or fetal death) and 20% have induced abortions. The state population decreased an estimated 71,620 women during the period resulting in an estimated 0.7% reduction in pregnancies. MDPH. Office of the State Registrar and Center for Health Statistics. 1987 a, 1988 a.

[252] Michigan Department of Public Health procures the hospital discharge tape for data analysis purposes. The MIDB tape represents over 95% of the state's discharges, it is not an unduplicated count of individuals but rather hospital episodes. The delivery data will include fetal deaths which were delivered. The data was calculated by DRG.

pregnant women per licensed doctor in Michigan. Physician supply was adequate for demand in Michigan.

Table I.1

Number of People Eligible for Medical Assistance By Program

Program	1985 Average Month	1986 Average Month
Aid to Families with Dependent Child (C)	659,783.9	644,607.9
MSA Families with Dependent Children (N)	34,440.7	32,950.5
MSA for child under 21 (Q)	55,272.3	56,587.2
Pregnant Women Program (L)[a]	522	625.7
Subtotal key programs	750,019	734,771
Total all eligible	1,129,683	1,018,715

[a] This program began in October 1985 to address the needs of the uninsured low-income pregnant woman and her infant. No assets test was applied for those who met this very low-income level. In future years this category serves for women under the OBRA expansions.
Source: MSA, Office of Program Policy reports, 1986-1989.

Enrolled Providers[253]

Participating providers enroll with the Medical Services Administration on an annual basis. The Medicaid Provider Master File (PMF) contains the potential suppliers of services to clients. Provider enrollment appears to vacillate over the decade. In 1986 more potential providers appeared on the file than for 1985. The number of clinical providers[254] enrolled to be Medicaid providers increased 2.9% between 1985 and 1986; the difference in obstetric or family practitioner specialty was a gain of 2.0%. The number of enrolled providers dropped between 1986 and 1987 by

[253] This data was supplied as an extract tape of the Provider Master File (PMF) through November 1988 by the Office of Support Services, MSA.

[254] Clinical providers used here include only physicians, hospital outpatient clinics and public (medical) clinics in the fee-for-service sector. Each provider location has a number thus this does not represent the actual provider supply without applying a process to unduplicate providers with multiple locations.

2.4%. This drop shows that the increase in provider supply is unstable and has no apparent relationship to reimbursement rates.[255] The key clinical providers in Medicaid are described in Table I.2. This table presents a duplicate listing of providers[256] because it is based on each approved site of service for enrolled providers. The provider specialties were grouped into non-maternal and child health (Non-MCH) which includes General Practitioner (no board specialty) and all other categories of specialty except as specified for the study; Obstetrics and Gynecology, Family Practice, and Pediatrics. These latter MCH specialties relate to board eligibility or certification based on additional training or experience. Table I.3 lists the unduplicated supply of physicians and public clinics during the same years indicating allopathic (MD) and osteopathic (DO) physicians and public clinic providers counted once by their unique provider identification number for two certified specialties listed in the Provider Master File. The number is larger than the state's own resources since providers from border states (Ohio, Indiana, and Wisconsin) render services to Michigan Medicaid clients; plus clients receive care as needed anywhere in the United States.

Based on the OHMA Physician Census, Medicaid enrollment of Obstetricians and Gynecologists was in exact proportion to the state's supply, 5.4% of all available. Medicaid had significantly fewer enrolled Family Practitioners than the proportion in the state's supply (8.6% of all providers). Obstetrical supply includes the former, but

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[255] Medicaid reimbursement increases for all categories of providers peaked at 5% in 1985 and there was no general increase in 1986.

[256] Paid claims are processed by provider identification number; each provider physical location has its own number; claims counts therefore represent providers who are duplicated. A merger with the Provider Master File allows the unique provider number to be identified for each provider identified by site. Unique provider data are unduplicated, or each provider is counted only once.

also includes those deemed eligible in the obstetrics specialty. This indicator underestimates the real obstetrical supply to Medicaid women but counting all Family Practitioners and general physicians for maternity care would greatly overestimate supply; Table I.2 presents this data. The addition of new providers did not maintain the total pool of providers available to serve Medicaid. Significant reimbursement increases in one area of practice did not improve the potential supply significantly. Michigan Medicaid had an excellent level of participation by the medical community as evidenced by the number of licensed providers and the enrollment files.

The analysis of paid claims indicated that significant amounts of maternity care are provided by non-specialists. Hospital-based physicians can bill Medicaid for their services rendered at a 60% of screen rate as the hospital clinic billing is at 40% of the procedure rate. Medicaid is aware that many facilities do not have the professional provider bill the state. This area, along with care by residents and other House staff, may account for many of the providers who did not receive FFS reimbursement for prenatal care.[257]

Potential provider supply is of concern to public policy makers, especially as increased numbers of women may be Medicaid eligible. Although MCH provider enrollment sites increased, unduplicated providers[258] by major category decreased.

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[257] Hospitals with training programs receive a special reimbursement as part of their inpatient reimbursement rate so resident physicians may not bill Medicaid for their professional services to clients.

[258] For this phase of aggregation in the provider file, the lowest provider category is selected to determine placement type. Movement between categories occurred but a physician is still a physician when he runs a "public clinic". One or two cases moved to a hospital-based provider each year, respectively; since over 2000 hospitals existed each year it was deemed inappropriate to add this classification into potential providers. Maternity providers are thus codes: 10 (MD), 11 (DO), 40 (hospital outpatient clinics) and 77 ("public" or freestanding clinics).

In 1985 a total of 31,569 enrolled providers represent the potential supply. This supply of enrolled Medicaid providers was increased to 32,485 in 1986.

Table I.2

Medicaid Master File Clinical Providers by Specialty Area, Years 1983-1987
(Duplicated Counts)

Year	Total	Non-MCH	Obstetrics	Family Practice	Pediatrics
1987	56,710	48,572	3338	1650	3150
1986	55,951	47,540	3526	1680	3205
1985	56,181	49,873	3241	1630	3067
1984	51,410	43,133	3509	1596	3172
1983	48,258	39,966	3567	1551	3174

NOTE: This table provides duplicated counts of actual physician and public clinic providers by listed first specialty of practice. Each count represents a separate identification number which reflects a physical location for service.

Table I.3

Unique Provider Physician and Public Clinics, Years 1983-1987

Year	Total Supply No.	Clinics (77) No.	Physicians (10,11) No.		
			ALL	MD	DO
1987	20,374	225	20,149	16,947	3202
1986	20,236	187	20,049	16,948	3101
1985	20,220	186	20,034	16,853	3181
1984	19,164	182	18,982	15,838	3144
1983	18,654	171	18,483	15,393	3090

NOTE: This table provides unduplicated counts of allopathic and osteopathic physicians, and public clinic providers listed by their unique provider identification number. A physician's change to a public provider designation between 1985 and 1986 does not represent the loss of service by the MD.

Based on the OHMA Physician Census published in 1990, the state's patient care physicians available to Michigan residents in 1986 were generally enrolled as Medicaid potential providers. Based on the provider tape which does not have active purging, participating physicians from the Master File might be deceased, gone from the state, or no longer in a patient care role but did not notify Medicaid to remove them. An estimated 10% of MDs and 5% of DOs are projected in this category; if this estimation holds, Medicaid would then have about a 97% enrollment rate for MDs and a 97.5% rate for DOs.

Specialty Care

The availability of specialty care for high risk clients requires some monitoring according to state health policy makers. In 1987 enrolled-certified providers decreased to 23.5% of all providers in the Medicaid Master File. In the 1986 and 1985 period, 37.5% had a certified designation. Presence as an enrolled provider does not assure access as seen in the actual number of providers reimbursed for maternity care. The actual proportion of medically high risk women is less than 15% of the caseload so if medical need was matched with provider specialty training, enough specialists should be available. The actual number of physicians certified in obstetrics for the Medicaid

Master file is decreasing annually. Some would say this precipitous drop is related to the fear of malpractice and the increasing cost of doing obstetrics. Others would say it is a lack of adequate compensation for services. On the latter point Medicaid selectively paid a 47% increase in 1986 yet certified obstetricians and total obstetric supply declined; another large increase was paid beginning November 1, 1987. New obstetrical service providers decreased in the proportion who were certified specialists from 3.5% to 3.0% in 1986. Actual suppliers of maternity care also decreased between 1985 and 1988. Proof of certification of specialty may have caused some deceleration in specialty claim after 1983. In 1985, 1,115 (5.5%) of unduplicated physicians were certified in obstetrics and their supply declined slightly to 5.4% in 1986, and further dropped in 1987 to 5.1% of physicians. Family Practitioners represented a staple 3.2% of providers in 1985 and 1986 and showed a slight decrease in 1987 (3.1%) as noted in table I.4.

The trend to a decreasing physician pool for families in Medicaid is not unique to obstetrics. Pediatric specialists went from 1,150 unique providers (6.3%) in 1983 to a low of 987 (4.9%) in 1988. This loss of pediatric supply is similar to the unique provider obstetric loss and is not being made up by family physicians whose number is rather stable. Pediatricians did not experience any significant increase in malpractice premiums, nor has there been a "crisis" noted yet in supply, but their loss in Michigan Medicaid equals obstetrics, despite the large fee screen incentives and tort reforms of 1986 and beyond for obstetrics. Unlike the obstetric services, no special increase in fee screens was made between 1983-1986 for pediatric procedures beyond neonatal intensive care hospital rate recognition (fees increased in 1987 and 1990.) The area of specialty participation in Medicaid appears to be an issue unrelated to malpractice issues. In Michigan targeted rate increases of 108% for prenatal care

professional services over the 1986-1987 period did not increase providers for obstetrics in Medicaid.

Low Caseloads. It appears that less than 10% of the caseload of the majority of participating providers are Medicaid clients.[259] Both the total number of providers available and the number of clients served per provider have been of concern to groups investigating obstetric access. These issues require monitoring when caseload shifts and provider incentives occur. As seen here, physician practice does not always concur with national and state questionnaires which state that the reimbursement amount is the major deterrent in participation.

[259] The Michigan State Medical Society sent member questionnaires in 1983, 1985 and cooperated with the MDPH in 1988. In all years the survey response was less than 50% but the unweighted data was consistent. These efforts are unpublished but were used for state policy purposes.

Table I.4

Estimated Supply of Obstetric Physicians by Certification[a] for Medicaid, 1983-1987
(Unduplicated Counts from Unique Provider Identification Numbers)

Year	Certified Obstetrics		Certified Family Practice		OB Supply[b]		New OB	
	No.	%	No.	%	No.	MD	No.	MD
1987	1038	5.1	627	3.1	1131	1032	34	33
1986	1088	5.4	638	3.2	1159	1057	32	20
1985	1115	5.5	641	3.2	1171		24	11
1984	1155	6.0	648	3.4	1155		21	9
1983	1179	6.3	656	3.5	1208	1101	51	44

a Prior to 1984 physicians declared their own specialty by self-report to MSA. The process of Medicaid enrollment for providers was changed and proof of education and training for specialty eligibility and certification was required. Existing providers were grandfathered into the system.
Eight certified obstetric clinics appeared in all years. The number of DOs is the difference between the total and the number of MDs given.
This data was prepared from an extract tape of the Provider Master File from the Office of Support Service, MSA in 1988.

b This dichotomous variable includes any provider with a listed obstetrics/gynecological special certification or eligibility in the Provider Master File in specialty areas one or two in the extract tape. Up to 52 specialty codes could appear in the full provider tape listing. Use of a third code did not increase the supply sufficiently to warrant extra classification from the extract tape.

Provider Participation Characteristics

Provider Differences by County

Eighteen of Michigan's 83 counties are urban (populations over 100,000), and under 5% of its population reside in the upper two-thirds of the state. Provider location generally reflects population distribution and all areas of the state have a delivery hospital within a one hour driving distance, most have access within a half hour drive.[260] Medicaid maternity providers were geographically dispersed in the state. Only one county (Keweenaw - population 2,000) lacked a paid maternity provider either year.[261]

The following tables describe county participation by provider and served clients for the two study years. Counties with a mean over 25 Medicaid clients served per provider are shown in Table I.5 These counties may be the first affected if there is a rapid increase in Medicaid caseload without a corresponding provider increase.

Comparison By Large County Size

A comparison of the large counties to the remaining 65 counties for changes in Medicaid maternity clients and reimbursed Medicaid-paid providers of professional maternity services found 81% of the pregnant women with Medicaid prenatal care reimbursement in 1986, and also in 1985, saw a provider with the primary location in a large county. Among those clients with paid professional delivery charges, 80% used providers with their first service county as a large population county in both years. The number of clients served by provider did not change significantly in the

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[260]MDPH, unpublished data from the Access to OB Services Subcommittee, 1989.

[261]There was only one client delivery from Keweenaw in 1986 and the county had no licensed resident physician.

aggregate, or by service county population between the base year and a year of significant increase in provider reimbursement.

In 1985, the state Medicaid program paid 3,242 providers of maternity care and 2,313 (71%) of them were from the 18 large counties. In 1986, the number of paid Medicaid maternity providers decreased to 3,164 but there was no significant difference in their distribution by size of county. Seven large counties gained providers and ten showed a loss with one maintaining the status quo. The net loss from large counties was 53 paid maternity providers, or over two-thirds of the state's loss of 78 providers in 1986. Livingston and Macomb counties showed the largest rate of loss of the urban counties; both of these counties are bedroom communities and may see change based on declining caseloads. There was no significant difference between the large and smaller counties in provider loss. Table I.6 shows the change in providers between the two study years for the large population counties. Ottawa, Kalamazoo and Calhoun counties seemed to benefit from additional providers in 1986. These western counties are more conservative and the gain might be attributed to the greater efforts put forth by the county health departments to find new PPC providers (who had to become Medicaid providers to receive payment for deliveries) versus a change from a Medicaid to a PPC provider. This area requires further exploration.

The number of unduplicated pregnant women served by providers in the large counties was 10.5 women per provider in 1985 and 11.7 women per provider in 1986. These data can be compared to the county distribution of linked women where 78% of women with Medicaid coverage at labor and delivery, or during pregnancy, resided in these large counties at the infant's birth.

Table I.5

Providers of Maternity Care and Average Caseloads which Exceed the State Average By Provider's Service Counties

	1985 Maternity Cases		1985 Providers	1986 Maternity Cases		1986 Providers
County	Mean No.	Std. Dev.	No.	Mean No.	Std. Dev.	No.
Bay	25.08	±34.9	25	30.11	±44.9	26
Berrien	27.38	±48.2	68	27.96	±43.2	65
Calhoun	27.95	±27.7	41	25.39	±37.7	48
Ingham	25.16	±46.9	93	34.03	±69.9	93
Jackson	26.35	±26.9	28	31.56	±27.9	25
Kalamazoo	35.12	±81.8	48	36.92	±89.4	54
Monroe	44.53	±68.8	15	37.76	±55.4	17
Ogemaw	22.41	±23.4	12	39.00	±42.4	11
Saginaw	25.17	±44.1	77	30.69	±65.2	66
Wayne	26.92	±67.8	802	30.88	±84.4	795
State	**18.28**	**±42.2**	**3242**	**21.19**	**±52.8**	**3164**
MD Only	**17.98**	**±33.6**	**2227**	**20.49**	**±40.8**	**2247**
DO Only	**13.55**	**±22.8**	**769**	**16.49**	**±29.0**	**676**

Note: All counties but Ogemaw are urban counties. In the MSA study of providers between October 1987 - December 1988, Ogemaw had only 7 FFS paid maternity providers. After the 1987-1988 targeted increases in provider reimbursement Medicaid had fewer than 1,865 Medicaid paid FFS prenatal care providers (MSA, 1989).

Table I.6

Change in Reimbursed Maternity Providers For Large Counties, 1985-1986

County	1985 Providers	1986 Providers	Net Gain	Net Loss
Bay	25	26	+1	
Berrien	68	65		-3
Calhoun	41	48	+7	
Genesee	188	190	+2	
Ingham	93	93		
Jackson	28	25		-3
Kalamazoo	48	54	+6	
Kent	152	154	+2	
Livingston	19	14		-5
Macomb	155	136		-19
Monroe	15	17	+2	
Muskegon	65	62		-3
Oakland	359	328		-31
Ottawa	36	46	+10	
Saginaw	73	66		-7
St. Clair	49	46		-3
Washtenaw	97	95		-2
Wayne	802	795		-7
Total	2313	2260	+30	-83

APPENDIX J

PPC Program as a Medicaid Substitute

APPENDIX J

PPC Program as a Medicaid Substitute

The Michigan Department of Public Health (MDPH) expanded local efforts to access prenatal care in 1983. The desire to access the physician community prompted MDPH to authorize a fee level that Medicaid was striving to achieve. In a few counties where local physicians would not accept Medicaid or no obstetrical specialty services were available to low-income women, special liability contracts were established. The local level made every effort to institute a system for prenatal care access between 1985 and 1987. By the 1987 year, only a few counties did not actively participate in this program yet participation was below estimated need. In 1985, the PPC program accounted for 2.6% of the state's births with about 3,600 deliveries. The PPC caseload doubled in 1986 and represented 5% of the state's births. A comparison of caseload between Medicaid women and PPC found that 39% of the PPC clients who delivered in 1985 had Medicaid enrollment (below poverty); in 1986 this level increased to 58% (below poverty) and in 1987 it dropped to 48%. For 1987, Medicaid had changes in access including relaxed assets tests and the reimbursement rates were increased so normal prenatal care in Medicaid was above the PPC rate.[262] The sociodemographic constellation of the PPC caseload is not unlike the findings in Arkansas with Medicaid expansion.[263] Understanding the evolution of the PPC

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[262]The MDPH conducted record linkage with the birth certificate for PPC clients and these linked records were subsequently linked to Medicaid enrollment. PPC clients were found to be low medical risk but did not significantly differ in the outcomes of pregnancy from the state's population. The current dissertation file does not allow identification in PPC to be linked with the timing of Medicaid enrollment (during pregnancy or at delivery). MDPH, OSRCHS, May 1991.

[263]US General Accounting Office, 1991.

program is important in the evaluation of the policy of reimbursement incentives to Medicaid. This dissertation can not evaluate the PPC program, but only offers some explanation of its potential impact as a competitive system of care, on the Medicaid efforts to improve provider participation and access. The negotiated statewide PPC fees in 1985 were as follows for the medical component of prenatal care:

$263 for the package of care including postpartum visit,

$16 for an individual prenatal visit if less than six visits, and

$35 for the postpartum visit only with prenatal visit coverage.

The PPC program did not differentiate reimbursement rates by level of medical need.[264] Providers received the same reimbursement ceiling for all women as negotiated locally; in October 1987 there was a reimbursement increase. Labor and delivery care was not covered in PPC until 1987 at which time reimbursement was equal to the Medicaid fee screen.

In the first three quarters of 1985, Medicaid reimbursement rates fell just above $150 for the normal package of prenatal care and over $250 for the high-risk package of prenatal care. A 5% raise given in October 1985 made the PPC rates similar to the Medicaid high-risk rate. The prenatal-visit rate reimbursed by Medicaid was less for normal risk women but more for high risk women in 1985. With the large Medicaid reimbursement increase effective in January 1986, the normal-risk Medicaid fee screen for prenatal care was about 90% of the PPC rate and the high-risk rate was about 150% of the PPC rate for prenatal packages. The Medicaid high-risk visit rate was 200% of the PPC rate and the normal-risk level prenatal care visit was about 120% of

[264]The health department believes that all low income women are at high risk for poor pregnancy outcomes. The normal medical risk clients seen in Medicaid with poverty levels below 60%, have more poor outcomes than the general population.

the PPC rate in 1986. It was always to the physician's economic advantage to see clients through the PPC program in 1985, and in 1986, PPC was better for most clients (normal-risk package). During 1986, Medicaid coverage was superior for high-risk clients since there were no restrictions on laboratory testing and other support services needed to address high-risk problems, and the Medicaid reimbursement level was significantly better.

Physicians identify problems other than economics in their utilization of the Medicaid system; specifically, problems in billing, delays in payment and a greater need to justify services.[265] The high-risk reimbursement level in Medicaid was equal to the rate in PPC by the fall of 1985. In Medicaid, the high-risk care claim required the physician to document the medical risk condition in the remarks section of the claim. In addition, all physicians who billed the prenatal-package-of-care needed to write in the begin date of the prenatal care service in the remarks section of the claim. Claims with any of this information missing pended, and delays in payment occurred until all procedures were completed correctly. More billing hassles occurred in preparing the claim for service reimbursement through the Medicaid system than for local health department processing. Also, the Medicaid package-of-care originally inferred first trimester enrollment with a continuous provider, but PPC accepted the prenatal care package with a minimum of six visits. Since most clients would be low medical risk by Medicaid criteria (over 82%), the physician did better economically and administratively by billing PPC. Although PPC clients were not

[265] Refer to Chapter 2.

originally envisioned to be enrolled in Medicaid, arrangements were made to accept Medicaid payment in the clinical settings of the PPC program.[266]

Local agencies generated physician contracts for PPC so there is no statewide database on the number of participating physicians, by type, specialty, or location. Such a comparison could address the advantages of these relaxed administrative procedures in locating additional providers for poor women, versus those willing to work within the Medicaid system. The PPC program offered physicians almost everything reported as a constraint to serving government-funded clients and it should be evaluated to define its impact on access.[267] The MDPH-linked birth records to participating women and found no reduction in infant loss but did find an associated gain in birthweight distribution when contrasted to the remaining births on the birth file in the preliminary evaluation.[268] Prematurity was not assessed. The PPC women were generally at low medical risk according to birth certificate indicators.[269]

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[266]Clinical settings were prior health departments' Maternity and Infant Care projects and new hospital-based efforts in PPC.

[267]As a minimum provider name, office addresses, provider type, medical specialty, and the amount of total annual remuneration should be compared with the Medicaid Master File to determine if the PPC program actually brought new providers into Medicaid and if these providers stayed enrolled after PPC phased into Medicaid.

[268]This weight change may represent regression to the mean.

[269] MDPH, OSRCHS, 1988. A final evaluation of the PPC program was not available as of December 31, 1991.

APPENDIX K

Medicaid-paid Newborns at Birth

APPENDIX K

Medicaid-paid Newborns at Birth

During the 23-month study period, Medicaid-covered newborns resulted in 63,433 infant cases with birth records. A total of 13.1 percent (8,279) of these infants were added to Medicaid during their first month of life and their mother's received no Medicaid coverage during either pregnancy or delivery-60 days postpartum. There was no significant difference in the number of babies born by year; or by Medicaid status of the mother. Each cohort year, Medicaid paid for the care of 23.8% of the births occurring to Michigan residents. Infant births include the 3,592 born to women with two or more delivery events and the 5,202 births to women added to Medicaid with the delivery. As found for October 1983 deliveries (Howell et al., 1988), just over 10% of the live-born deliveries paid by Medicaid were to women who received their Medicaid enrollment at the delivery hospitalization.

Infant Data

In addition to poverty, several demographic and life style variables contribute to low birthweight and a perceived inadequate use of prenatal medical care.[270] Selected risk factors available on the Michigan birth certificates in 1985 and 1986 are

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[270]Institute of Medicine, 1985. The research concluded that early prenatal care did not significantly change low birth weight but women with early care and adequate visits had reduced amounts of low birth weight. The effectiveness of prenatal care was questioned but the committee was convinced that some prenatal care was better than none, early care was superior to late care, and adequate care better than other categories (p 140). The problem with the data used to develop this posture was that it was not validated and adequacy is biased if data is missing. (In the Medicaid data, the lack of concurrence of gestational age in conjunction with missing data for age, birth weight, initiation of prenatal care, and number of visits rendered this classification useless.) Six categories of risk factors for low birth weight were identified (p. 51).

presented by racial group. Based on additional analysis, just under a third of teen mothers of Medicaid-covered newborns are high school graduates; black mothers of Medicaid infants achieve higher educational levels than either white or Hispanic mothers, regardless of age at delivery. Infant outcomes are not related to the educational level of adults or teenagers in the Michigan Medicaid population. Several key sociodemographic variables are identified in the data for Medicaid infants.

Age of Mother

Teenage women are more likely to have late enrollment in prenatal care and increased low birthweight infants. Among Michigan Medicaid births, teenagers were significantly less likely to enroll in prenatal care during the first trimester of pregnancy, despite Medicaid coverage. One-third of all infants covered by Medicaid at birth have teen mothers not enrolled in Medicaid (they are probably covered by their parents' insurance, but this insurance will not cover the grandchild). Of these teen mothers, only 52 percent enrolled in prenatal care during the first trimester, according to birth certificate data. Almost one-fourth of the women covered by Medicaid during pregnancy are teenagers, and 58 percent of infants born to these teen Medicaid covered women had early prenatal care. A much larger percentage of non-teen mothers had first trimester care: 64.9% of mother's with infants added to Medicaid during the first month and 68.1% of the women on Medicaid.

Factors Related to Infant Death

Prematurity is the major predictor of infant death among the Medicaid infants. Black infants are twice as likely to be of very low gestational age (14-27 weeks) and significantly ($p < .0001$) more likely to be 28-36 weeks gestation at birth than their comparable white/Hispanic peers covered by Medicaid.

Birthweight among Medicaid newborns continues to reflect racial disparity. Black Medicaid newborns had a mean birthweight of 3,050 grams ±644 (just under 6 pounds 11 ounces) and a median birthweight of 3,118 grams (6 pounds 14 ounces); this was less than the 3,160 gram median (3,084 mean) for black Michigan births in 1986. White/Hispanic Medicaid newborns had a mean birthweight of 3,292 grams ±617 grams (about 7 pounds 4 ounces) and a median birthweight of 3,317 grams. The corresponding state average weight was a mean of 3,416 grams and a median of 3,430 grams (about 7 pounds 9 ounces). Differences in birthweight among white newborns below poverty are larger than among the black population and black Medicaid infants. Some of this difference relates to the birthweight distributions between the racial groups, and the greater likelihood of prematurity and low weight in blacks. Within Medicaid, an average black-white difference in birthweight was 200 to 242 grams, whereas the state general population difference between black and white birthweight was 270 grams to 332 grams.

Infant deaths to Medicaid cohort newborns totaled 946 infant deaths for an infant mortality rate (IMR) of 14.9; 59.2 percent occurred during the neonatal period (19.5% to added infants and 80.5% to those with a mother also on Medicaid). The same proportion (19.5:80.5) of deaths occurred in the postneonatal period by Medicaid coverage. Those infants added to Medicaid at birth had an IMR of 22.1 (183 deaths/8279 live births) compared to an IMR of 13.8 for infants whose mother was also on Medicaid at delivery (763/55154 live births). This difference in infant death is significant ($p < .0001$) showing a bias in the infants added to Medicaid after birth. Infant deaths were 163 in Detroit for an IMR of 19.15.

Table K.1
Selected Indicators of Medicaid-covered Infants by Mother's Race

Risk Factors	Mother Black		Mother White/Hispanic	
Plurality	22,597		39,976	
Singletons	21,977	(97.3%)	39,073	(97.7%)
Twins	608	(2.7%)	885	(2.2%)
Triplets+	12	(0.0%)	18	(0.0%)
Timing of Care				
No prenatal care	538	(2.4%)	428	(1.1%)
First trimester	14,800	(65.5%)	25,941	(64.9%)
Second trimester	6,051	(26.8%)	10,935	(27.4%)
Last trimester	1,013	(4.5%)	2,178	(5.4%)
Missing data	195	(0.9%)	495	(1.2%)
Provider at Delivery				
MD	19,482	(86.2%)	31,265	(78.2%)
DO	2,927	(13.0%)	8,428	(21.1%)
Nurse midwife	63	(0.3%)	101	(0.3%)
Other professional	10	(0.0%)	89	(0.2%)
Other	114	(0.5%)	94	(0.0%)
Gestational Age at Birth				
14 to 27 weeks	460	(2.0%)	344	(0.9%)
28 to 36 weeks	4,009	(17.7%)	4,184	(10.5%)
37 to 46 weeks	17,263	(76.4%)	33,636	(84.1%)
Missing or error	865	(3.8%)	1,813	(4.5%)
Teen Education Level[a]	(No. teens = 6,363)		(No. teens = 10,172)	
Acceptable for age	5,461	(86.1%)	7,169	(70.7%)
Low for age	878	(13.9%)	2,973	(29.3%)
Educational Level[b]				
Not finish school	9,114	(40.3%)	17,953	(44.9%)
Finished school	13,484	(59.7%)	22,024	(55.1%)
Maternal Complications not related to Pregnancy				

Table K.1
Selected Indicators of Medicaid-covered Infants by Mother's Race

Risk Factors	Mother Black		Mother White/Hispanic	
Drugs	327	(1.4%)	133	(0.3%)
Other Complication	1,201	(5.3%)	2,161	(5.4%)
Complications of Pregnancy				
Present in mother	1,785	(7.9%)	4,060	(10.2%)
Complications Labor[c]				
Present in:	6,364	(28.2%)	11,226	(28.1%)
Other problems	7,239	(32.0%)	13,140	(32.9%)
Congenital Malformations				
Present in:	606	(2.7%)	448	(1.1%)
Other Infant Illness				
Present in:	134	(0.6%)	294	(0.7%)
Low Birthweight				
Present in:	3,400	(15.0%)	3,342	(8.4%)
Apgar Scores				
One minute mean, median	7.75	8.0	7.83	8.0
Five minute mean, median	8.79	9.0	8.91	9.0
Hebdomadal Deaths	77% died < 1 day		65% died < 1 day	
Hebdomadal Death Rate[d]		10.49		5.32
Present in:	237		213	
Neonatal Death Rate[e]		12.22		7.0
Present in:	276		280	
Postneonatal Death Rate[f]		6.7		5.7
Present in:	151		228	
Infant Mortality Rate[g]		18.9		12.7
Present in:	427		508	

a For women under age 20 at delivery, a low level of education is defined as age 14 or less and less than 7 grades completed; age 15 and less than 8 grades completed; age 16 and less than 9 grades completed; age 17 and less than 10 grades completed and ages 18 and 19 and less than 11 grades completed. The Michigan legislature recently declared age 19.5 years as reasonable for a high school senior.
b The achievement of high school graduation by diploma or equivalent.
c This data appears as reported on the certificate and is not generated by condition.
d - g The specific death rate refers to the number of cohort deaths per 1,000 live births.

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