Mortality of CPS Clients in Washington State

From Birth to Age Four

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Executive Summary

Mortality of CPS Clients in Washington State From Birth to Age Four

This report presents new information about demographic and medical characteristics of Washington State children involved with Child Protective Services (CPS) and the deaths that occurred in this group of at-risk children. Analyses included all Washington children born between July 1991 and December 1994 and were based on linked data from multiple sources. Children with CPS involvement, and with differing levels of CPS involvement, were compared to those without CPS involvement.

Findings

When children with CPS involvement are compared to those without CPS episodes, mortality rates are *lower* for CPS-involved children when neonatal (first month of life) mortality is included and *higher* when neonatal mortality is excluded. This was true for both Medicaid and Non-Medicaid children. The small numbers of deaths among CPS involved children suggest that caution should be used in interpreting these findings.

Differences in mortality rates excluding neonatal deaths reflect the prevalence of at-risk children within the CPS-involved groups. Poor children, African American and Native American children, children with poor birth outcomes, children of mother who smoke or use drugs, were poorly educated, or had inadequate prenatal care, and children of unmarried or teen mothers were more likely to experience some level of CPS involvement. Furthermore, among Medicaid children, the share of at-risk children increased with increasing intensity of CPS involvement.

After controlling for an number of other risk factors, Medicaid children with CPS referral (accepted or unaccepted) had a two-fold increased risk of death in early childhood (after the first month of life). No increased risk of death was found for children with out-of-home placements after controlling for other factors. A number of risk factors were identified with greater increases in the risk of early childhood death than CPS referral.

Since no specific measures of family violence were available for this study, the increased risk of child death associated with CPS referral may reflect the presence of violence in the family, or other behavioral or attitudinal characteristics. More study would be required to distinguish outcomes between families with violent behaviors who were and were not involved with CPS.

SIDS (Sudden Infant Death Syndrome) was the leading cause of postneonatal death reported for children less than one year old in all of the study groups. Accidents and Adverse Effects were the leading cause of death among children one to four years old, in all study groups except CPS-involved Non-Medicaid children. In that group two of three deaths were attributed to birth defects.

INTRODUCTION

Child abuse and neglect is increasingly recognized as a major issue in the United States. Survivors of child maltreatment face social, emotional, and physical consequences and may perpetuate the cycle of violence in their own families. For a small number of children, maltreatment results in death (Bensley and Meengs, 1996).

An essential step in preventing child deaths is understanding why these deaths occur and how to intervene to prevent future deaths. While much statistical data is available for infant deaths (deaths of children up to one year old) in the United States (Dollfus, 1990; MacDorman, Iyasu, Gardner, 1995), a limited number of population-based studies have addressed fatalities among maltreated children (Sabotta and Davis, 1992; McClain et al., 1994). Furthermore, information about the characteristics of Washington children who have been reported as victims of child abuse or neglect has not been generally available.

A comprehensive system for reviewing unexpected child deaths in Washington is being developed in response to legislation passed in 1993 (RCW 70.05.170) and 1995 (SHB 1035). The multi-disciplinary Child Death Prevention and Review Team, sponsored jointly by the Department of Health (DOH) and the Department of Social and Health Services (DSHS), encourages the formation of local child death review teams through local health districts and regional DSHS offices. Both King and Spokane Counties have published reports of in-depth child death review activities. County-level analyses permit detailed review of individual deaths, but the small number of deaths in any one county limits the range of analyses which can be performed.

This report presents new information about demographic and medical characteristics of Washington State children involved with Child Protective Services (CPS) and the deaths that occurred in this group of at-risk children. The analyses included all Washington children born between July 1, 1991, and December 31, 1994, and were based on linked data from multiple sources, including the First Steps Database. Children with CPS involvement, and with differing levels of CPS involvement, were compared to those without CPS involvement.

The specific goals of this report are to:

- compare mortality rates for CPS-involved children and other Washington State children;
- describe characteristics of children involved with Child Protective Services, comparing children with and without CPS involvement, and with differing levels of CPS involvement, to other children of similar family income levels; and
- estimate the added risk (if any) of death for children with different levels of CPS involvement.

DATA SOURCES

The primary sources of data used in this report were vital records (birth and death certificates), Medicaid claims, and referrals for child abuse and neglect for Washington children born between July 1, 1991, and December 31, 1994.

The First Steps Database (FSDB) provides a single repository for data from different sources (birth certificates, infant death certificates, maternal and infant services paid by Medicaid, and Medicaid eligibility history). Birth certificates, provided by the DOH Center for Health Statistics (CHS), contain data on prenatal care, pregnancy outcomes, and background information for all births to Washington State residents. Medicaid claims contain extensive information on Medicaid payments for maternal and infant care, type of medical care, and medical diagnoses. The FSDB was developed in 1990 and is maintained by DSHS Research and Data Analysis. For the purposes of this study, DOH CHS provided certificates for deaths which occurred up to age five. These were linked to records in the FSDB.

The Case and Management Information System (CAMIS), maintained by the DSHS Children's Administration (CA), contains information on referrals to Child Protective Services (CPS) and out-of-home placements. The CAMIS database was started in July 1991 and implemented on a statewide basis in early 1992. Information from CAMIS was obtained from the DSHS CA in October 1995 and linked to the FSDB.

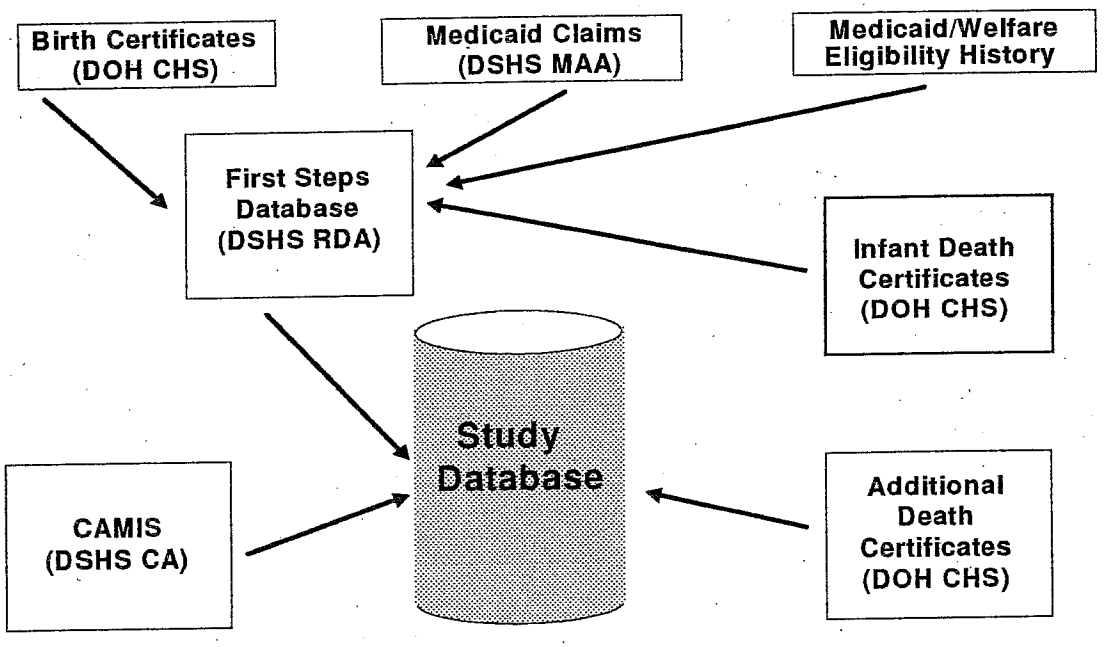

Figure 1. Data Sources for Child Death Analysis

STUDY GROUPS

A total of 274,594 children were born to Washington residents from July 1, 1991, through December 31, 1994. Between July 1991 and October 1995, 20,984 (7.6%) of these children had some involvement with Child Protective Services (DSHS Children's Administration) based on records identified in the Case and Management Information System (CAMIS). These children were assigned to one of five groups:

No CPS–Medicaid. Low-income children with no indication of a referral (accepted or unaccepted) identifying the child as a victim in a report of abuse or neglect. Mothers of these children received Medicaid-paid maternity care, and the family income was less than 185% of the Federal Poverty Level (FPL) (N=92,411).

Unaccepted CPS Referral–Medicaid. Low-income children with a referral identifying the child as a victim in a report of abuse or neglect. The referral was not accepted for further investigation. Unaccepted CPS Referral reflects a relatively low level of CPS involvement. Mothers of these children received Medicaid-paid maternity care, and the family income was less than 185% of the FPL (N=3,003).

Accepted CPS Referral–Medicaid. Low-income children with an accepted referral identifying the child as a victim in a report of abuse or neglect. A CPS referral is accepted for investigation if it involves allegations serious enough to constitute abuse if substantiated. Referrals are accepted for investigation according to a risk assessment tool used by caseworkers. An accepted referral may not be substantiated upon investigation. This group excluded children with an out-of-home placement. Accepted CPS Referral reflects an intermediate level of CPS involvement. Mothers of these children received Medicaid-paid maternity care, and the family income was less than 185% of the FPL (N=10,817).

Placement–Medicaid. Low-income children with an out-of-home placement and an accepted referral identifying the child as a victim in a report of abuse or neglect. Out-of-home Placement reflects the highest level of involvement with CPS. Mothers of these children received Medicaid-paid maternity care, and the family income was less than 185% of the FPL (N=3,245).

No CPS–Non-Medicaid. Higher income children with no indication of a referral (accepted or unaccepted) identifying the child as a victim in a report of abuse or neglect. Mothers of these children did not receive Medicaid-paid maternity care, and the family income was generally above 185% of the FPL (N=161,199).

Any CPS–Non-Medicaid. Higher income children with any type of CPS involvement (referral or placement). Mothers of these children did not receive Medicaid-paid maternity care, and the family income was generally above 185% of the FPL (N=3,919).

LIMITATIONS

Studies of child abuse and neglect have used different methods to identify child abuse and neglect. In this report, involvement with Child Protective Services (CPS) is used as an indicator of child maltreatment. While child maltreatment is under-reported in CPS records (Bensley and Meengs, 1996), children with CPS records represent a distinct group which has been brought to the attention of a state agency as possible victims of child abuse and neglect.

Some abused or neglected children may not be identified at all in CPS records; however, at the present time, no other method is available to identify such children on a statewide basis. The inclusion of children who truly were abused or neglected in the groups categorized as "No CPS" in this report will tend to reduce the differences observed between the groups. The great majority of children categorized as "No CPS" are (presumably) accurately classified, and so the overall effect of this classification problem is expected to be small.

While many different variables were available for analysis in the linked data sets used in this study, a number of key factors were missing. No measures of family violence, parental values and attitudes, or parental history of maltreatment as a child were available. Measures of maternal substance abuse and mental health conditions were available only for the Medicaid study groups; no similar measures could be readily obtained for fathers or other adults in the household, or for the Non-Medicaid study groups.

The number of children included in the study was large; however, the time available to follow these children for the occurrence of death was limited. Death data reported for ages greater than twelve months old was not complete until the end of 1996 and will not be available for analysis before late 1997. A full four years of follow-up for children born in 1994 will not be complete until the end of 1999.

Although sub-groups based on level of CPS involvement were created for Medicaid children, the number of Non-Medicaid children with CPS involvement was too small to permit similar groupings. For this reason, it was not possible to study the level of CPS involvement in Non-Medicaid children.

A number of rules were developed to manage the many differences in the timing of CPS involvement. Specifically, the classification of CPS study groups required that CPS episodes occur close to or after birth and before death. Age-specific mortality rates for CPS involved study groups were calculated for children who experienced the given level of CPS involvement at or before that age. The decision rules and their effects on the composition of the study groups are described more fully in the Appendices.

FINDINGS

Results are presented in three sections:

- Mortality Rates and Causes of Death,
- Demographic and Medical Characteristics,
- Multivariate Model.

Descriptive data about mortality is presented in the first section. The next section, Demographic and Medical Characteristics, summarizes the differences in the prevalence of risk factors between CPS-involved children and the general population of Washington children. Risk factors for child death occur more frequently among CPS-involved children as compared to similar children with no CPS involvement. An understanding of differences in risk factors between CPS involved children and those without CPS involvement is an important consideration when mortality rates are analyzed.

A striking difference between CPS-involved children and other Washington children is that the majority (more than 80%) of CPS-involved children in this study were from low income families.

Regardless of the child's age at death or the cause of death, one factor—poverty— stands out in published studies as consistently being associated with higher death rates. Nersesian and others (1985) found that low income children in Maine had an overall death rate 3.1 times greater than higher income children and were at higher risk for disease-related deaths, accidental deaths, and homicide deaths. A study of Canadian children of low-income families found similar increased rates of death and identified a large number of health problems associated with poverty (Shah, Kahan, Krauser, 1987).

Our study has attempted to measure the mortality risk associated with CPS involvement that was independent of poverty and other risk factors which CPS-involved children experience. One approach to this problem was to compare children of similar family income levels. Children were divided into groups based on the mother's Medicaid eligibility status since Medicaid enrollment for maternity care indicates a family income of less than 185% of the Federal Poverty Level.

A more sophisticated method of controlling for risk factors is presented in Multivariate Model. In this section logistic regression was used to estimate the risk of death for CPS-involved children independent of other risk factors identified in this study.

Table 1. CPS Involvement Prior to Mid-1995
For All Washington Births 7/1/91 - 12/31/94

	Number of Children	Number with any CPS Involvement	Rate of CPS Involvement
All Births	**274,594**	**20,984**	**7.6%**
Medicaid	109,476 (39.9%)	17,065 (81.3%)	15.6%
Non-Medicaid	165,118 (60.1%)	3,919 (18.7%)	2.4%

- One in 13 Washington children (7.6%) born between July 1991 and December 1994 had some involvement with CPS prior to mid-1995. Low income (Medicaid) children are more frequently involved with CPS than higher income (Non-Medicaid) children.
- While the Medicaid group contained 109,476 children (39.9% of total births) and the Non-Medicaid group contained 165,118 children (60.1% of total births), 81.3% (17,065/20,984) of the CPS involved children belonged to the Medicaid group.
- The rate of CPS involvement among Medicaid children was more than six times greater than that for Non-Medicaid children: one in six (15.6%) Medicaid children was involved with CPS, compared to one in forty (2.4%) Non-Medicaid children.

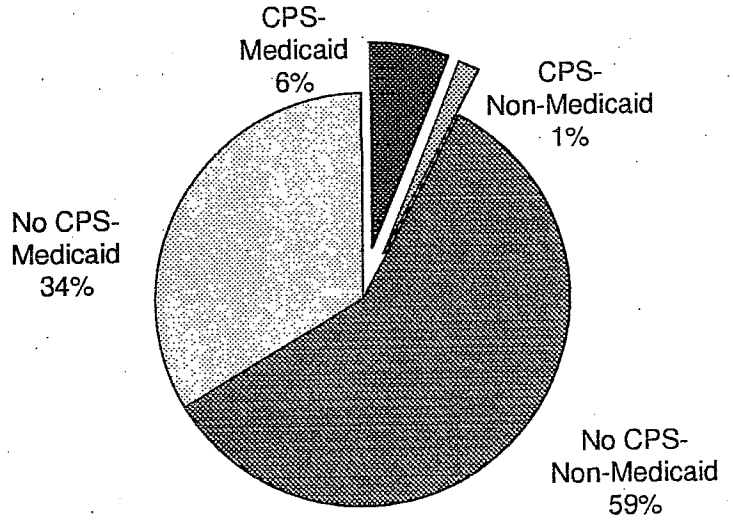

Figure 2. Washington Children Born 7/1/91 - 12/31/94 (N=274,594)

Mortality Rates and Causes of Death

Mortality rates and causes of death vary depending on the age of the child. Mortality is highest shortly after the time of birth and then declines sharply. As children become older, the leading causes of death shift from those associated with pregnancy and delivery to unintentional injury (accidents). Because of these established trends, deaths were analyzed separately for children in the following age groups:

neonatal:	first month of life
postneonatal:	months 2-12
preschool:	age 1-4 years.

A total of 1,869 deaths were identified for the 274,594 children in this study. The majority of the deaths (91.7%) occurred during the child's first year of life, and nearly one-half (48.6%) occurred during the first 28 days after birth. Just 155 deaths had occurred to children older than one year of age at the time of this analysis.

More than 80% of the children in this study were referred to CPS after the neonatal period. As a result, the number of neonatal deaths occurring to CPS-involved children was very small (N=11). Mortality rates are presented including and excluding neonatal deaths. Since the number of deaths occurring after the first year of life was small (N=155), the postneonatal and preschool deaths (total N=935) were combined for some analyses.

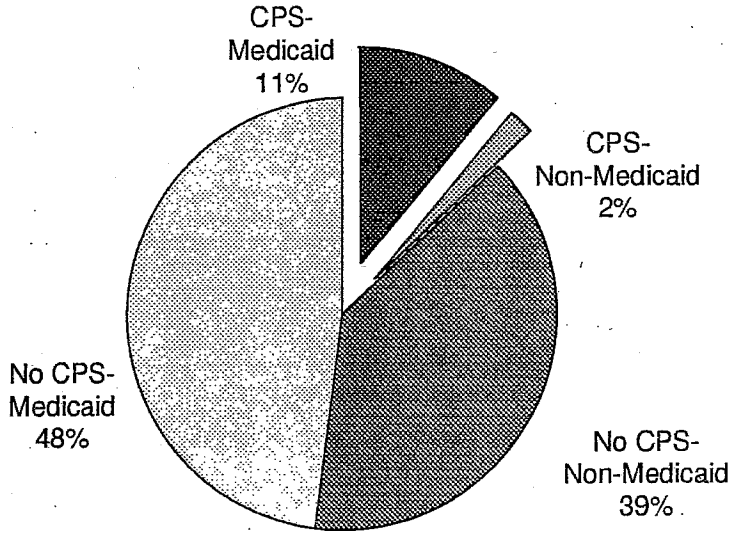

Figure 3. Postneonatal and Preschool Child Deaths (N=935) Among Washington Children Born 7/1/91 - 12/31/94

MORTALITY RATES

- The overall mortality rate for Washington children born between July 1991 and December 1994 was 6.8 per 1000 live births.
- The highest overall mortality rate (9.5 per 1000) occurred among low income (Medicaid) children with no CPS involvement and was nearly twice the rate for higher income (Non-Medicaid) children (5.3 per 1000) with no CPS involvement.
- When children with CPS involvement are compared to those without CPS episodes, mortality rates are lower for CPS involved children when neonatal mortality is included. This is true for both Medicaid and Non-Medicaid children; however, the small number of deaths among CPS involved children raises the issue of the statistical significance of these differences.

The statistical significance of these findings is explored further on page 10.

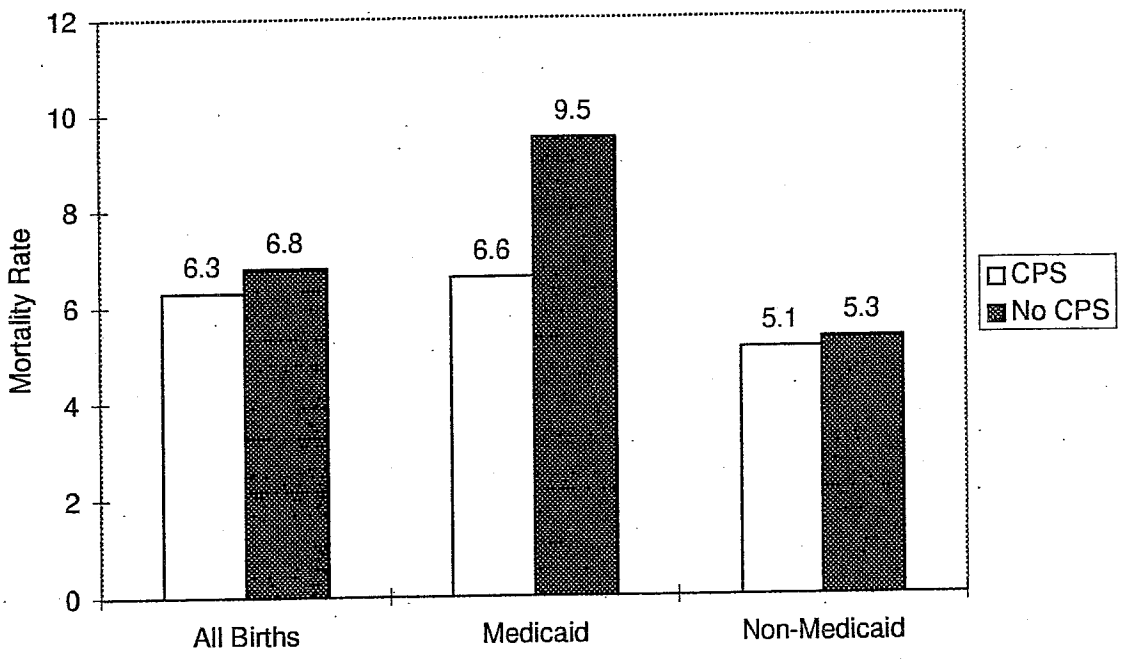

Figure 4. Mortality Rates For Washington Children Born 7/1/91 - 12/31/94

- The mortality for Washington children excluding neonatal deaths was 3.4 per 1000, one-half the rate including neonatal deaths (6.8 per 1000).

- Mortality rates excluding neonatal deaths are higher for children with CPS involvement than for those without CPS episodes. This is true for both Medicaid and Non-Medicaid children and for all births.

- The mortality rate for Non-Medicaid children with CPS involvement (4.3 per 1000) was nearly twice the rate (2.3 per 1000) for Non-Medicaid children with no CPS involvement. For Medicaid children, the mortality rate for CPS-involved children (6.2 per 1000) was just 1.3 times the rate for children without CPS episodes. Comparing children of similar income levels reduces the apparent added risk of death among CPS-involved children.

While mortality rates excluding neonatal deaths are higher for CPS-involved children than for those without CPS involvement, the differences are smaller for low income (Medicaid) children than for higher income (Non-Medicaid) children.

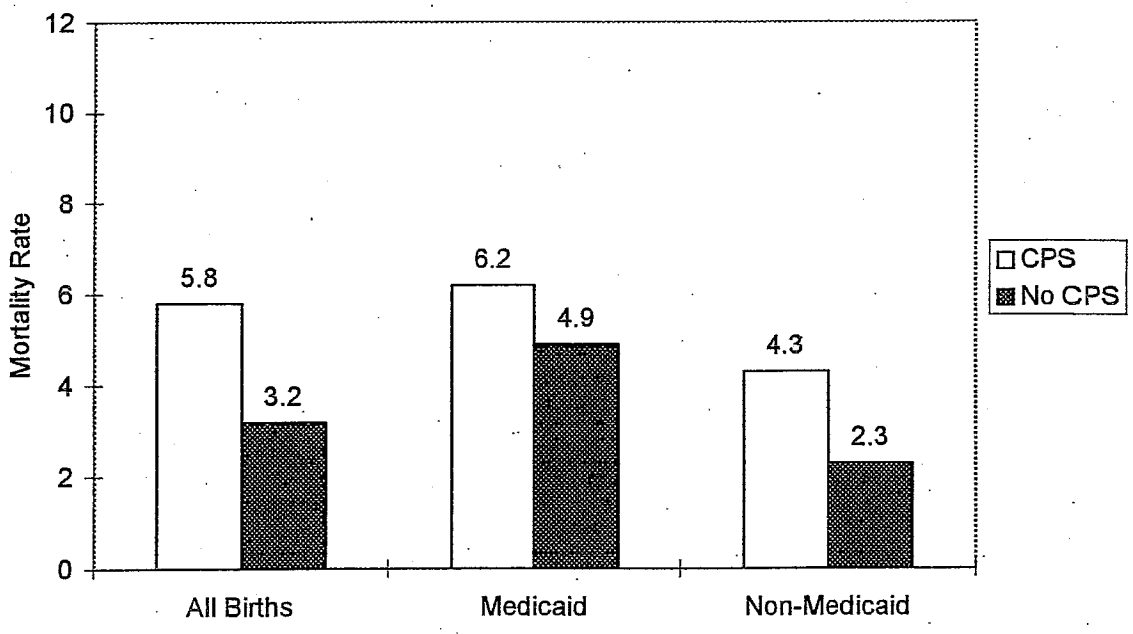

Figure 5. Mortality Rates (Excluding Neonatal Mortality) For Washington Children Born 7/1/91-12/31/94

The following table summarizes the comparisons of mortality rates for children with and without CPS involvement by Medicaid status. When total mortality including neonatal deaths is considered, only the difference in the Medicaid groups is statistically significant: Medicaid children without CPS involvement had higher mortality (9.5 per 1000) than Medicaid children with CPS involvement (6.6 per 1000). This difference should be interpreted cautiously because children who live longer have more opportunity to become involved with CPS, and this phenomenon may influence total mortality rates.

For all three age groups, Medicaid children had higher death rates than Non-Medicaid. Neonatal mortality was 4.0 per 1000 for Medicaid children, compared to 3.0 for Non-Medicaid children, and postneonatal mortality was 4.2 per 1000 for Medicaid children, compared to 1.9 for Non-Medicaid children. While substantial improvements in neonatal mortality have occurred since the implementation of the First Steps Program (Maternity Care Access Act of 1989), the effects of poverty and its associated risk factors have not disappeared (Cawthon and Schubert, 1997).

When total mortality excluding neonatal deaths is considered, the mortality rates are higher for children with CPS involvement compared to those without. This finding is statistically significant for both Medicaid and Non-Medicaid children and for all births.

Table 2. Mortality Rates For All Washington Births 7/1/91 - 12/31/94

	Mortality Rates			Statistically
	CPS	No CPS	p value	Significant?
DEATHS AGE 0 - 4 YRS				
All births	6.3	6.8	p=0.39	no
Medicaid	6.6	9.5	p=0.0003	yes
Non-Medicaid	5.1	5.2	p=0.84	no
DEATHS AGE 1 MONTH - 4 YRS				
All Births	5.8	3.2	p<0.0001	yes
Medicaid	6.2	4.9	p=0.03	yes
Non-Medicaid	4.3	2.3	p=0.007	yes

The relationship between the child's age at death and CPS involvement was explored further by identifying the proportion of deceased children who had CPS involvement prior to death.

- Children who died during the first month of life had the lowest rate of CPS involvement; one in a hundred (1.2%) children who died in the neonatal period was involved with CPS prior to death.

- Children aged one to four years who died had the highest rate of CPS involvement; one in five (20.6%) of these children was involved with CPS prior to death.

- The rate of CPS involvement was intermediate for children who died in the postneonatal period (months 2 through 12); more than one in ten (11.5%) of these children was involved with CPS prior to death.

These differences reflect the changing spectrum of causes of death at different ages during early childhood. Mortality rates for children of specific ages and for Medicaid children with different levels of CPS involvement are shown on the next page.

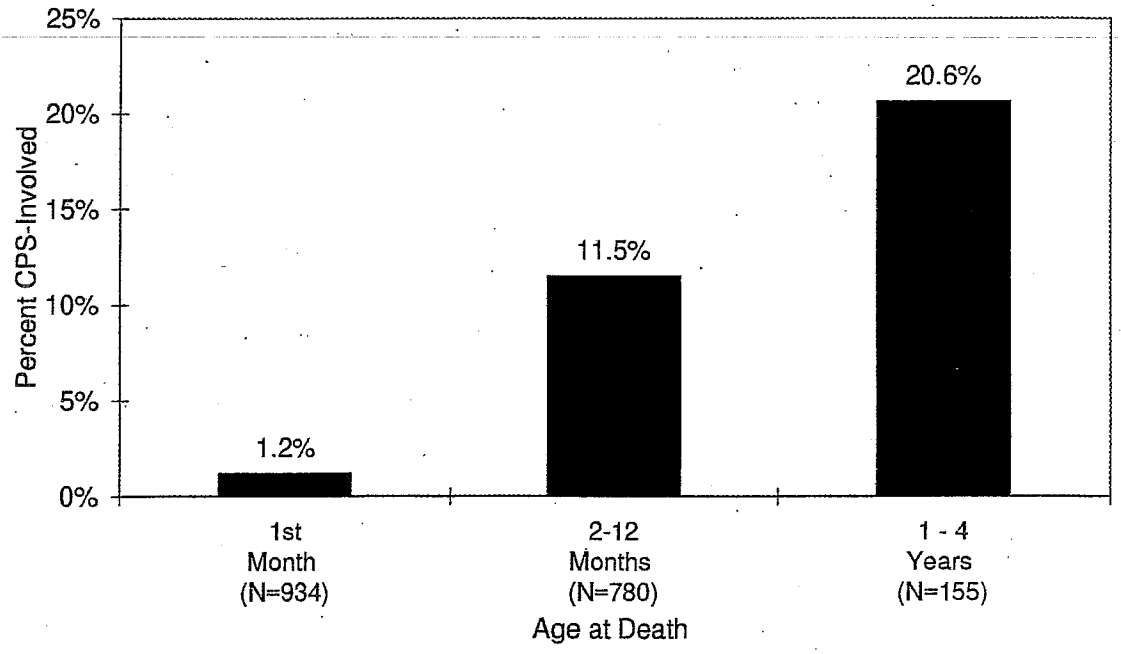

Figure 6. Rates of CPS Involvement Among Deceased Washington Children Born 7/1/91-12/31/94

Age-specific mortality rates control for children who have their first CPS involvement later in childhood. In computing age-specific mortality rates, assignment to CPS study groups excluded children with CPS involvement after that age. Age-specific mortality rates may provide a better measure for comparing death rates across the study groups; however, comparison of mortality rates for older children is limited by small numbers of deaths.

Table 3. Age-Specific Mortality Rates for Children Born 7/1/91 - 12/31/94

	MEDICAID								NON-MEDICAID			
	No CPS		Unaccepted CPS Referral		Accepted Referral (No Placement)		Placement		No CPS		Any CPS	
	#	(# / 1000)	#	(# / 1000)	#	(# / 1000)	#	(# / 1000)	#	(# / 1000)	#	(# / 1000)
TOTAL	**876**	**(9.5)**	**16**	**(5.3)**	**84**	**(7.8)**	**13**	**(4.0)**	**860**	**(5.3)**	**20**	**(5.1)**
excl. neonatal deaths	450	(4.9)	16	(5.3)	76	(7.0)	13	(4.0)	363	(2.3)	17	(4.3)
Age at Death												
0 - 27 days (neonatal)	426	(4.0)	0	(0.0)	8	(4.1)	0	(0.0)	497	(3.0)	3	(7.0)
28 days - 12 months	388	(3.9)	12	(7.0)	58	(9.4)	6	(3.3)	302	(1.9)	14	(8.6)
1 year old	35	(0.4)	2	(0.8)	9	(1.0)	3	(1.2)	39	(0.2)	2	(0.7)
2 years old	17	(0.3)	1	(0.4)	6	(0.7)	2	(0.8)	16	(0.1)	0	(0.0)
3 years old	7	(0.2)	1	(0.6)	3	(0.5)	2	(1.2)	5	(0.1)	1	(0.4)
4 years old	3	(0.3)	0	(0.0)	0	(0.0)	0	(0.0)	1	(<0.1)	0	(0.0)

- For Medicaid children, the total mortality rates for CPS-involved children (5.3 for Unaccepted CPS Referral, 7.8 for Accepted CPS Referral, and 4.0 for Placement) were lower than the mortality rate for the No CPS study group (9.5).

- Among Medicaid children, when neonatal deaths are excluded, the number of deaths and the mortality rate for the No CPS group (4.9) drop substantially, while deaths among CPS involved children decline only slightly or not at all. The mortality rates excluding neonatal deaths for the Unaccepted CPS Referral (5.3) and the Placement (4.0) groups were similar to that of the No CPS group (4.9); and the rate for the Accepted CPS Referral group (7.0) was 1.4 times that of the No CPS group (4.9).

- For Non-Medicaid children, the mortality rate excluding neonatal deaths for the Any CPS group (4.3) was nearly twice the rate for the No CPS group (2.3) and lower than the rates for the Medicaid Unaccepted (5.3) and Accepted (7.0) CPS Referral groups.

- Following the neonatal period, age-specific mortality rates were generally higher among the CPS involved groups for both Medicaid and Non-Medicaid children than either of the No CPS groups; however, the number of deaths occurring after age one was small.

- For Medicaid children, after the neonatal period more intense CPS involvement tended to be associated with higher death rates at each age level with one exception, the relatively low post-neonatal mortality rate of the Placement group (3.3). Again, the number of deaths occurring after age one was small.

CAUSES OF DEATH

More than one-third of deaths during the first 28 days of life—neonatal deaths—are caused by birth defects, complications of prematurity and pregnancy, and infections (Rowley et al., 1995). Neonatal mortality declined rapidly in the United States from 1970 through 1980 after the introduction of neonatal intensive care units. Further decreases have been attributed to regionalization of perinatal services and new treatments for lung disease of prematurity which became available in the early 1990s (Merritt et al., 1990). Prevention of neonatal death is directed primarily at improving medical treatments during pregnancy and the neonatal period.

The leading causes of postneonatal deaths in the United States (deaths occurring during the first year of life, after the first 28 days) are SIDS (sudden infant death syndrome), birth defects, and unintentional injuries (Rowley et al., 1995). For children age one to four years in the United States, unintentional injury is the leading cause of death, followed by birth defects, cancer, and homicide (Smith, Luallen, Froehlke, Rodriguez, 1995).

Two systems developed by the National Center for Health Statistics (NCHS) were used in this study to classify child deaths. (NCHS, 1991) One system was used to classify infant deaths (children younger than 1 year old); a different system was used to classify deaths of children one year old and older. Both systems categorize causes of death based on the underlying cause of death, reported on the death certificate using the International Classification of Diseases, Ninth Edition (ICD-9) codes.

Neonatal Deaths

Table 4 presents the distribution of neonatal (0 - 27 days) death causes among the study groups. It shows which causes of death occurred most often for neonates in the study groups.

The causes of neonatal death in the study population are consistent with previous studies identifying complications of pregnancy and delivery as a major cause of neonatal death. Five of the six most common causes of infant death (congenital anomalies; slow gestation and low birth weight; complications of pregnancy; placenta, cord and membranes; and infections in the perinatal period) involve problems of pregnancy and delivery. These five causes account for more than half the neonatal deaths in study population.

Table 4. Causes of Neonatal Infant Deaths for Washington Children Born 7/1/91 - 12/31/94

	MEDICAID								NON-MEDICAID			
	No CPS		Unaccepted CPS Referral		Accepted Referral (No Placement)		Placement		No CPS		Any CPS	
	(N = 426)		(N = 0)		(N = 8)		(N = 0)		(N = 497)		(N = 3)	
	#	(%)	#	(%)	#	(%)	#	(%)	#	(%)	#	(%)
Causes of Death												
Congenital Anomalies	141	(33.1%)	0	(0.0%)	2	(25.0%)	0	(0.0%)	177	(35.6%)	0	(0.0%)
Slow Gestation and Low Birthweight	53	(12.4%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	55	(11.1%)	1	(33.3%)
Complications of Pregnancy	30	(7.0%)	0	(0.0%)	1	(12.5%)	0	(0.0%)	34	(6.8%)	0	(0.0%)
Respiratory Distress Syndrome	25	(5.9%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	31	(6.2%)	0	(0.0%)
Placenta, Cord, and Membranes	19	(4.5%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	27	(5.4%)	0	(0.0%)
Infections, Perinatal Period	21	(4.9%)	0	(0.0%)	1	(12.5%)	0	(0.0%)	17	(3.4%)	0	(0.0%)
SIDS	23	(5.4%)	0	(0.0%)	2	(25.0%)	0	(0.0%)	5	(1.0%)	0	(0.0%)
Intrauterine Hypoxia and Birth Asphyxia	10	(2.3%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	19	(3.8%)	0	(0.0%)
Neonatal Hemorrhage	4	(0.9%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	7	(1.4%)	0	(0.0%)
Accidents and Adverse Effects	4	(0.9%)	0	(0.0%)	1	(12.5%)	0	(0.0%)	5	(1.0%)	0	(0.0%)
Pneumonia and Influenza	4	(0.9%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	4	(0.8%)	0	(0.0%)
Viral Diseases	4	(0.9%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	2	(0.4%)	0	(0.0%)
Birth Trauma	4	(0.9%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	2	(0.4%)	0	(0.0%)
Maternal Conditions	4	(0.9%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	2	(0.4%)	0	(0.0%)
Meningitis	1	(0.2%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
Malignant Neoplasms	1	(0.2%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
Benign Neoplasms, CIS	1	(0.2%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
Diseases of Blood	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	1	(0.2%)	0	(0.0%)
Slow Fetal Growth and Fetal Malnutrition	1	(0.2%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
Hemolytic Disease	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	1	(0.2%)	0	(0.0%)
All Other Disease Conditions	76	(17.8%)	0	(0.0%)	1	(12.5%)	0	(0.0%)	108	(21.7%)	2	(66.7%)

- The leading cause of neonatal death was congenital anomalies (birth defects), followed by slow gestation and low birthweight.

- A total of eleven (11) infants with CPS involvement died during the first month of life. No Medicaid infants who were placed out-of-home in foster care or who had unaccepted referrals died during the neonatal period.

- The small number of neonatal deaths among CPS-involved children limits the conclusions that can be drawn from these data about the relationship between child maltreatment and neonatal death.

The histories of two Accepted CPS Referral–Medicaid children who died were studied in more detail. The child whose cause of death was in the category of Accidents and Adverse Effects was born to an unmarried mother who had many diagnoses of substance abuse during the postpartum year and who suffered from a broken arm (fractured humerus) early in pregnancy. The cause of death for this child was unclear from the records available. The death certificate listed an abrasion or friction burn as the cause of death, and Medicaid claims included a diagnosis of abnormal heart rhythm on the day the child died. The second child, whose cause of death was in the All Other Disease Conditions category, died on the eighth day of life. Although the death certificate cause of death was somewhat inconsistent (Deficiency of Cell Mediated Immunity), Medicaid claims indicated the child had a severe birth defect involving the heart (truncus arteriosis).

Brief review of the histories of these children who died reflects the complexity of evaluating whether the death was potentially related to child abuse and neglect. The data available from vital statistics and Medicaid claims data is a small fraction of that obtained during the local child death review process. While review of individual case histories is not a focus of this report, these cases are provided as examples of the possible uses of administrative data. These data may be used to summarize the child's history and to identify cases potentially related to child abuse and neglect.

Postneonatal Deaths

Table 5 presents the distribution of causes of postneonatal (months 2 - 12 of life) deaths. It shows which causes of death occurred most often for infants in the study groups.

SIDS (Sudden Infant Death Syndrome) was the leading cause of postneonatal death in all the study groups. A public education campaign, called Back to Sleep, emphasizing the importance of sleep position as a risk factor for SIDS was initiated in the early 1990s; since then, the number of deaths from SIDS has declined. In some cases, the listing of SIDS as the cause of death may occur without autopsy or documentation sufficient to exclude other causes conclusively. Researchers have estimated that up to 5 percent of deaths classified as SIDS may, in fact, be attributed to fatal child abuse and neglect (McLain, 1994).

Table 5. Causes of Postneonatal Infant Deaths for Washington Children Born 7/1/91 - 12/31/94

	MEDICAID								NON-MEDICAID			
	No CPS		Unaccepted CPS Referral		Accepted Referral (No Placement)		Placement		No CPS		Any CPS	
	(N = 388)		(N = 12)		(N = 58)		(N = 6)		(N = 302)		(N = 14)	
	#	(%)	#	(%)	#	(%)	#	(%)	#	(%)	#	(%)
Causes of Death												
SIDS	222	(57.2%)	6	(50.0%)	32	(55.2%)	4	(66.7%)	145	(48.0%)	6	(42.9%)
Congenital Anomalies	48	(12.4%)	2	(16.7%)	6	(10.3%)	1	(16.7%)	58	(19.2%)	1	(7.1%)
Accidents and Adverse Effects	16	(4.1%)	1	(8.3%)	7	(12.1%)	0	(0.0%)	9	(3.0%)	1	(7.1%)
Pneumonia and Influenza	13	(3.4%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	7	(2.3%)	0	(0.0%)
Homicide	6	(1.5%)	0	(0.0%)	5	(8.6%)	0	(0.0%)	4	(1.3%)	1	(7.1%)
Respiratory Distress Syndrome	6	(1.5%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	5	(1.7%)	0	(0.0%)
Septicemia	4	(1.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	5	(1.7%)	0	(0.0%)
Bronchitis and Bronchiolitis	4	(1.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	1	(0.3%)	0	(0.0%)
Gastritis, Duodenitis, Enteritis	1	(0.3%)	0	(0.0%)	1	(1.7%)	1	(16.7%)	1	(0.3%)	0	(0.0%)
Slow Gestation and Low Birthweight	1	(0.3%)	0	(0.0%)	1	(1.7%)	0	(0.0%)	1	(0.3%)	0	(0.0%)
Infections, Perinatal Period	2	(0.5%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	1	(0.3%)	0	(0.0%)
Intrauterine Hypoxia and Birth Asphyxia	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	3	(1.0%)	0	(0.0%)
Meningitis	2	(0.5%)	0	(0.0%)	1	(1.7%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
Malignant Neoplasms	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	2	(0.7%)	1	(7.1%)
Meningococcal Infection	3	(0.8%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
HIV	1	(0.3%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	1	(0.3%)	1	(7.1%)
Complications of Pregnancy	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	1	(0.3%)	1	(7.1%)
Viral Diseases	1	(0.3%)	0	(0.0%)	1	(1.7%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
Benign Neoplasms, CIS	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	1	(0.3%)	1	(7.1%)
Cystic Fibrosis	2	(0.5%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
Hernia and Intestinal Obstruct	2	(0.5%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
Diseases of Blood	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	1	(0.3%)	0	(0.0%)
Acute Upper Respiratory Infections	1	(0.3%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
All Other Disease Conditions	53	(13.7%)	3	(25.0%)	4	(6.9%)	0	(0.0%)	56	(18.5%)	1	(7.1%)

- For Medicaid infants, SIDS was the cause of death in at least half the deaths in each study group (50.0% of the Unaccepted CPS Referral deaths, 55.2% of Accepted Referral deaths, 66.7% of Placement deaths, and 57.2% of Other Medicaid deaths). Among Non-Medicaid infants, the proportion of deaths in the Any CPS group who died from SIDS (42.9%) was similar to that for the No CPS group (48.0%).

- Rates of SIDS deaths (shown in Figure 7 below) were consistently higher—two to four times—for CPS-involved children than for children without CPS involvement. The increased risk of SIDS among CPS involved children reflects similar increased risks—two to five times higher—of postneonatal mortality for CPS-involved children. Higher rates of SIDS deaths observed among CPS involved children may be related to the prevalence of other risk factors such as poverty, smoking, and substance abuse.

- Congenital Anomalies (birth defects) was the second leading cause of death for all groups except the Accepted CPS Referral–Medicaid group. In that study group, Accidents and Adverse Effects was the second leading cause of postneonatal death. In the Any CPS–Non-Medicaid group, Congenital Anomalies and Accidents and Adverse Effects were tied with a number of other categories each represented by only one (1) death.

- Homicide was the cause of death for 8.6% of deaths in the Accepted CPS Referral Medicaid group—nearly six times the proportion of deaths attributed to homicide in the No CPS Medicaid group (1.5%).

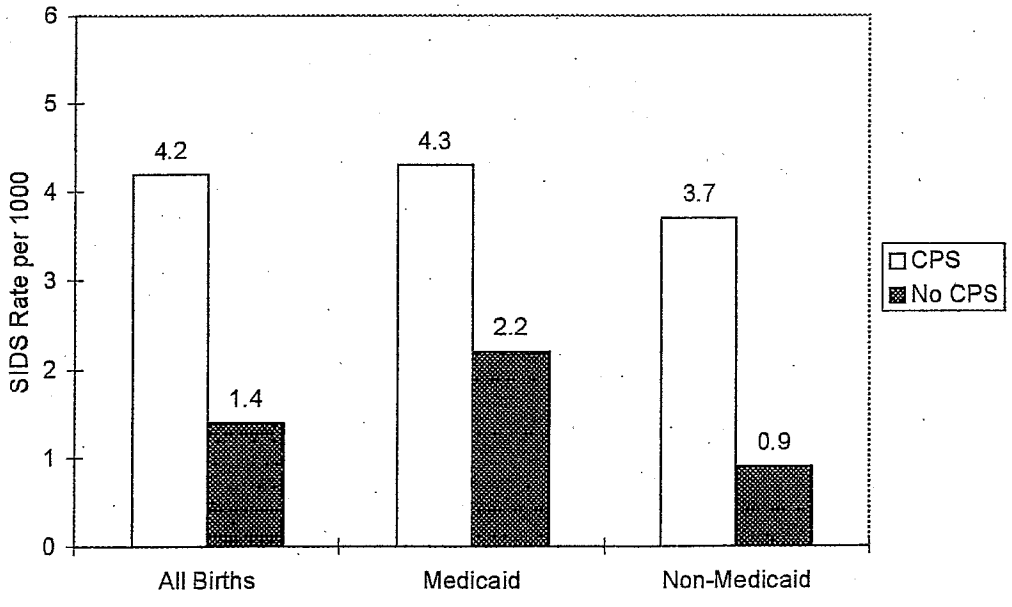

Figure 7. SIDS During the Postneonatal Period for Washington Children Born 7/1/91-12/31/94

Table 6. Causes of Deaths of Washington Children 1 - 4 Years Old Born 7/1/91 - 12/31/94

	MEDICAID				NON-MEDICAID	
	No CPS	Unaccepted CPS Referral	Accepted Referral (No Placement)	Placement	No CPS	Any CPS
	(N = 62)	(N = 4)	(N = 18)	(N = 7)	(N = 61)	(N = 3)
	# (%)	# (%)	# (%)	# (%)	# (%)	# (%)
Cause of Death						
Accidents and Adverse Effects	29 (46.8%)	2 (50.0%)	6 (33.3%)	2 (28.6%)	15 (24.6%)	0 (0.0%)
Congenital Anomalies	6 (9.7%)	1 (25.0%)	4 (22.2%)	1 (14.3%)	14 (23.0%)	2 (66.7%)
Malignant Neoplasms	5 (8.1%)	0 (0.0%)	0 (0.0%)	1 (14.3%)	8 (13.1%)	0 (0.0%)
Homicide and Legal Intervention	4 (6.5%)	0 (0.0%)	4 (22.2%)	1 (14.3%)	1 (1.6%)	0 (0.0%)
Conditions in Perinatal Period	2 (3.2%)	0 (0.0%)	1 (5.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Septicemia	2 (3.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (3.3%)	0 (0.0%)
Anemias	1 (1.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Benign Neoplasms, CIS	1 (1.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Diseases of Heart	1 (1.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (3.3%)	0 (0.0%)
Meningitis	1 (1.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Cerebrovascular Diseases	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (3.3%)	0 (0.0%)
Chronic Liver Disease and Cirrhosis	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (1.6%)	0 (0.0%)
Meningococcal Infection	0 (0.0%)	0 (0.0%)	1 (5.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
All Other Disease Conditions	10 (16.1%)	1 (25.0%)	2 (11.1%)	2 (28.6%)	16 (26.2%)	1 (33.3%)

Deaths of 1 - 4 Year Olds

Table 7 presents the causes of death in 1 - 4 year olds. It shows which causes of death occurred most often for 1 - 4 year olds in the study groups.

- Accidents and Adverse Effects were the leading cause of death among 1 - 4 year olds in each study group with the exception of Any CPS–Non-Medicaid. The proportion of deaths among 1 - 4 year olds in the No CPS–Medicaid group caused by Accidents and Adverse Effects (46.8%) was nearly twice that in the No CPS–Non-Medicaid group (25.0%).

- One-third of deaths of 1 - 4 year olds in the Medicaid Accepted CPS Referral group were caused by Accidents and Adverse Effects. In comparison, Accidents accounted for nearly half (46.8%) of 1 - 4 year old deaths in the Medicaid No CPS study group.

- For the Accepted CPS Referral–Medicaid group, 22.2% of deaths were caused by Homicide and Legal Intervention compared to 6.5% of the No CPS–Medicaid study group. A total of 55.5% of 1 - 4 year old deaths among Accepted CPS Referrals–Medicaid were caused by either Accidents and Adverse Effects or Homicide and Legal Intervention compared to 53.3% of the No CPS–Medicaid study group.

Table 9. Underlying Medical Conditions for Deaths of Washington Children Born 7/1/91 - 12/31/94

	MEDICAID							
	No CPS		Unaccepted CPS Referral		Accepted Referral (No Placement)		Placement	
	(N = 876)		(N = 16)		(N = 84)		(N = 13)	
	#	(%)	#	(%)	#	(%)	#	(%)
Medical Condition								
Down Syndrome	7	(0.8%)	1	(6.3%)	1	(1.2%)	0	(0.0%)
Cleft Lip / Palate	4	(0.5%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
Other Congenital Anomalies	21	(2.4%)	0	(0.0%)	3	(3.6%)	0	(0.0%)
Musculoskeletal Deformities	20	(2.3%)	3	(18.8%)	5	(6.0%)	0	(0.0%)
Cerebral Palsy	6	(0.7%)	0	(0.0%)	0	(0.0%)	2	(15.4%)
Disorders of the Nervous System	67	(7.6%)	3	(18.8%)	12	(14.3%)	2	(15.4%)
Disorders of the Circulatory System	72	(8.2%)	2	(12.5%)	13	(15.5%)	1	(7.7%)
Metabolic and Immunity Disorders	8	(0.9%)	0	(0.0%)	1	(1.2%)	1	(7.7%)
Conditions Originating in the Perinatal Period	46	(5.3%)	0	(0.0%)	7	(8.3%)	0	(0.0%)
Hearing Loss	2	(0.2%)	0	(0.0%)	0	(0.0%)	1	(7.7%)
Mental Retardation	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
Speach Disorders	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
Hyperkinesis	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
Mental Disorders	1	(0.1%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
Developmental Disorders	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
Learning Disorders	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
Any Diagnosed Medical Condition	254	(29.0%)	9	(56.3%)	42	(50.0%)	7	(53.8%)
No Diagnosed Medical Condition	622	(71.0%)	7	(43.8%)	42	(50.0%)	6	(46.2%)

UNDERLYING MEDICAL CONDITIONS

The cause of death per the death certificate provides limited information about the medical condition of the child. Birth defects and serious medical conditions may or may not be indicated on death certificates and are important in understanding more about the child's health status. A classification system which identifies birth defects and serious medical conditions which occur in early childhood was developed for other studies (see Keenan et al., 1996). This system is based on International Classification of Diseases (ICD-9) diagnoses in Medicaid claims from the child's first two years of life.

Table 9 displays the number and percentage of children who died in each of the four Medicaid study groups that also had a diagnosed medical condition. A diagnosed medical condition does not necessarily indicate the cause of a child's death. However, it may reveal whether the child who died had a physical condition which put him/her at risk of early death.

- The rate of diagnosed medical conditions for each of the CPS involved study groups (56.3% of Unaccepted CPS Referrals, 50.0% of Accepted CPS Referrals, and 53.8% of Placements) was nearly twice that of the No CPS study group (29.0%).

- Children in the Unaccepted CPS Referral study group (total N=16) who died had the following conditions: Down syndrome (1 child), musculoskeletal deformities (3 children), disorders of the nervous system (3 children), and disorders of the circulatory system (2 children).

- Nearly one-third (25 children) of deaths in the Accepted CPS Referral study group (total N=84) had a disorder of the nervous system or a disorder of the circulatory system. Conditions for this group also included Down syndrome (1 child), other congenital anomalies (3 children), musculoskeletal deformities (5 children), metabolic and immunity disorders (1 child), and conditions originating in the perinatal period (7 children).

- Children in the Placement study group (total N=13) who died had the following conditions: cerebral palsy (2 children), disorders of the nervous system (2 children), disorders of the circulatory system (1 child), metabolic and immunity disorders (1 child), and hearing disorders (1 child).

Table 10. Risk Factors Among Washington Children Born 7/1/91 - 12/31/94

	MEDICAID				NON-MEDICAID	
	No CPS	Unaccepted CPS Referral	Accepted Referral (No Placement)	Placement	No CPS	Any CPS
	(N = 92,411)	(N = 3,003)	(N = 10,817)	(N = 3,245)	(N = 161,199)	(N = 3,919)
	# (%)	# (%)	# (%)	# (%)	# (%)	# (%)
BIOLOGICAL RISK FACTORS						
Birthweight						
Very Low (<3.3 lbs.)	868 (0.9%)	33 (1.1%)	137 (1.3%)	77 (2.4%)	1,099 (0.7%)	41 (1.0%)
Med Low (3.3 - 5.5)	4,350 (4.7%)	220 (7.3%)	948 (8.8%)	465 (14.3%)	5,868 (3.6%)	271 (6.9%)
Normal (>5.5)	87,021 (94.2%)	2,745 (91.4%)	9,712 (89.8%)	2,685 (82.7%)	153,996 (95.5%)	3,599 (91.8%)
Unknown	172 (0.2%)	5 (0.2%)	20 (0.2%)	18 (0.6%)	236 (0.1%)	8 (0.2%)
Gestational Age at Birth						
Full Term (>36 wks)	84,327 (91.3%)	2,695 (89.7%)	9,560 (88.4%)	2,650 (81.7%)	149,515 (92.8%)	3,487 (89.0%)
Mod Preterm (28-36	6,747 (7.3%)	270 (9.0%)	1,097 (10.1%)	528 (16.3%)	9,484 (5.9%)	368 (9.4%)
Extr. Preterm (<28)	421 (0.5%)	9 (0.3%)	53 (0.5%)	32 (1.0%)	494 (0.3%)	14 (0.4%)
Unknown	916 (1.0%)	29 (1.0%)	107 (1.0%)	35 (1.1%)	1,706 (1.1%)	50 (1.3%)
SOCIOECONOMIC RISK FACTORS						
Race/Ethnicity						
White	58,031 (62.8%)	2,245 (74.8%)	8,108 (75.0%)	2,178 (67.1%)	137,433 (85.3%)	3,229 (82.4%)
Hispanic	18,701 (20.2%)	256 (8.5%)	722 (6.7%)	162 (5.0%)	4,224 (2.6%)	109 (2.8%)
Asian	5,608 (6.1%)	49 (1.6%)	231 (2.1%)	48 (1.5%)	9,432 (5.9%)	157 (4.0%)
Black	4,769 (5.2%)	187 (6.2%)	848 (7.8%)	446 (13.7%)	4,043 (2.5%)	225 (5.7%)
Native American	3,125 (3.4%)	192 (6.4%)	626 (5.8%)	295 (9.1%)	1,410 (0.9%)	93 (2.4%)
Unknown	2,177 (2.4%)	74 (2.5%)	282 (2.6%)	116 (3.6%)	4,657 (2.9%)	106 (2.7%)
Marital Status						
Married	47,338 (51.2%)	1,067 (35.5%)	3,604 (33.3%)	824 (25.4%)	148,643 (92.2%)	2,683 (68.5%)
Single	44,849 (48.5%)	1,931 (64.3%)	7,181 (66.4%)	2,396 (73.8%)	12,372 (7.7%)	1,222 (31.2%)
Unknown	224 (0.2%)	5 (0.2%)	32 (0.3%)	25 (0.8%)	184 (0.1%)	14 (0.4%)
Mother's Educational Attainment						
None	525 (0.6%)	9 (0.3%)	20 (0.2%)	3 (0.1%)	131 (0.1%)	7 (0.2%)
0-7 yrs	6,135 (6.6%)	75 (2.5%)	227 (2.1%)	95 (2.9%)	520 (0.3%)	25 (0.6%)
8-11 yrs	19,435 (21.0%)	932 (31.0%)	3,430 (31.7%)	1,076 (33.2%)	4,889 (3.0%)	591 (15.1%)
12 yrs	27,531 (29.8%)	778 (25.9%)	2,693 (24.9%)	706 (21.8%)	40,634 (25.2%)	1,103 (28.1%)
13-15 yrs	12,970 (14.0%)	300 (10.0%)	790 (7.3%)	207 (6.4%)	38,903 (24.1%)	634 (16.2%)
16 yrs	2,342 (2.5%)	22 (0.7%)	69 (0.6%)	12 (0.4%)	25,330 (15.7%)	176 (4.5%)
17+ yrs	949 (1.0%)	4 (0.1%)	29 (0.3%)	5 (0.2%)	15,556 (9.7%)	93 (2.4%)
Unknown	10,777 (11.7%)	296 (9.9%)	1,241 (11.5%)	528 (16.3%)	11,242 (7.0%)	313 (8.0%)
Birth before 1992*	11,747 (12.7%)	587 (19.5%)	2,318 (21.4%)	613 (18.9%)	23,994 (14.9%)	977 (24.9%)
Medicaid Eligibility						
Grant Recipient	36,703 (39.7%)	1,889 (62.9%)	7,426 (68.7%)	2,422 (74.6%)		
Pre-FS Med Only	23,563 (25.5%)	554 (18.4%)	1,782 (16.5%)	555 (17.1%)		
FS Expansion	31,704 (34.3%)	527 (17.5%)	1,491 (13.8%)	212 (6.5%)		
No Eligibility Recorc	441 (0.5%)	33 (1.1%)	118 (1.1%)	56 (1.7%)		
Mat. Case Mgt.(MCM) and Mat. Support Svcs.(MSS)						
Neither	35,147 (38.0%)	962 (32.0%)	3,590 (33.2%)	1,029 (31.7%)		
MCM	1,506 (1.6%)	90 (3.0%)	297 (2.7%)	143 (4.4%)		
MSS	38,409 (41.6%)	1,098 (36.6%)	3,602 (33.3%)	877 (27.0%)		
Both	17,349 (18.8%)	853 (28.4%)	3,328 (30.8%)	1,196 (36.9%)		

*Prior to 1992, information about the mother's educational attainment was not collected on birth certificates.

Demographic and Medical Characteristics

Risk factors associated with higher mortality rates were conceptualized in three categories: biological, socioeconomic, and environmental. **Biological** risk factors, including low birth weight and preterm birth, are present at birth and are associated with increased morbidity and mortality. **Socioeconomic** risk factors indicate that a child comes from an economically disadvantaged population and include membership in certain ethnic minorities, birth to an unmarried mother, low maternal educational attainment, and poverty (measured in this report by the type of Medicaid eligibility). **Environmental** risk factors include characteristics of the mother and conditions of pregnancy which either may be harmful to an unborn child or may indicate that a child is in a dangerous situation. Environmental risk factors include teen pregnancy, birth to a mother with many prior children, maternal smoking, inadequate prenatal care, maternal substance abuse, and maternal mental health conditions.

BIOLOGICAL RISK FACTORS

Birthweight

- The highest rate of low birthweight (2.4% + 14.3%, or 16.7%) occurred among the Placement-Medicaid group and was nearly three times the rate for the No-CPS-Medicaid group (5.6%). The low birthweight rates for the Unaccepted Referral-Medicaid (8.4%) and Accepted Referral-Medicaid (10.1%) groups were intermediate.

- The lowest rate of low birthweight (4.3%) occurred among No CPS-Non-Medicaid children. The Any CPS Non-Medicaid group had a higher low birthweight rate (7.9%).

Gestational Age at Birth

- The highest rate of prematurity (17.3%) occurred among the Placement-Medicaid group and was more than twice the rate for the No-CPS-Medicaid group (7.8%). The prematurity rates for the Unaccepted Referral-Medicaid (9.3%) and Accepted Referral-Medicaid (10.6%) groups were intermediate.

- The lowest rate of prematurity (6.2%) occurred among No CPS-Non-Medicaid children. The Any CPS Non-Medicaid group had a higher rate of prematurity (9.8%).

SOCIOECONOMIC RISK FACTORS

Race/Ethnicity

- For Medicaid children, African Americans and Native Americans were over-represented in the CPS-involved groups. As CPS involvement increased, the proportions of these groups increased, up to 13.7% and 9.1%, respectively, in the Placement-Medicaid group, compared to 5.2% and 3.4% in the No CPS–Medicaid group.

Table 10. (cont'd)
Risk Factors Among Washington Children Born 7/1/91 - 12/31/94

	MEDICAID				NON-MEDICAID	
	No CPS	Unaccepted CPS Referral	Accepted Referral (No Placement)	Placement	No CPS	Any CPS
	(N = 92,411)	(N = 3,003)	(N = 10,817)	(N = 3,245)	(N = 161,199)	(N = 3,919)
	# (%)	# (%)	# (%)	# (%)	# (%)	# (%)
ENVIRONMENTAL RISK FACTORS						
Mother's Age						
< 15 Years Old	312 (0.3%)	34 (1.1%)	88 (0.8%)	25 (0.8%)	31 (0.0%)	13 (0.3%)
15 - 17 Years Old	6,961 (7.5%)	374 (12.5%)	1,402 (13.0%)	347 (10.7%)	1,162 (0.7%)	234 (6.0%)
18 - 19 Years Old	12,659 (13.7%)	551 (18.3%)	1,827 (16.9%)	442 (13.6%)	3,135 (1.9%)	308 (7.9%)
20 - 24 Years Old	35,045 (37.9%)	1,079 (35.9%)	3,865 (35.7%)	1,126 (34.7%)	27,652 (17.2%)	1,104 (28.2%)
25 - 29 Years Old	20,819 (22.5%)	588 (19.6%)	2,047 (18.9%)	663 (20.4%)	53,869 (33.4%)	1,066 (27.2%)
30 - 34 Years Old	11,131 (12.0%)	273 (9.1%)	1,146 (10.6%)	437 (13.5%)	49,969 (31.0%)	795 (20.3%)
35 - 39 Years Old	4,425 (4.8%)	80 (2.7%)	377 (3.5%)	167 (5.1%)	21,492 (13.3%)	327 (8.3%)
> 39 Years Old	992 (1.1%)	22 (0.7%)	60 (0.6%)	35 (1.1%)	3,775 (2.3%)	65 (1.7%)
Unknown	67 (0.1%)	2 (0.1%)	5 (0.0%)	3 (0.1%)	114 (0.1%)	7 (0.2%)
Mean	**24.1 Yrs Old**	**22.8 Yrs Old**	**23.1 Yrs Old**	**24.0 Yrs Old**	**29.1 Yrs Old**	**26.2 Yrs Old**
Median	**23 Yrs Old**	**22 Yrs Old**	**22 Yrs Old**	**23 Yrs Old**	**29 Yrs Old**	**26 Yrs Old**
Prior Children						
None	39,792 (43.1%)	1,270 (42.3%)	4,038 (37.3%)	875 (27.0%)	65,091 (40.4%)	1,445 (36.9%)
1 Child	25,211 (27.3%)	820 (27.3%)	2,888 (26.7%)	815 (25.1%)	56,836 (35.3%)	1,207 (30.8%)
2 Children	14,135 (15.3%)	482 (16.1%)	1,970 (18.2%)	674 (20.8%)	24,252 (15.0%)	660 (16.8%)
3 - 5 Children	10,630 (11.5%)	375 (12.5%)	1,683 (15.6%)	741 (22.8%)	11,671 (7.2%)	504 (12.9%)
> 5 Children	1,358 (1.5%)	33 (1.1%)	136 (1.3%)	87 (2.7%)	926 (0.6%)	47 (1.2%)
Unknown	1,285 (1.4%)	23 (0.8%)	102 (0.9%)	53 (1.6%)	2,423 (1.5%)	56 (1.4%)
Mean	**1.1 Children**	**1.1 Children**	**1.3 Children**	**1.7 Children**	**1.0 Children**	**1.2 Children**
Median	**1 Children**	**1 Children**	**1 Children**	**1 Children**	**1 Children**	**1 Children**
Mother Smoked During Pregnancy						
Yes	22,546 (24.4%)	1,344 (44.8%)	5,194 (48.0%)	1,843 (56.8%)	16,408 (10.2%)	1,295 (33.0%)
No	66,436 (71.9%)	1,561 (52.0%)	5,067 (46.8%)	1,160 (35.7%)	139,611 (86.6%)	2,465 (62.9%)
Unknown	3,429 (3.7%)	98 (3.3%)	556 (5.1%)	242 (7.5%)	5,180 (3.2%)	159 (4.1%)
Trimester Prenatal Care Began						
1st Trimester	59,702 (64.6%)	1,885 (62.8%)	6,480 (59.9%)	1,568 (48.3%)	138,661 (86.0%)	2,819 (71.9%)
2nd Trimester	22,106 (23.9%)	797 (26.5%)	2,828 (26.1%)	895 (27.6%)	13,060 (8.1%)	682 (17.4%)
3rd Trimester	4,773 (5.2%)	151 (5.0%)	713 (6.6%)	298 (9.2%)	1,835 (1.1%)	134 (3.4%)
No Prenatal Care	711 (0.8%)	26 (0.9%)	157 (1.5%)	153 (4.7%)	506 (0.3%)	84 (2.1%)
Unknown	5,119 (5.5%)	144 (4.8%)	639 (5.9%)	331 (10.2%)	7,137 (4.4%)	200 (5.1%)
Adequacy of Prenatal Care						
Adequate Plus	25,383 (27.5%)	864 (28.8%)	2,945 (27.2%)	717 (22.1%)	49,509 (30.7%)	1,153 (29.4%)
Adequate	30,713 (33.2%)	926 (30.8%)	3,141 (29.0%)	754 (23.2%)	67,028 (41.6%)	1,419 (36.2%)
Intermediate	20,913 (22.6%)	716 (23.8%)	2,542 (23.5%)	678 (20.9%)	28,348 (17.6%)	737 (18.8%)
Inadequate	5,412 (5.9%)	193 (6.4%)	830 (7.7%)	410 (12.6%)	2,751 (1.7%)	159 (4.1%)
Unknown	9,990 (10.8%)	304 (10.1%)	1,359 (12.6%)	686 (21.1%)	13,563 (8.4%)	451 (11.5%)
Maternal Substance Abuse and Mental Health Diagnoses						
Substance Abuse	2,494 (2.7%)	280 (9.3%)	1,281 (11.8%)	1,037 (32.0%)		
Mental Health	2,732 (3.0%)	168 (5.6%)	606 (5.6%)	267 (8.2%)		
Both	302 (0.3%)	36 (1.2%)	175 (1.6%)	189 (5.8%)		
None	86,883 (94.0%)	2,519 (83.9%)	8,755 (80.9%)	1,752 (54.0%)		

- Hispanic and Asian children were under-represented in the CPS-involved Medicaid groups, and as the level of CPS involvement increased, the proportions of these groups tended to decrease, down to 5.0% and 1.5%, respectively, in the Placement-Medicaid group, compared to 20.2% and 6.1% in the No-CPS–Medicaid group.

- The proportion of non-white children in the Non-Medicaid study groups (14.7% for No CPS and 17.6% for Any CPS) was less than half that for the No CPS Medicaid group (37.2%). The Any CPS-Non-Medicaid group contained substantially more African Americans (5.7%) and Native Americans (2.4%) than the No CPS-Non-Medicaid group (2.5% African Americans and 0.9% Native Americans).

Marital Status

- Among Medicaid children, the No CPS group had the lowest proportion of children of single mothers (48.5%) and Placement had the highest (73.8%). Children of single mothers accounted for 64.3% of the Unaccepted CPS Referral study group and 66.4% of the Accepted CPS Referral group.

- Among Non-Medicaid children, the proportion with single mothers was four times higher in the Any CPS group (31.2%) than in the No CPS group (7.7%). For both these Non-Medicaid groups, the proportions were less than that for Medicaid No CPS (48.5%).

ENVIRONMENTAL RISK FACTORS

Mother's Age

- Among Medicaid children, mothers less than 20 years old tended to be over-represented in the CPS-involved groups, and mothers more than 20 years old were generally under-represented in the CPS-involved groups. This is reflected in the lower average ages for the CPS-involved groups (22.8 years old for Unaccepted Referral and 23.1 years for Accepted Referral) compared to the No CPS group (24.1 years).

- Mothers of Non-Medicaid children were older than mothers of Medicaid children: the average age was 29.1 years for the No CPS group and 26.2 years for the Any CPS group.

Maternal Smoking

- For Medicaid children, the rate of maternal smoking during pregnancy increased with the level of CPS involvement. The rates of maternal smoking in the Accepted (44.8%) and Unaccepted (48.0%) CPS referral groups were about twice that of the No CPS group (24.4%). Over half (56.8%) of mothers of children in the Placement group had smoked during pregnancy.

- Among Non-Medicaid children, the rate of maternal smoking was three times greater in the Any CPS group (33.0%) compared to the No CPS group (10.2%). More mothers of children in the Any CPS Non-Medicaid group had smoked (33.0%) than had mothers in the No CPS Medicaid group (24.4%).

SUMMARY

Among Medicaid children, a number of identified risk factors occurred more frequently as the level of CPS involvement increased. The No CPS groups had the lowest proportion of children with risk factors, the Unaccepted and Accepted CPS Referral groups tended to be moderately higher, and the Placement group had the highest proportion:

Table 11. Frequency of Selected Risk Factors Among Medicaid Children

Risk Factor	No CPS	Unaccepted	Accepted	Placement
Mother educated 8 - 11 years	21.0%	31.0%	31.7%	33.1%
Grant recipient	39.7%	62.9%	68.7%	74.6%
Maternity Case Management (MCM)	1.6%	3.0%	2.7%	4.4%
3 or more prior children	13.0%	13.6%	16.9%	25.6%
Prenatal care began after first trimester	29.9%	32.4%	34.2%	41.5%
Intermediate or inadequate prenatal care	28.5%	30.2%	31.2%	33.5%
Diagnosed substance abuse	3.0%	10.5%	13.4%	37.7%
Mental health diagnosis	3.3%	6.8%	7.2%	14.0%

For Non-Medicaid children, the No CPS and Any CPS groups had lower proportions of children than the No CPS Medicaid group for the following risk factors:

Table 12. Frequency of Selected Risk Factors Among Non-Medicaid and Medicaid Children

	Non-Medicaid		Medicaid
Risk Factor	No CPS	Any CPS	No CPS
Mother educated 8 - 11 years	3.0%	15.1%	21.0%
3 or more prior children	7.8%	14.1%	13.0%
Prenatal care began after first trimester	9.5%	22.4%	29.9%
Intermediate or inadequate prenatal care	19.3%	22.9%	28.5%

Multivariate Model

A sophisticated statistical method was used to try to assess the independent risk of CPS involvement for early childhood (28 days - 4 years) death in the study population. This model (based on logistic regression) permits evaluation of the independent contribution of each identified risk factor. Because many of the identified risk factors are inter-related, the results of applying this method cannot be predicted by simply studying the data presented earlier in this report.

The factors identified as being strong risk factors should not be interpreted as being causes of the outcome of interest, early childhood death. In a sense, the true causes of child deaths, such as dangerous situations or behaviors, could not be measured with the available data.

Because more data was available for Medicaid children than for Non-Medicaid children, a model for Medicaid children only and a model for all children were developed. The results of the two models were similar. Among Medicaid children, the following observations were noted:

- A number of protective factors were identified. After controlling for other risk factors, Hispanic or African American ethnicity and college education (more than one year) of the mother reduced the risk of early childhood death by up to 50%. No increased risk of death was found for Native American children.

- The risk of early childhood death tended to increase as the mother's age at delivery decreased. While the risk of death for children with mothers 25 years old was 1.7 times that of the lowest risk children, the risk increased to more than three times for children of mothers 15 years old.

- Children with unaccepted CPS referrals only (OR=1.81) and accepted CPS referrals and no out-of-home placement (OR=1.94) were nearly twice as likely to have died than children with no CPS referrals. No increased risk of death was found for children with out-of-home placements.

- Low birth weight was a strong predictor of post-neonatal and early childhood death. Extremely low birth weight children were nearly five times more likely to have died than normal birth weight children. Very low birth weight (OR=2.45) and medium low birth weight (OR=2.06) children were at least twice as likely to have died.

- As the mother's number of prior children increased, the likelihood that the child had died also increased. Children whose mothers had five prior children were nearly twice as likely to have died as children whose mothers had no prior children.

- Premature children were more likely to have died than those born from a full term pregnancy (at least 36 weeks). Children born in the twenty-eighth week of pregnancy were over twice as likely to have died. Children born in the twenty-fourth week or earlier were over 2.5 times more likely to have died.

Table 10. Risk of Death Between 1 month and 4 years of Age For Medicaid Children

Characteristic	Odds Ratio	Comparison Group
Mother's Age†**:		
15 Years Old	3.12	46 Years Old
18 Years Old	2.52	
20 Years Old	2.22	
25 Years Old	1.68	
CPS Involvement:		
Unaccepted CPS Referral**	1.81	No CPS
Accepted CPS Referral (No Placement)*	1.94	
Race / Ethnicity:		
Hispanic*	0.56	White
Black**	0.73	
Birth weight:		
Extremely Low (<2.2 lbs.)*	4.90	Normal (> 5.5 lbs.)
Very Low (2.2 - 3.3 lbs.)*	2.45	
Medium Low (3.3 - 5.5 lbs.)*	2.06	
Prior Children†*:		
One Child	1.13	No Prior Children
Two Children	1.28	
Three Children	1.45	
Five Children	1.87	
Gestational Age†*:		
20 Weeks	4.10	36 Weeks
24 Weeks	2.88	
28 Weeks	2.03	
32 Weeks	1.42	
Mother's Smoking Status:		
Smoker*	1.44	Non-Smoker
Unknown*	1.52	
Diagnosed Maternal Subst. Abuse:		
Alcohol*	3.59	No Diagnosed Abuse
Mother's Educational Attainment:		
More than 13 Years*	0.64	12 or 13 Years
Severe Medical Condition:		
Yes*	1.58	No

† *The characteristic relates to a continuous variable in the model; the odds ratio was calculated for the characteristic using the continuous variable.*

* $p < .05$

** $p < .1$

- Children of mothers who smoked (OR=1.44) and of mothers whose smoking status was not reported on the birth certificate (OR=1.52) were approximately 1.5 times more likely to have died than children of non-smokers.

- The relationship between diagnosed maternal alcohol abuse and early childhood death was strong (OR=3.59). A statistically significant relationship was not found between diagnosed maternal abuse of drugs or of both alcohol and drugs and early childhood death in spite of an elevated mortality rate among children of drug abusing mothers. Additional analysis revealed that controlling for accepted CPS referral caused these two indicators to be statistically insignificant.

- Children with severe underlying medical conditions were 1.5 times more likely to have died than children not diagnosed with a severe medical condition.

The interpretation of the results of such a model with many complex interactions is not simple. An association observed between the outcome of childhood death and any risk factor does not indicate that the risk factor is necessarily a cause of early childhood death. Furthermore, a relatively high occurrence of a true (but potentially unidentified) risk factor may fully account for an observed association of death and an identified risk factor.

For example, early childhood mortality is increased among African American and Native American children compared to white children. Yet, in this model, after controlling for a number of risk factors, no increased risk of death was observed for Native American children, and African American ethnicity was associated with a reduced risk of death.

The increased risk of early childhood death for children in the CPS Referral (Accepted or Unaccepted) groups should not be interpreted as a measure of the effectiveness of CPS activities in Washington State. With no measure of family violence available in this model, it is possible that the variables labeled CPS Referral (Accepted or Unaccepted) actually indicate the presence of violence in the family, or other behavioral or attitudinal characteristics. More study would be necessary to distinguish outcomes between families with violent behaviors who were and were not involved with CPS.

CONCLUSIONS

Overall mortality rates (including neonatal deaths) indicated that the risk of death for those with CPS involvement was lower for Medicaid children and the same for Non-Medicaid children, compared to those with no CPS involvement. However, mortality rates excluding neonatal deaths indicated that, considering Medicaid and Non-Medicaid children separately, those who had some level of CPS involvement were more likely to have died than those with no CPS involvement. It is important to recognize that approximately one-half of all child deaths analyzed here occurred in the neonatal period (first month of life) while the majority of CPS referrals occurred after the neonatal period.

Differences in mortality rates excluding neonatal deaths reflect the prevalence of at risk children within the CPS-involved study groups. Disproportionate numbers of CPS-involved children belong to groups with biological, socioeconomic, or environmental risk factors. Poor children; black and Native American children; children who had sub-optimal birth outcomes; children of mothers who smoke or use drugs, were poorly educated, or had substandard prenatal care; and children of unmarried or teen mothers were more likely to experience some level of CPS involvement. Furthermore, among Medicaid children, the share of at risk children increased with the intensity of CPS involvement.

The high rate of CPS involvement among children of mothers diagnosed with substance abuse or mental health disorders was striking. Over half of the children whose mothers' Medicaid records contained drug abuse diagnoses, drug and alcohol abuse diagnoses, or selected mental health diagnoses had some level of CPS involvement.

Children with prior CPS involvement who died showed differences in diagnosed medical conditions compared to the No CPS children who died. Across the three Medicaid study groups with CPS involvement, at least half of all children who died were diagnosed with a serious medical condition or birth defect. One-third of children in the No CPS Medicaid study group who died had such a diagnosed medical condition. This may be an indication that an understanding of these children's special needs led to increased vigilance on the part of people making referrals to CPS as well as CPS caseworkers. It also reveals that higher mortality rates among children experiencing CPS involvement may, in part, have been due to a higher frequency of physical ailments.

Sudden Infant Death Syndrome (SIDS) was the leading cause of postneonatal (months 2 - 12 of life) death reported on death certificates in all the study groups. Rates of SIDS deaths were consistently two to four times higher for CPS-involved children than for similar children without CPS involvement. Higher rates of SIDS deaths observed among CPS involved children may be related to the prevalence of other risk factors such as poverty, smoking, and substance abuse.

Multivariate analysis revealed risk factors which were strongly associated with early childhood (1 month - 4 years) death independent of the effects of other characteristics. Biological risk factors were the strongest predictors of subsequent death. The high risks

associated with extremely low birth weight and premature birth before 24 weeks of gestation (odds ratio [OR] = 4.90 and 4.10, respectively) indicate that even after the neonatal period the biological risk factors continue to exert their effects.

Among environmental risk factors, diagnosed alcohol abuse (OR = 3.59) and teen birth (OR = 3.12 for children of 15 year old mothers) showed a strong association with early childhood death. Other statistically significant socioeconomic and environmental risk factors identified in the logistic regression included birth to a mother with many prior children, maternal smoking, and a severe underlying medical condition of the child. Because logistic regression reports the relative strength of a risk factor independent of the effect of other risk factors, the likelihood of infant death increases for children with more than one.

The logistic regression model showed an increased likelihood of postneonatal death for children in the Unaccepted CPS Referral (OR = 1.81) and Accepted CPS Referral (OR = 1.94) study groups. This finding is not surprising given that CPS caseworkers receive referrals for what an observer interprets as child abuse or neglect. Thus, a CPS referral suggests a specific danger to a child, such as family violence, that is not directly measured by any of the other risk factors.

This report has introduced the complexities that surround deaths among 0 - 4 year olds in Washington State. Child deaths involve interactions of socioeconomic, biological, and environmental factors which are associated with an increased risk of death. While certain risk factors may be predictive of child death, the true causes lie in the dangerous conditions and situations to which children are subject.

This report has highlighted that CPS caseworkers serve an especially challenging population. Beyond the possibility that they were victims of abuse and neglect, children referred to CPS were more likely to display characteristics associated with an increased risk of dying. The increased likelihood that children with CPS involvement died must be viewed in the context of the inherent risks facing these children.

Statewide analysis of child deaths, as in this report, provides information about overall trends in child mortality and can supplement local child death review by revealing how individual cases relate to a larger picture. In addition, statewide analysis might suggest areas of concern which may become focal points of detailed review on the local level.

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