

MISSED OPPORTUNITY BIRTHS IN MICHIGAN, AS OF JANUARY 1, 2006

BACKGROUND

In August 1994, the Centers for Disease Control and Prevention issued recommendations on the use of zidovudine (ZDV) to reduce perinatal transmission of HIV, in which it was recognized that administration of ZDV to the mother and infant could substantially reduce rates of perinatal HIV transmission.¹ Specifically, the report recommended that care providers consider administering ZDV during pregnancy, delivery, and neonatally when clinically appropriate. Since that time, cases of perinatal transmission have declined sharply, as seen in the 75% reduction in perinatally acquired AIDS cases between 1992 and 1998.² However, despite the release of the aforementioned recommendations and subsequent updates to them, some HIV positive pregnant women and their perinatally exposed children still do not receive the recommended schedule of ZDV, thereby increasing the probability of seroconversion in the children. These children and their mothers are referred to as “missed opportunities.”

Data for this report were taken from the Michigan HIV/AIDS Reporting System (HARS), which is maintained by the Michigan Department of Community Health (MDCH) HIV/STD & Other Bloodborne Infections Surveillance Section (henceforth referred to as HIV Surveillance). HARS is a public health surveillance registry that includes surveillance case reports of HIV and AIDS and is generally recognized as a comprehensive tool for defining the population of HIV-positive persons in Michigan. HIV and AIDS have been name-based notifiable conditions in Michigan since 1989 and 1981, respectively. HARS also contains a considerable amount of information about children born to HIV-positive women, including hospital of birth, timing of the mother’s diagnosis with respect to her pregnancy, characteristics of prenatal care, and receipt of ZDV during pregnancy, delivery, and in the neonatal period. In addition, since 2001, HIV Surveillance has been conducting Enhanced Perinatal HIV Surveillance (EPS), a supplemental abstraction project that entails the collection of more extensive maternal and pediatric information through review of prenatal records, birth records, and the medical records of mothers and their children.

In this report, a child is considered a non-missed opportunity if his or her mother received ZDV during pregnancy and delivery and the child also received neonatal ZDV. In addition, children who received neonatal ZDV are considered non-missed opportunities if their mothers did not receive prenatal care (or prenatal care receipt was unknown) and subsequently did not receive ZDV during pregnancy, but did receive ZDV during delivery. Any children that do not meet either of these two criteria are defined as missed opportunities (see Table 3 below for tabular representation of missed opportunity categories). Prenatal missed opportunity births are defined as births for which the mothers received prenatal care, but did not/unknown receive prenatal ZDV. Women are identified as prenatal care recipients if information is documented for total number of prenatal care visits and/or month of pregnancy prenatal care began. Delivery/neonatal missed opportunity births are births for which ZDV administration at delivery is no/unknown/refused and/or neonatal ZDV administration is no/unknown/refused. Note that this category contains seven home births.

There are limitations to interpreting the data presented in this report. Missed opportunity births include births for which information is unknown. One reason data may not be known is that HIV Surveillance, which obtains its data through chart review, lacks the staffing necessary to complete all chart reviews. In addition, births that occurred in 2005 are still in the process of being reviewed. On the other hand, information in the charts that are reviewed may be missing. It should be noted that Michigan law (MCL 333.5123, effective March 30, 1989) requires physicians to test pregnant women for HIV and to maintain documentation of their test results. The data presented in this report, therefore, most likely overestimate the occurrence of missed opportunities due to this lack of information.

As of January 1, 2006, the Michigan Department of Community Health has received reports on 1,070 children born to HIV positive women in Michigan, 652 of which meet the definition of missed opportunity (Figure 1). The majority of these (n=596; 91%) occurred during or after 1989, the year MCL 333.5123 went into effect. Because the CDC recommendations were published in 1994, the remainder of the report will focus on the years 1994 through 2005; 308 missed opportunities occurred during this period. While 52 (17%) of these 308 missed opportunity births have resulted in confirmed HIV positive status in the children, only 8 (2%) of 407 non-missed opportunity births have become HIV positive (Table 1).

Figure 1. Annual Number of Missed Opportunity and Non-Missed Opportunity Births to HIV-Positive Women in Michigan, as of January 1, 2006

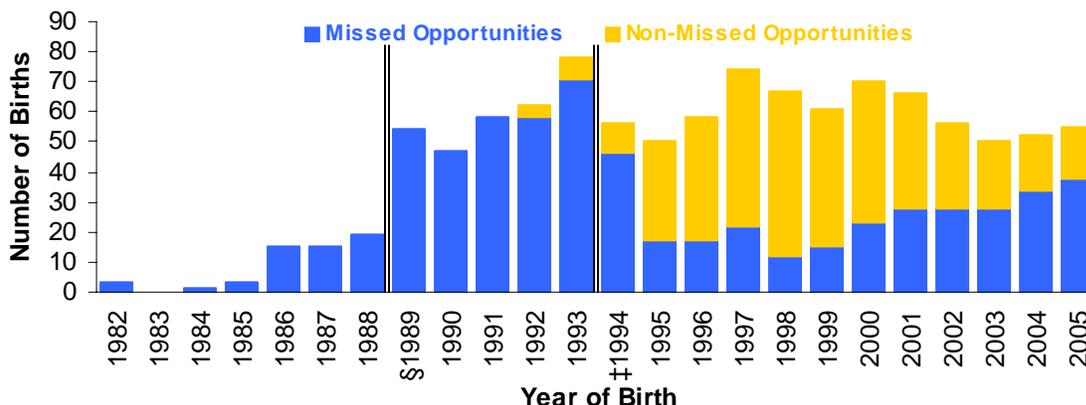


Table 1. Annual Number of Missed Opportunity and Non-Missed Opportunity Births to HIV-Positive Women in Michigan, as of January 1, 2006

Year of Birth	Missed Opportunity Births			Non-Missed Opportunity Births			Total		
	HIV+	Total	Percent HIV+	HIV+	Total	Percent HIV+	HIV+	Total	Percent HIV+
1982	2	3	67%	0	0	0%	2	3	67%
1983	0	0	0%	0	0	0%	0	0	0%
1984	1	1	100%	0	0	0%	1	1	100%
1985	1	3	33%	0	0	0%	1	3	33%
1986	4	15	27%	0	0	0%	4	15	27%
1987	4	15	27%	0	0	0%	4	15	27%
1988	7	19	37%	0	0	0%	7	19	37%
§1989	18	54	33%	0	0	0%	18	54	33%
1990	18	47	38%	0	0	0%	18	47	38%
1991	17	58	29%	0	0	0%	17	58	29%
1992	16	58	28%	0	4	0%	16	62	26%
1993	13	71	18%	0	7	0%	13	78	17%
†1994	12	46	26%	0	10	0%	12	56	21%
1995	6	17	35%	2	33	6%	8	50	16%
1996	5	17	29%	2	41	5%	7	58	12%
1997	7	22	32%	0	52	0%	7	74	9%
1998	2	12	17%	2	55	4%	4	67	6%
1999	3	15	20%	1	46	2%	4	61	7%
2000	2	23	9%	0	47	0%	2	70	3%
2001	7	28	25%	1	38	3%	8	66	12%
2002	4	28	14%	0	28	0%	4	56	7%
2003	1	28	4%	0	22	0%	1	50	2%
2004	1	34	3%	0	18	0%	1	52	2%
2005	2	38	5%	0	17	0%	2	55	4%
Total	153	652	23%	8	418	2%	161	1,070	15%
1994-2005	52	308	17%	8	407	2%	60	715	8%

§MCL 333.5123 implemented

†CDC recommendations issued

The distribution of the race/ethnicity of missed opportunity births is similar to that of non-missed opportunity births (Table 2). The majority of children born to HIV positive women are black, non-Hispanic. These race/ethnicity distributions are also similar to the distribution of race/ethnicity among females currently living with HIV/AIDS, as reported in the MDCH HIV Surveillance Quarterly Statistics for January 1, 2006 (20% white, non-Hispanic; 74% black, non-Hispanic; 4% Hispanic; 2% Other or Unknown).

Table 2. Race/Ethnicity of Children Born to HIV-Positive Women in Michigan (1994-2004), as of January 1, 2006

Race/Ethnicity of HIV-Exposed Children	Missed Opportunity Births		Non-Missed Opportunity Births		Total	
	Number	Percent	Number	Percent	Number	Percent
White, Non-Hisp.	49	16%	76	19%	125	17%
Black, Non-Hisp.	235	76%	305	75%	540	76%
Hispanic	11	4%	20	5%	31	4%
Asian/Pacific Islander	1	<1%	1	<1%	2	<1%
American Indian	0	0%	3	1%	3	<1%
Unspecified/Multi-race	12	4%	2	<1%	14	2%
Total	308	100%	407	100%	715	100%

A birth is characterized as a missed opportunity if a lapse occurs in any one or more of the three arms of ZDV therapy, as described above. Table 3 shows how missed opportunity births are characterized as such according to where the lapse in therapy occurred. The majority of births fall into the group in which pregnancy, delivery, and neonatal ZDV is no/unknown/refused (34%). Sixty-nine of the 104 births in this group had “no’s” documented in each of the arms of therapy. Over a quarter (26%) of the children did receive neonatal ZDV, while their mothers did not receive pregnancy or delivery ZDV (or ZDV dosing was unknown or refused during these periods). In addition, nearly a quarter (23%) of children received neonatal ZDV and their mothers received ZDV during pregnancy, but their receipt of delivery ZDV is no/unknown/refused. This is most likely due to lack of staffing to review labor & delivery charts.

Table 3. Number of Children Born per Category of Missed Opportunity Birth (1994-2005), as of January 1, 2006[§]

Pregnancy ZDV [¶]	Delivery ZDV	Neonatal ZDV	Number (n=308)	Percent
Y	Y	7N, 2U	9	3%
Y	27N, 44U	Y	71	23%
Y	6N, 6U	5N, 7U	12	4%
23N, 3R, 2U	Y	Y	28	9%
2N, 1R	Y	1N, 2U	3	1%
41N, 3R, 37U	40N, 2R, 39U	Y	81	26%
73N, 1R, 30U	77N, 27U	79N, 25U	104	34%

[§]Shaded areas indicate no, refused, or unknown (N=number no, R=number refused, U=number unknown).

[¶]The gray boxes in the pregnancy ZDV category represent births for mothers who had prenatal care as well as mothers who did not have prenatal care. A prenatal missed opportunity is defined as a birth in which the mother did not take ZDV during pregnancy (or is unknown) AND had prenatal care. Thus, not all births represented by gray boxes in this category are prenatal missed opportunities.

Over three-quarters (76%) of missed opportunity births are to mothers who were diagnosed with HIV before or during pregnancy (Table 4). These women, then, had some contact with the health care system. When women of childbearing age test positive for HIV, health care providers should counsel women about precautions that need to be taken if she becomes pregnant. If women indicate that they plan to have children, resources need to be made available to the women to ensure they are provided appropriate care during their pregnancies.

Table 4. Timing of Mothers' Diagnosis with Respect to Pregnancy Among Missed Opportunity Births (1994-2005), as of January 1, 2006

Time Mother Diagnosed with HIV	Number	Percent
Before Pregnancy	147	48%
During Pregnancy	87	28%
At Time of Delivery	10	3%
Before Birth, Time Unknown	5	2%
After Birth	53	17%
HIV-infected, Time Unknown	6	2%
Total	308	100%

Among prenatal missed opportunity mothers, the majority (76%) initiated prenatal care in their first or second trimesters (Table 5). In addition, these mothers had an average of 7 prenatal care visits. These data likely indicate lack of compliance with Michigan's HIV testing law for pregnant women. Prenatal care visits provide an ideal opportunity to test and counsel pregnant women about HIV. As such, access to prenatal care should be improved and universal HIV testing during the prenatal period should be implemented.

Table 5. Trimester of Pregnancy Prenatal Care Began Among Prenatal Missed Opportunities (1994-2005), as of January 1, 2006

Description of Prenatal Care		
Trimester Prenatal Care Began	Number	Percent
First	41	39%
Second	39	37%
Third	18	17%
Missing	8	8%
Total	106	100%

Number of Prenatal Care Visits*

Range	1 - 24
Mean	7.0 (\pm 5.0)

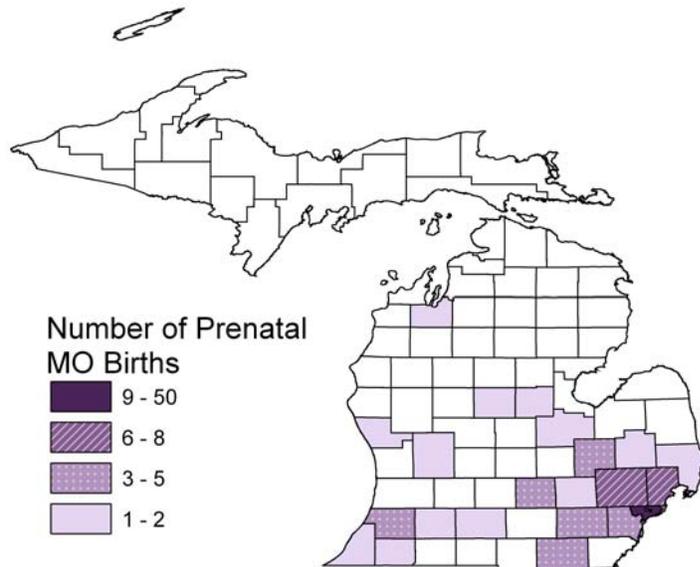
*Information on number of prenatal care visits missing for 14 births

Site of prenatal care is not collected in HARS. Thus, Table 6 shows the county of residence at birth for all prenatal care missed opportunity births compared to the county of residence at diagnosis of all women in Michigan currently living with HIV. Nearly half (47%) of the prenatal care missed opportunity births were living in Detroit. Similarly, 50% of HIV-infected women reside in Detroit. Including the Detroit residents, 68% of missed opportunity births were living in Southeast Michigan while 32% were living in out-state Michigan. Among HIV-positive women, 69% reside in Southeast Michigan and 31% reside in out-state Michigan or were diagnosed in prison.

Table 6. County of Residence at Birth Among Prenatal Missed Opportunity Births (1994-2005) and County of Residence at Diagnosis Among All HIV-Positive Women in Michigan, as of January 1, 2006

County of Residence	Baby's Residence at Birth		Residence at Diagnosis of All HIV+ Women	
	Number	Percent	Number	Percent
Allegan Co.	-	-	7	<1%
Antrim Co.	-	-	2	<1%
Barry Co.	-	-	3	<1%
Bay Co.	-	-	9	<1%
Berrien Co.	1	1%	83	3%
Branch Co.	-	-	1	<1%
Calhoun Co.	1	1%	32	1%
Cass Co.	1	1%	7	<1%
Charlevoix Co.	-	-	3	<1%
Cheboygan Co.	-	-	1	<1%
Chippewa Co.	-	-	2	<1%
Clare Co.	-	-	1	<1%
Clinton Co.	-	-	6	<1%
Delta Co.	-	-	2	<1%
Dickinson Co.	-	-	1	<1%
Eaton Co.	-	-	10	<1%
Emmet Co.	-	-	3	<1%
Genesee Co.	4	4%	95	3%
Gogebic Co.	-	-	1	<1%
Grand Traverse Co.	1	1%	7	<1%
Hillsdale Co.	-	-	3	<1%
Ingham Co.	5	5%	74	3%
Ionia Co.	-	-	1	<1%
Isabella Co.	1	1%	4	<1%
Jackson Co.	-	-	19	1%
Kalamazoo Co.	2	2%	55	2%
Kalkaska Co.	-	-	1	<1%
Kent Co.	2	2%	146	5%
Lake Co.	-	-	4	<1%
Lapeer Co.	2	2%	3	<1%
Lenawee Co.	3	3%	7	<1%
Livingston Co.	1	1%	3	<1%
Mackinac Co.	-	-	1	<1%
Macomb Co.	8	8%	72	3%
Marquette Co.	-	-	2	<1%
Mason Co.	-	-	5	<1%
Mecosta Co.	-	-	4	<1%
Midland Co.	1	1%	5	<1%
Missaukee Co.	-	-	2	<1%
Monroe Co.	-	-	6	<1%
Montcalm Co.	-	-	7	<1%

Muskegon Co.	2	2%	25	1%
Newaygo Co.	-	-	4	<1%
Oakland Co.	7	7%	195	7%
Oceana Co.	-	-	3	<1%
Ogemaw Co.	-	-	2	<1%
Ontonagon Co.	-	-	1	<1%
Osceola Co.	-	-	2	<1%
Oscoda Co.	-	-	1	<1%
Otsego Co.	-	-	4	<1%
Ottawa Co.	-	-	11	<1%
Roscommon Co.	-	-	1	<1%
Saginaw Co.	2	2%	38	1%
Sanilac Co.	-	-	2	<1%
St Clair Co.	1	1%	16	1%
St Joseph Co.	-	-	7	<1%
Van Buren Co.	3	3%	14	1%
Washtenaw Co.	3	3%	64	2%
Wayne Co., Excluding Detroit	4	4%	226	8%
Detroit	50	47%	1396	50%
Wexford Co.	-	-	3	<1%
Out of State Resident, Born in MI	1	1%	N/A	N/A
Prison	-	-	69	2%
Unknown	-	-	1	<1%
Total	106	100%	2785	100%



Tables 7a and 7b display the facilities at birth and counties of those facilities among delivery and/or neonatal missed opportunity births that occurred from 1994 through 2005. Table 7a also includes the total number of HIV exposed births that occurred at each facility between 1994 and 2004 and the total number of births in Michigan that occurred at each facility in 2004. The majority of missed opportunity births (47%) occurred at DMC Hutzel Hospital. This is proportional to total HIV exposed births that occurred at DMC Hutzel Hospital between 1994 and 2005 (43%). In terms of geography, 69% of missed opportunity births occurred in Detroit. In all, 78% occurred in Southeast Michigan and 22% in the rest of the state.

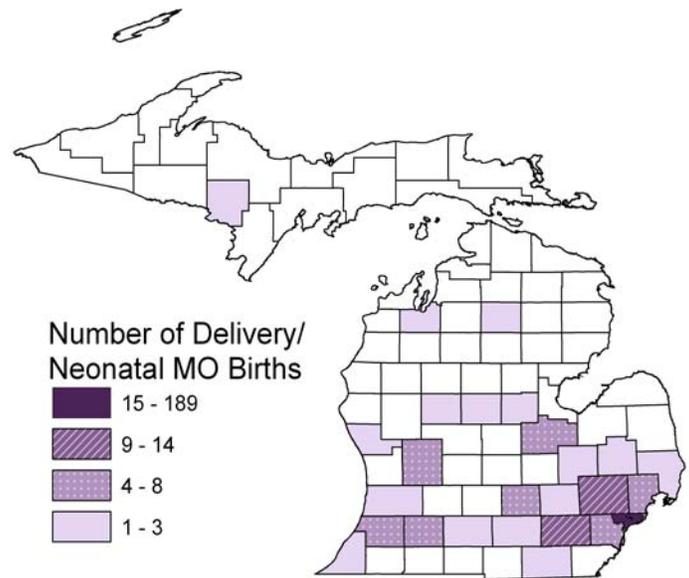
Table 7a. Facility at Birth Among Delivery and/or Neonatal Missed Opportunity Births (1994-2005), as of January 1, 2006

Facility of Birth	County of Facility	Missed Opportunity Births		Total HIV Exposed Births		Total Births in MI (2004)	
		Number	Percent	Number	Percent	Number	Percent
Allegan General Hospital	Allegan Co.	1	<1%	1	<1%	163	<1%
Battle Creek Health System	Calhoun Co.	1	<1%	9	1%	1,153	1%
Bay Medical Center	Bay Co.	-	-	1	<1%	979	1%
Beaumont Hospital	Oakland Co.	3	1%	3	<1%	6,583	5%
Bixby Medical Center	Lenawee Co.	2	1%	2	<1%	666	1%
Borgess Medical Center	Kalamazoo Co.	2	1%	8	1%	1,515	1%
Botsford General Hospital	Oakland Co.	1	<1%	1	<1%	986	1%
Bronson Methodist Hospital	Kalamazoo Co.	6	2%	19	3%	3,101	2%
Carson City Hospital	Montcalm Co.	-	-	1	<1%	330	<1%
Central MI Community Hospital	Isabella Co.	1	<1%	1	<1%	519	<1%
Covenant Health Care	Saginaw Co.	4	1%	18	3%	3,607	3%
Dickinson Co Memorial	Dickinson Co.	1	<1%	1	<1%	573	<1%
DMC Hutzel Hospital	Detroit	130	47%	306	43%	5,210	4%
DMC Sinai-Grace Hospital	Detroit	15	5%	28	4%	2,155	2%
Foote Memorial Hospital	Jackson Co.	1	<1%	7	1%	1,963	2%
Genesys Regional Medical Center	Genesee Co.	-	-	2	<1%	3,064	2%
Hackley Hospital	Muskegon Co.	2	1%	4	1%	984	1%
Henry Ford Hospital	Detroit	9	3%	22	3%	2,138	2%
Henry Ford Hospital-Wyandotte	Wayne Co.	1	<1%	1	<1%	1,555	1%
Holland Community Hospital	Ottawa Co.	-	-	1	<1%	1,841	1%
Hurley Medical Center	Genesee Co.	2	1%	23	3%	2,926	2%
Ingham Regional Medical Center	Ingham Co.	1	<1%	3	<1%	1,924	1%
Ionia Co. Memorial Hospital	Ionia Co.	-	-	1	<1%	141	<1%
Lakeland Medical Center	Berrien Co.	3	1%	21	3%	1,048	1%
Lapeer Regional Hospital	Lapeer Co.	2	1%	2	<1%	855	1%
Marquette General Hospital	Marquette Co.	-	-	3	<1%	734	1%
McLaren General Hospital	Genesee Co.	-	-	1	<1%	654	1%
Mecosta Co General Hospital	Mecosta Co.	1	<1%	2	<1%	655	1%
Mercy General Health Partners	Muskegon Co.	-	-	2	<1%	1,347	1%
Mercy Hospital-Detroit	Detroit	7	3%	14	2%	N/A	N/A
Mercy Hospital-Grayling	Crawford Co.	1	<1%	1	<1%	319	<1%
Metropolitan Hospital	Kent Co.	2	1%	5	1%	1,632	1%
Mid MI Regional Medical Center	Midland Co.	1	<1%	2	<1%	1,117	1%
Mt Clemens General Hospital	Macomb Co.	1	<1%	4	1%	1,733	1%
Munson Medical Center	Grand Traverse Co.	1	<1%	3	<1%	1,931	2%
North Oakland Medical Center	Oakland Co.	3	1%	11	2%	1,596	1%
North Ottawa Community Hospital	Ottawa Co.	-	-	1	<1%	485	<1%
Northern Michigan Hospital	Emmet Co.	-	-	1	<1%	785	1%

Oakwood Annapolis Hospital	Wayne Co.	1	<1%	1	<1%	926	1%
Oakwood Beyer Hospital	Washtenaw Co.	-	-	1	<1%	N/A	N/A
Oakwood Hospital	Wayne Co.	5	2%	6	1%	5,448	4%
Port Huron Hospital	St Clair Co.	1	<1%	1	<1%	1,564	1%
Providence Hospital	Oakland Co.	4	1%	10	1%	3,728	3%
South Haven Community Hospital	Van Buren Co.	4	1%	5	1%	326	<1%
Sparrow Hospital	Ingham Co.	3	1%	23	3%	3,762	3%
Spectrum	Kent Co.	2	1%	26	4%	8,201	6%
St John Hospital	Detroit	7	3%	22	3%	3,874	3%
St John Hospital-Detroit Riverview	Detroit	14	5%	26	4%	1,229	1%
St John Hospital-Macomb	Macomb Co.	3	1%	4	1%	1,148	1%
St John Hospital-Oakland	Oakland Co.	1	<1%	1	<1%	0	0%
St Joseph Mercy Hospital-Livingston	Livingston Co.	2	1%	2	<1%	805	1%
St Joseph Mercy Hospital-Macomb	Macomb Co.	1	<1%	1	<1%	1,558	1%
St Joseph Mercy Hospital-Oakland	Oakland Co.	2	1%	3	<1%	2,336	2%
St Joseph Mercy Hospital-Ypsilanti	Washtenaw Co.	6	2%	13	2%	4,108	3%
St. Mary's Hospital-Grand Rapids	Kent Co.	-	-	4	1%	2,431	2%
St Mary's Hospital-Livonia	Wayne Co.	1	<1%	1	<1%	1,270	1%
University Of Michigan Medical Center	Washtenaw Co.	8	3%	21	3%	3,998	3%
Unknown	St Clair Co.	1	<1%	1	<1%	N/A	N/A
Home Birth		7	3%	7	1%	857	1%
Other Facilities*		N/A	N/A	N/A	N/A	22,036	17%
Total		278	100%	715	100%	128,572	100%

Table 7b. County of Facility at Birth Among Delivery and/or Neonatal Missed Opportunity Births (1994-2005), as of January 1, 2006

County of Facility at Birth	Number	Percent
Allegan Co.	1	0%
Berrien Co.	3	1%
Calhoun Co.	1	0%
Crawford Co.	1	0%
Dickinson Co.	1	0%
Genesee Co.	2	1%
Grand Traverse Co.	1	0%
Ingham Co.	4	1%
Isabella Co.	1	0%
Jackson Co.	1	0%
Kalamazoo Co.	8	3%
Kent Co.	4	1%
Lapeer Co.	2	1%
Lenawee Co.	2	1%
Livingston Co.	2	1%
Macomb Co.	5	2%
Mecosta Co.	1	0%
Midland Co.	1	0%
Muskegon Co.	2	1%
Oakland Co.	14	5%
Saginaw Co.	4	1%
St Clair Co.	2	1%
Van Buren Co.	4	1%
Washtenaw Co.	14	5%
Wayne Co., Excluding Detroit	8	3%
Detroit	189	68%
Total	278	100%



SUMMARY

As of January 1, 2006, the Michigan Department of Community Health has received reports on 1,070 cases of births to HIV-positive mothers. In 1994, the Centers for Disease Control and Prevention issued a report indicating that zidovudine (ZDV) be given to mothers prenatally and during delivery as well as to the infant neonatally in order to reduce transmission of HIV from mother to child. Yet, since 1994, 308 missed opportunity births have occurred in Michigan. These births are characterized by a lapse in one of the three therapeutic arms, or births for which this information is unknown. Seventeen percent of missed opportunity births have since tested HIV positive compared to only 2 percent of births that were not missed opportunities.

The majority of missed opportunity births were characterized as missed opportunities because administration of ZDV was no or unknown for all three arms of therapy. Furthermore, 69 of the 308 missed opportunities since 1994 had “no’s” documented in each of the three arms.

The race/ethnicity of missed opportunity births was similar to both non-missed opportunity births and the distribution of women currently living with HIV in Michigan.

Three-quarters of missed opportunity births are to mothers diagnosed with HIV before or during pregnancy. These women must have had contact with the health care system in order to have been tested. Furthermore, 106 of the 308 missed opportunities had prenatal care and no/unknown documentation for receipt of prenatal ZDV (defined as "prenatal missed opportunities"). The majority of these women initiated their prenatal care in the first or second trimester. Women of childbearing age that test HIV positive should be counseled about what steps should be taken should they become pregnant. Prenatal care visits offer the ideal opportunity to test and counsel all women for HIV in order to avoid potential perinatal transmission.

The majority of prenatal missed opportunities were residing in Southeast Michigan at the time of birth. The distribution of residence of prenatal missed opportunities was similar to that of all currently living HIV positive women. Similarly, the majority of delivery/neonatal missed opportunities occurred in Southeast Michigan. In fact, 47% of these missed opportunity births occurred at DMC Hutzel Hospital. This is similar to the proportion of all HIV-exposed births that have occurred there since 1994 (43%).

As indicated, a birth could be included as a missed opportunity if information for any of the three arms of therapy was unknown. Some of this information could be unknown due to lack of documentation. However, this information is more likely unknown because HIV Surveillance lacks the staffing to review all of the charts for each HIV-exposed birth. Thus, HIV Surveillance has hired a student intern for the summer of 2006 to review charts to fill in potential gaps in information. The student will begin working initially at DMC Hutzel Hospital due to its large number of missed opportunity births. Once finished at Hutzel Hospital, the student may potentially relocate to other Detroit hospitals as time permits.

This report will be revised and reissued early next year, once the student's term is completed and the data have been cleaned and entered. This report will then be reissued annually in order to guide program efforts to prevent perinatal transmission.

REFERENCES

¹ Centers for Disease Control and Prevention. Recommendations of the U.S. Public Health Service Task Force on the Use of Zidovudine to Reduce Perinatal Transmission of Human Immunodeficiency Virus. MMWR 1994;43(No. RR-11).

² Centers for Disease Control and Prevention. Fact Sheet: Status of Perinatal HIV Prevention: U.S. Declines Continue. Nov 1999. <http://www.cdc.gov/hiv/pubs/facts/perinat1.pdf>.