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Background

Microcephaly, also called microcephalus, refers to a small head size compared to what is expected for the person's age and sex. The diagnosis of microcephaly is based on the measurement of head circumference. Microcephaly varies from mild to severe.

Microcephaly sometimes develops after birth. Congenital microcephaly is present before or at the time of birth. The small head size reflects less than expected brain growth and possible abnormal brain development.

Congenital microcephaly may be detected prenatally in some cases. Microcephaly may not be evident until the late 2nd or 3rd trimester of pregnancy, or at birth. Abnormal brain development may be difficult to diagnose before birth. [1,2]

MICROCEPHALY

Microcephaly may occur alone. However, people with other conditions such as spina bifida, congenital heart defects, or Down syndrome, may also have microcephaly. Individuals with microcephaly may face challenges such as cognitive impairment, cerebral palsy, seizures, and lifelong disability.

Microcephaly is reported to the Michigan Birth Defects Registry (MBDR) by hospitals and other reporting entities. This issue presents microcephaly trends for babies born in Michigan during 2000 through 2012.[1,2]

Points of Interest

- Microcephaly is a sign that brain growth and development are not normal
- A baby may be born with microcephaly or microcephaly may develop after birth
- Individuals with microcephaly may have a variety of needs that can include health, education and lifetime support

Etiology

The cause of microcephaly in most babies is unknown. Possible causes include:

- Genes/genetics
- Congenital infections
- Severe malnutrition
- Exposure to alcohol, certain drugs or toxic chemicals
- Certain maternal health conditions or medications
- Interrupted blood supply during development

Microcephaly per MBDR Reporting, 2000-2012

Occurrence

In the United States, the estimated birth prevalence of microcephaly ranges from 2 to 12 affected babies in every 10,000 live births.[3]

In Michigan, about 1,500 infants who were born in the years 2000 through 2012 were reported to the MBDR as diagnosed with microcephaly in their first year of life. The overall birth prevalence of microcephaly during this time is 9.3 cases per 10,000 live births. The trend data shows a slight decrease in prevalence for this period (Figure 1).

The prevalence rate of microcephaly reported with no other birth defect was compared with the rate of microcephaly reported with major birth defects such as spina bifida and serious heart defects, and with less severe birth defects. The rate of microcephaly reported with additional birth defects is higher than the rate of microcephaly alone (Figure 2).

Figure 1: Five year moving prevalence rate of microcephaly reported with and without additional birth defects, and total: MBDR, 2000-2012

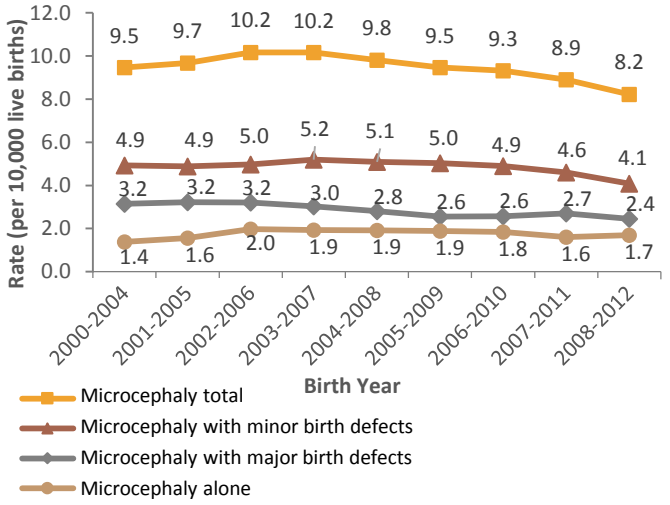
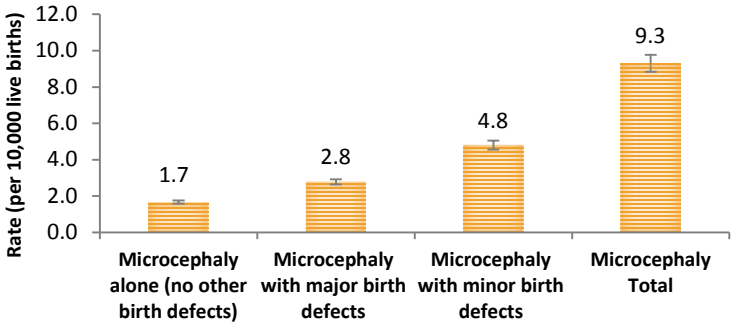


Figure 2: Prevalence rate of microcephaly alone vs. microcephaly with birth defects and total: MBDR 2000-2012



Demographics

Considering all cases reported 2000-2012 and maternal age, infants born to mothers younger than 20 years old had the highest rate of microcephaly, followed by infants born to mothers 35 years or older (10.7 and 10.1 cases per 10,000 live births, respectively). By maternal race, we found the highest rate of microcephaly among infants who were born to black mothers (12.8) compared to infants born to white mothers (8.5). Microcephaly was more prevalent in the Arab population (10.5) than in the Hispanic population (8.9). Girls were slightly more likely to be affected with microcephaly than boys, with a prevalence rate of 9.4 and 9.0 cases per 10,000 live births, respectively (Table 1).

Table 1: Prevalence rate of microcephaly stratified by selected demographic variables: MBDR, 2000-2012

Demographic	Prevalence Rate[1,2]
Maternal Age	
<20	**10.7**
20-24	**9.6**
25-29	**8.7**
30-34	**8.6**
35+	**10.1**
Maternal Race	
Whites	**8.5**
Blacks	**12.8**
Other[3]	**7.3**
Maternal Ethnicity	
Hispanic	**8.9**
Arabic	**10.5**
Sex of Infant	
Male	**9.0**
Female	**9.4**

Footnotes to Table 1.

[1]Prevalence rates are based on births to mothers living in Michigan at the time of delivery. Data are current through January 2015.

[2]Prevalence rate expressed as cases per 10,000 live births

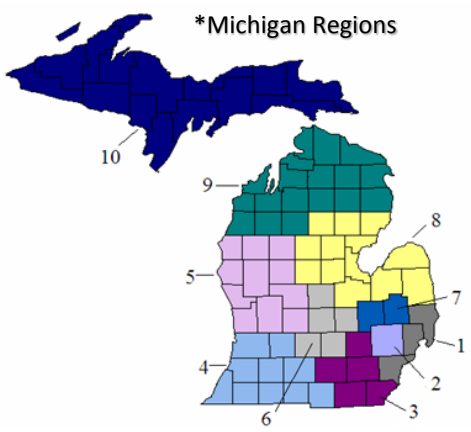
[3]Includes women who do not define themselves as Black or White and includes Native American and Asian/Pacific Islander.

Maternal Residence

Table 2 displays the prevalence of microcephaly according to mother's residence at the time of birth. As expected, MBDR reporting shows that babies are born with microcephaly throughout the state. The prevalence rate was highest in region 6 at 12.9 and lowest in region 10 with 3.0 cases per 10,000 live births (Table 2). This is a similar range as is seen nationally. The variation may be due to differences in reporting practices, clinical diagnostic practices, or other factors. A standard case definition has been approved by the National Birth Defects Prevention Network, and the Centers for Disease Control and Prevention.

Table 2: Prevalence rate of microcephaly by region of maternal residence: MBDR, 2000-2012

Region	Number of Cases	Prevalence Rate[1,2]
1	595	11.9
2	191	10.2
3	131	9.3
4	89	5.4
5	206	8.5
6	114	12.9
7	43	4.9
8	97	9.1
9	28	4.9
10	11	3.0
Total	1,505	9.3



Footnotes to Table 2.

[1]Prevalence rates are based on births to mothers living in Michigan at the time of delivery. Data are current through January 2015.

[2]Prevalence rate expressed as cases per 10,000 live births.

*Regions approximate pediatric specialty care service areas.

What does it mean?

Microcephaly is described using terms that reflect variable causes and severity.

Acquired
Microcephaly that develops *after* birth. Brain growth is slower than expected or stops too soon. This may be due to trauma, infection or certain health conditions.

Congenital
Microcephaly that is present *at* or *before* birth. This may be due to prenatal infection, genetic conditions, or other causes.

Proportionate
Microcephaly with body weight and length also below the normal range, and in proportion to head size. This may be seen with intrauterine growth restriction (IUGR) and in many genetic conditions.

Relative
When the head size is small compared to the person's own weight and length, but measures in the expected range for age and sex.

The use of a uniform case definition will mean that data are more comparable across regions.[3]

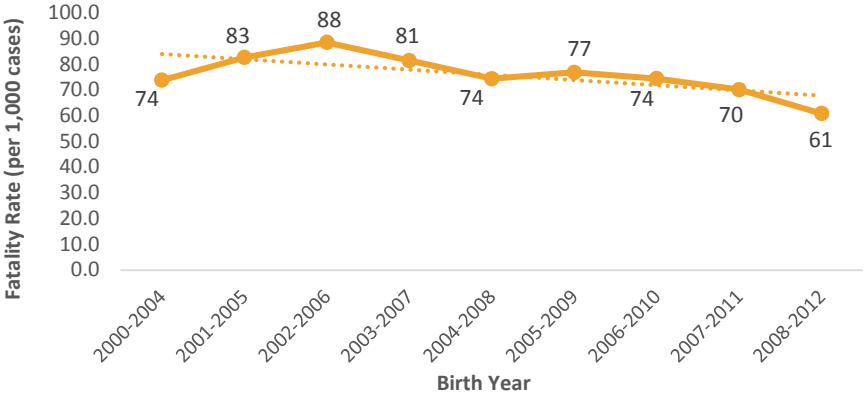
Infant Mortality and Fatality

Microcephaly is rare, but affected babies often face many health challenges. The mortality rate during these years was 0.07 deaths of babies with microcephaly per 1,000 live births (all babies).

The case fatality rate in infants with microcephaly was about 76 deaths per 1,000 infants with microcephaly. That means about one in every fourteen babies born with microcephaly died before his or her first birthday.

Figure 4 shows fatality rate trends in infants diagnosed with microcephaly in the first year of life from 2000 to 2012. Overall, the fatality rate of microcephaly decreased slightly during this time period (Figure 4).

Figure 4: Five year moving fatality rate of microcephaly: MBDR, 2000-2012



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The Michigan Monitor

The Michigan Monitor is online at:
www.michigan.gov/mchepi
MBDR reporting:
http://www.michigan.gov/mbdr

Give us your feedback!

MBDR and Enhanced Microcephaly Surveillance

MBDR is working with state, local and national partners to improve what we know about microcephaly in Michigan babies. These efforts are particularly important now due to concerns about potential Zika virus infection during pregnancy and the risk for transmission to the fetus. Congenital Zika infection is linked to microcephaly and other health problems including: seizures, vision loss, hearing loss, impaired mobility, and development. Congenital Zika infection may also cause miscarriage or stillbirth.

Beginning with babies born in 2016, MBDR is recontacting hospitals to request additional case information for microcephaly reports. We ask for your understanding and cooperation to provide this crucial information. Supplemental information collected by the MBDR will help us better understand the variability and causes of microcephaly, associated health conditions and special health, service and support needs of babies and families.

Section 2631 of the Public Health Code regulates procedures protecting confidentiality and disclosure of data provided to the MBDR. Like all MBDR case data, the confidentiality of supplemental data is protected by law and strictly maintained by the department.

Supplemental reporting documents for microcephaly can be found online at www.michigan.gov/mbdr. For further information, please contact MBDR staff.

Provider Tips

- Head circumference measurement should be plotted on charts corresponding to the infant's sex.
- Preterm infant measures should be plotted on preterm growth charts. Adjust for gestational age if using standard growth charts.

Suggested standards:
https://intergrowth21.tghn.org/

Resources for health professionals and families

- Children's Special Health Care Services (CSHCS) Program: **www.michigan.gov/cshcs**
- Early On®, Michigan's early intervention system: **www.1800earlyon.org**
- Early Hearing Detection and Intervention: **www.michigan.gov/ehdi**
- Home Visiting Programs: **www.michigan.gov/homevisiting**
- Michigan's Family to Family Information Center: **http://f2fmichigan.org**
- Centers for Disease Control and Prevention, National Center on Birth Defects and Disabilities: **www.CDC.gov/NCBDDD/birthdefects**
- National Birth Defects Prevention Network (NBDPN): **www.nbdpn.org**
- March of Dimes: **http://www.marchofdimes.org/**

References

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