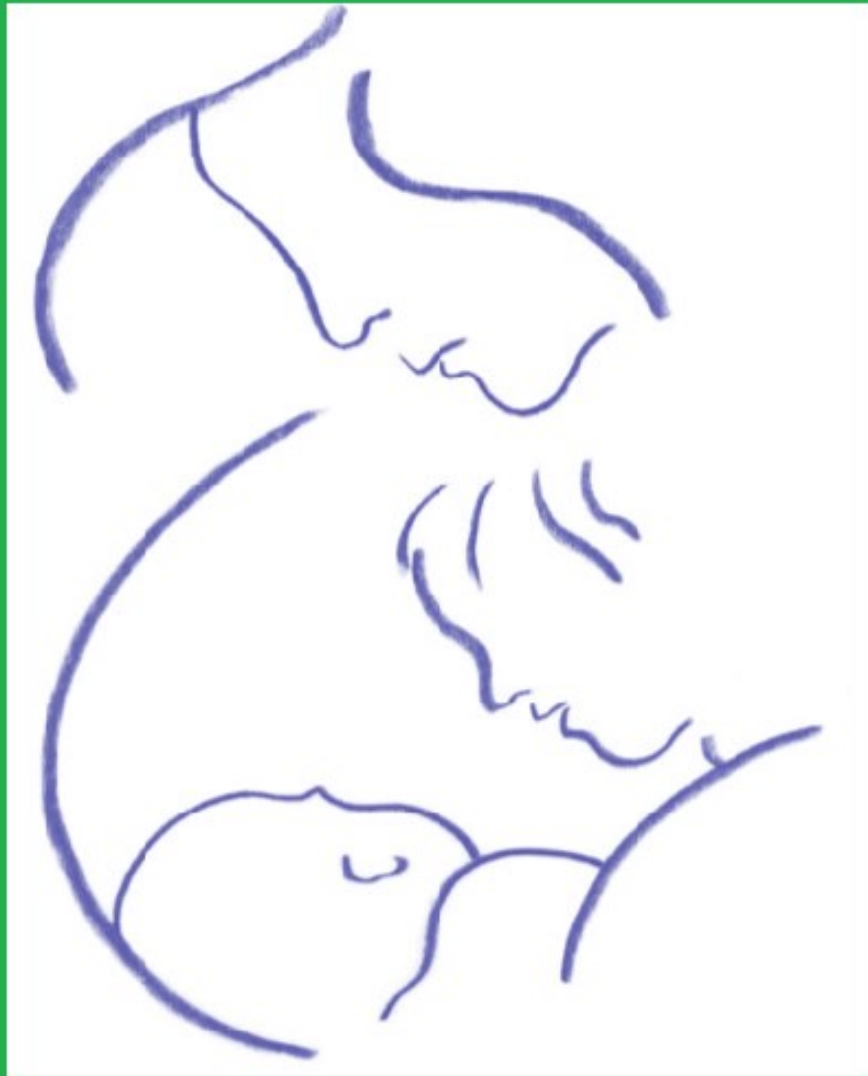


## Michigan Pregnancy & Pediatric Nutrition Surveillance



2014 Annual Report with 2008-2014 Trends



# Michigan Department of Health and Human Services WIC Program

## *Mission Statement*

The mission of the Michigan WIC program is to improve the health outcomes and quality of life for eligible women, infants, and children by providing nutritious food, nutrition education, breastfeeding promotion, and support and referrals to health and other services.

To this end:

- Delivery of services and supports are to be provided in a caring, respectful, efficient, and cost effective manner.
- Delivery of services shall be provided in a culturally competent and confidential manner.
- The WIC Program shall assure the broadest possible access to services, supports, and food.

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### Executive Summary

This report summarizes program data from the Michigan Special Supplemental Nutrition Program for Women, Infants and Children (WIC) which provides nutritional support and counseling to a large proportion of Michigan's most vulnerable residents. The Michigan Pregnancy Nutritional Surveillance System and the Pediatric Nutritional Surveillance System were used to compile this report. Pediatric data from 2014 was merged with maternal data from 2008-2014, creating a database of information that was used to analyze key maternal and pediatric health indicators. This report summarizes data from 2014 and highlights trends from 2008 through 2014.

- There were 249,940 children under the age of five years participating in WIC during 2014; of these, 55.8% were under the age of 2 years old.
- Michigan's live births went from 121,231 in 2008 to 114,399 in 2014, a 5.6% decrease (MDHHS, 2015) and maternal WIC enrollment decreased by 4.2%. Out of 65,945 total women enrolled in WIC in 2014, 4,099 (6.2%) women were prenatal and 12,731 (19.3%) were postpartum, 49,115 (74.5%) women were enrolled in WIC during their pregnancy and returned to WIC for postpartum visit.
- Enrollment of women during their 1<sup>st</sup> trimester increased by 14.4% from 2008 (31.2%) to 2014 (35.7%).
- Ideal prenatal weight gain was 25.5% in 2008 and 30.5% in 2014, a 19.6% increase.
- The incidence of low birthweight among infants enrolled in WIC increased by 9.8% from 8.2% in 2008 to 9.0% in 2014, which exceeded the Healthy People 2020 objective (8%). Low birthweight disproportionately affects Black, Non-Hispanic infants (13.1%) compared to White, Non-Hispanic infants (7.4%).
- The prevalence of breastfeeding initiation in 2014 was 63.6%, an increase of 16.3% from 2008 (54.7%).
- The prevalence of breastfeeding to 6 months was 18.5% in 2014 among WIC participants compared to 15.8% in 2008, a 17.1% increase.
- Among infants enrolled in WIC and born to mothers enrolled in WIC that initiated breastfeeding, 28.6% were breastfed to six months and 14.9% were breastfed for one year.
- The prevalence of obesity among children ages 2 to 5 years decreased by 4.3% from 14.0% in 2008 to 13.4% in 2014.
- From 2008 to 2014, the prevalence of anemia among all children 5 years and younger increased by 8.3%. In 2014, the prevalence of anemia was significantly higher among children under 2 years of age (19.6%) and among Black, Non-Hispanic children (27.6%).



### Introduction

A vital public health goal across the nation is enhancing the prosperity of mothers, infants and children. An infant's well-being is associated with a mother's health from the time of her own beginning, and the lifetime impacts of childbearing are affected by the amount of health care and self-care that mothers receive (Kotch, 2012). Numerous studies have demonstrated that implications that occur during fetal development can span across one's entire lifetime. A vast amount of neurological changes happen during the fetal period, therefore experiences during this time can significantly impact development (Thompson & Davis, 2014). Neurotoxin exposures such as lead, alcohol, and pesticides that occur during the delicate periods of early fetal development can lead to lasting deficits in brain function and structure (Buss, Entringer, Swanson, & Wadhwa, 2012). The improvement of birth outcomes and in turn reduction of infant morbidity and mortality translates to the improvement of maternal health during pregnancy. However, certain maternal behaviors have been proven to be detrimental to birth outcomes. For example, there is an association between maternal smoking and infant birthweight. Reduced fertility and ectopic pregnancy are possible outcomes of maternal smoking. Evidence suggests that maternal smoking is also associated with

an increased rate of premature birth, low birthweight and these infants are at a greater risk of death from sudden infant death syndrome (SIDS) (HHS, 2014). A universally recognized important predictor of infant mortality and morbidity is birthweight. In 2012, among babies born worldwide, approximately 15% had low birthweight (<2500 g). Infants with low birthweight are at an increased risk of childhood morbidity and mortality, as well as increased risk for cardiovascular disease and diabetes in adulthood (Barclay, 2014). Minority populations and those of lower socio-economic status are disproportionately affected by low birthweight births. For example, in Michigan, 13.2% of Black, non-Hispanics infants were born with low birthweight compared to 7.1% of White, Non-Hispanic infants in 2013 (MDHHS, 2013). Adverse birth outcomes have also been linked to poor maternal nutrition. A variety of adult chronic diseases, such as chronic kidney disease, hypertension and diabetes can increase as a result of the functional and structural changes produced by fetal undernutrition (Kotch, 2012). Additionally, women today are heavier; a more noteworthy rate of them are entering pregnancy overweight or obese, and several are putting on an excessive amount of weight throughout pregnancy (IOM, 2009).



## About WIC

The Supplemental Nutrition Program for Women Infants and Children (WIC) was established as a permanent program by Congress in 1974. It was generated in response to the acknowledgment that poverty and hunger was prevalent and that pregnant women, new mothers, infants, and children are at an increased risk if they suffer from insufficient nutrition (FRAC, 2015). WIC is under the jurisdiction of the U.S. Department of Agriculture’s (USDA)

Food and Nutrition Service (FNS). WIC provides early nutrition and health care intervention at entry point for an extensive amount of newborns

and children. Over a quarter of pregnant and postpartum women and children under 5 years of age, as well as over half of all infants in the United States partook in the program (Oliveira & Frazao, 2015).

Qualification criteria that should be met to participate in WIC are to be:

- ◆ a pregnant woman or postpartum woman, infant, or child under the age of five;
- ◆ a resident of Michigan;
- ◆ at or below 185% of the Poverty Income Guideline or participate in another

state-administered program that utilizes the same income guidelines;

- ◆ classified by a health professional as “nutritionally at risk”.

In 2013-2014, 54% of babies born in Michigan enrolled in WIC (MDHHS, 2015). In fiscal year 2014, there was an average of 8.3 million (8,258,476) WIC participants in the United States and 251,716 in Michigan (USDA, 2015). The state WIC organization is housed inside of the Bureau of Family Health Services in the Michigan Department of Health and Human Services (MDHHS). There is a statewide network of forty-eight WIC agencies who perform program efforts and data collection. In response to the need for services, these agencies are distributed throughout Michigan.

**Highlight**

The goal of WIC is to “safeguard the health of low-income women, infants and children up to age 5 who are at nutritional risk” - USDA

## PNSS and PedNSS

Program-based surveillance systems, namely, the Pregnancy Nutrition Surveillance System (PNSS) and the Pediatric Nutrition Surveillance System (PedNSS), help to monitor infant mortality, poor birth outcomes, nutritional status of pregnant and postpartum women, and newborns and children that are disadvantaged by low-income and enrolled in maternal and child health programs that are federally funded. Descriptions of maternal and child health trends, prevalence of health, and nutri-



## MI-PNSS & PedNSS Report 2008-2014

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tion and behavioral indicators can be provided by the data from the surveillance systems (CDC, 2012). Women, infants, and children currently enrolled in WIC provide the data that is collected in PNSS and PedNSS. Self-reported information such as demographics, behavioral, and health are recorded and verified by a health professional at the local WIC agencies. In addition, breastfeeding practices, clinical nutritional indicators, and anthropomorphic measurements are recorded.

A fundamental WIC program planning and evaluation data source was lost when the Centers for Disease Control and Prevention (CDC) stopped generating PNSS and PedNSS reports. 2011 was the last year that the CDC generated the PNSS & PedNSS reports nationally. In 2012, the Michigan Pregnancy & Pediatric Nutrition Surveillance Systems was implemented by including states in the Midwest Region (MWR States) (Michigan, Illinois, Indiana, Ohio, Minnesota, Wisconsin) and Hawaii. States were requested to submit their PNSS & PedNSS extracts from 2010 – 2012 during the first phase and reports similar to CDC were generated. Prevalence in 'National' column of the reports since 2012, includes the states that submitted their data extracts for processing. The MI-PNSS & PedNSS are a replica of the CDC PNSS & PedNSS system. The data is utilized for strategic planning,

execution of program needs and monitoring WIC program effectiveness. The information is additionally used in evaluation of various Block grants, Maternal and Child Health, and public health programs.

Please note that a higher occurrence of adverse outcomes may be expected when interpreting the surveillance data, as it is important to remember that the mission of WIC is to serve women, infants, and children who are among the most vulnerable populations.

Data from PNSS and PedNSS has several limitations that include loss to follow-up due to changes in participants' qualifications, relocation out of the state, or participant lack of recall. The analysis could be skewed if these limitations differ from the participants who remain in the program. There also may be noticeable fluctuations in the highlighted data from 2008 and 2009 compared to 2010-2014 as the Michigan WIC Program's eligibility system underwent a complete overhaul in 2008 – 2009. The existing Mainframe system (MTRACX) was replaced by a more robust, user friendly, and technologically advanced online eligibility system called MI-WIC. MI-WIC was implemented in phases and was completed statewide in May 2009. In addition, per USDA guidelines, major changes were implemented to Food Package rules in MI-WIC



in August of 2009. Some of these changes included, adding whole grains, breads, and cash value benefits for fresh fruits and vegetables. These changes were geared toward improving health outcomes for WIC clients.

### Linkage Methods

A SAS database was created for each year of data: 2008–2014 for PedNSS and 2008-2014 for PNSS. Depending on the outcome to be studied, several different merged datasets were created and used.

- ◆ To study the association of child outcomes (i.e. BMI, stature) and maternal characteristics, PedNSS (2014) was sorted and linked to PNSS by using Child ID (Infant ID). The merged dataset included only data from children whose mother enrolled in WIC. Each unique Child ID in PedNSS would link to one record of maternal data in PNSS.
- ◆ PedNSS 2014 was linked to PNSS 2010-2014 if the analysis focused on all children younger than 5 years old.
- ◆ PedNSS 2014 was linked to PNSS 2010-2012 if analysis focused on children 2 to 5 years old.
- ◆ If analysis were for children younger than 2 years old, then PedNSS 2014 were linked to PNSS 2013-2014.

## Demographic Characteristics

In 2014, there were 249,940 infants and children up to five years of age and 65,861 pregnant and postpartum women enrolled in Michigan's 48 local WIC agencies. There was a slight increase in women enrollees from 2008 to 2014 with a more significant increase in children enrollees. Over half (55.8%) of the children enrolled in WIC were under the age of two years. Of the mothers enrolled in 2014, 63.6% of them were between the ages of 20 to 29 years. The largest proportion of Michigan WIC clients (12.0%) were served by the Detroit Department of Health and Wellness Promotion, while the fewest (0.1%) was enrolled at the Keweenaw Bay Indian Community (Table 1).

### Highlight

From 2008 to 2014 Michigan's crude birth rate declined by 5.6% which could explain the reason maternal WIC enrollment decreased by 4.2% as trends in birth and poverty generally shape participation in WIC (Carlson, Neuberger, & Rosenbaum, 2015).



## MI-PNSS & PedNSS Report 2008-2014

**Table 1: Distribution of women, infants, and children enrolled in Michigan's WIC program during 2014 by local agency, MI-PNSS & PedNSS 2014**

Agency	Frequency	%	Agency	Frequency	%
Barry-Eaton DHD	3,524	1.1%	Kalamazoo County Health and Community Services	3,846	1.2%
Bay County HD	3,251	1.0%	Family Health Center	4,665	1.5%
Benzie-Leelanau DHD	854	0.3%	Kent County HD	23,765	7.5%
Berrien County HD	5,419	1.7%	Keweenaw Bay Indian Community	322	0.1%
Branch-Hillsdale-St. Joseph Community Health Agency	6,616	2.1%	Lapeer County HD	2,466	0.8%
Calhoun County HD	5,823	1.8%	Livingston County Department of Public Health	2,436	0.8%
Central MI District HD	6,258	2.0%	Luce-Mackinac-Alger-Schoolcraft DHD	1,050	0.3%
Chippewa County HD	1,469	0.5%	Macomb County HD	14,338	4.5%
Community Action Agency	2,831	0.9%	Marquette County HD	1,580	0.5%
Detroit DHWP	38,011	12.0%	Mid-MI Community Action Agency	2,279	0.7%
Detroit Urban League	16,305	5.2%	Mid-Michigan DHD	4,706	1.5%
Dickinson-Iron DHD	1,305	0.4%	Monroe County HD	3,926	1.2%
District Health Dept. #10	10,263	3.2%	Public Health—Muskegon County	8,397	2.7%
District Health Dept. #2	2,208	0.7%	Health Department of Northwest MI	3,658	1.2%
District Health Dept. #4	2,149	0.7%	Oakland County Health Division	19,091	6.0%
Downriver Community Services	3,831	1.2%	Public Health Delta & Menominee	1,905	0.6%
Genesee County HD	14,679	4.6%	Saginaw County Dept. of Pub Health	5,521	1.7%
Grand Traverse County HD	2,568	0.8%	Sanilac County HD	1,167	0.4%
Health Delivery, Inc.	2,841	0.9%	Shiawassee County HD	2,437	0.8%
Huron County HD	949	0.3%	St. Clair County HD	4,565	1.4%
Ingham County HD	9,503	3.0%	Tuscola County HD	1,929	0.6%
InterCare Community Health Network	16,689	5.3%	Washtenaw County Public Health	7,063	2.2%
Ionia County HD	2,197	0.7%	Wayne County HD	27,232	8.6%
Jackson County HD	6,155	1.9%	Western Upper Peninsula HD	1,759	0.6%
			Total	315,801	

MI-PNSS & PedNSS

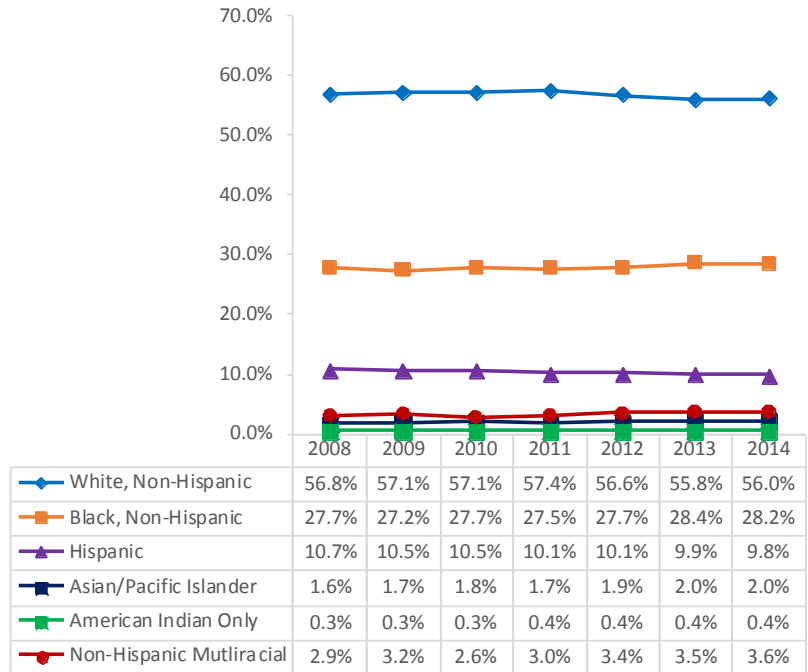
<sup>1</sup> Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup> Excludes Records with unknown data and errors



## Race and Ethnicity

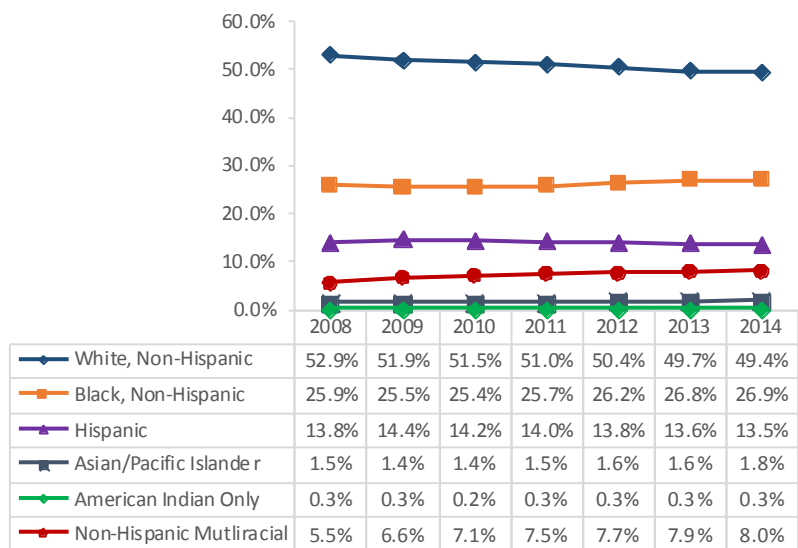
WIC participants self-identify their race and ethnicity (Figure 1). The distribution of race/ethnicity among women in 2014 is as follows: White, Non-Hispanic (56.0%), Black, Non-Hispanic (28.2%), Hispanic (9.8%), Asian/Pacific Islander (2.0%), American Indian Only (0.4%) and Multiracial, Non-Hispanic (3.6%). The proportion of Hispanic women enrolled in WIC decreased 8.4% from 2008 through 2014, while the proportion of American Indian women increased by 33.3%.

Figure 1: Race/Ethnicity of women participating in WIC, MI-PNSS 2008–2014<sup>1-2</sup>



In 2014, almost half (49.4%) of the children under 5 years of age were White, Non-Hispanic (Figure 2). The proportion of Multiracial, Non-Hispanic increased from 5.5% in 2008 to 8.0% in 2014, a 45.5% increase. There was also a 20.0% increase in Asian/ Pacific Islander children from 2008 to 2014.

Figure 2: Trend in race/ethnicity in the WIC population younger than five years of age, MI-PedNSS 2008-2014<sup>1-2</sup>



<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors frequency missing



## MI-PNSS & PedNSS Report 2008-2014

Despite the fact that the racial/ethnic distribution fluctuates by agency, White, Non-Hispanic enrollees tend to shape the larger part of participants in most agencies. The distribution of race and ethnicity for selected urban and rural agencies are listed in Table 2.

In 2014, the highest proportion of Black, Non-Hispanic participants (74.2%) were seen at The Detroit Department of Health and Wellness Promotion. Health Delivery System Inc. (88.0%) and the Detroit Urban League (84.8%) serve a predominately non-White population, while Kent County (30.6%) and InterCare Community Health Network (30.1%) enrolled the highest proportion of Hispanics.

### More about WIC

- ◆ Approximately \$6.2 billion was spent through WIC in FY 2014 (4.3 billion in food and 1.9 billion in administration) on food and other services for an average of 8.3 million participants (USDA, 2015).
- ◆ In FY 2014, Michigan ranked 8<sup>th</sup> nationally with 251,716 WIC participants. (USDA, 2015)

Table 2: Race and ethnicity distribution of WIC participants for selected urban and rural agencies, MI-PNSS & PedNSS 2014

Urban WIC Agency by Race/Ethnicity												
AGENCY	White, Non-Hispanic		Black, Non-Hispanic		Hispanic		Asian/Pacific Islander		American Indian Only		Non-Hispanic Multiracial	
	N	%	N	%	N	%	N	%	N	%	N	%
Detroit Dept. Health & Wellness Promotion	3,034	8.0%	28,180	74.2%	5,298	13.9%	649	1.7%	35	0.1%	767	2.0%
Wayne County HD	15,837	58.3%	7,238	26.6%	1,503	5.5%	965	3.6%	24	0.1%	1,592	5.9%
Kent County HD	8,245	34.7%	5,188	21.9%	7,254	30.6%	902	3.8%	25	0.1%	2,114	8.9%
Genesee County HD	6,438	43.9%	5,494	37.5%	979	6.7%	38	0.3%	6	0.0%	1,706	11.6%
Oakland County Health Division	8,990	47.1%	5,973	31.3%	2,413	12.7%	436	2.3%	12	0.1%	1,237	6.5%
Rural WIC Agency by Race/Ethnicity												
AGENCY	White, Non-Hispanic		Black, Non-Hispanic		Hispanic		Asian/Pacific Islander		American Indian Only		Non-Hispanic Multiracial	
	N	%	N	%	N	%	N	%	N	%	N	%
InterCare Community Health Network	9,930	60.1%	600	3.6%	4,969	30.1%	178	1.1%	16	0.1%	830	5.0%
District Health Department #10	8,161	79.7%	133	1.3%	1,353	13.2%	14	0.1%	16	0.2%	563	5.5%
Branch-Hillside-St. Joseph CHA	5,094	77.2%	139	2.1%	970	14.7%	7	0.1%	3	0.0%	388	5.9%
Central Michigan DHD	5,515	88.3%	82	1.3%	255	4.1%	34	0.5%	22	0.4%	339	5.4%
Health Department of Northwest MI	3,206	87.7%	27	0.7%	106	2.9%	18	0.5%	97	2.7%	196	5.4%



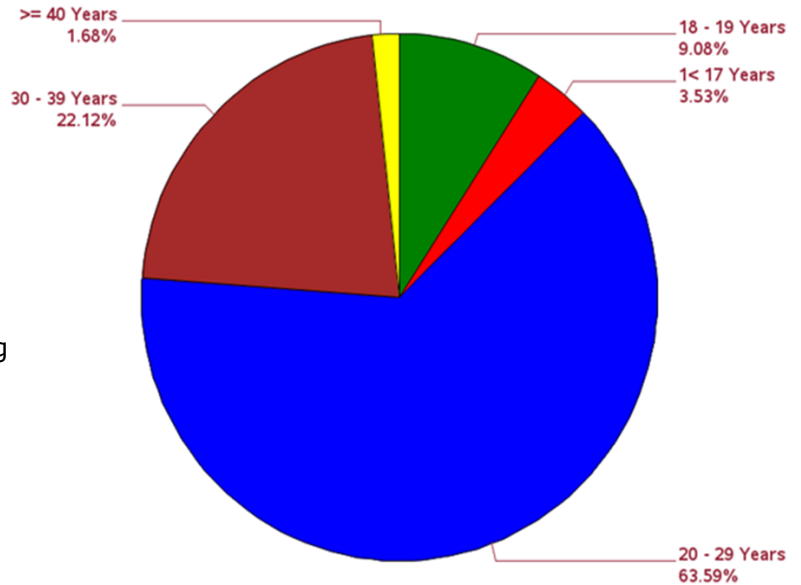


# MI-PNSS & PedNSS Report 2008-2014

## Maternal Age

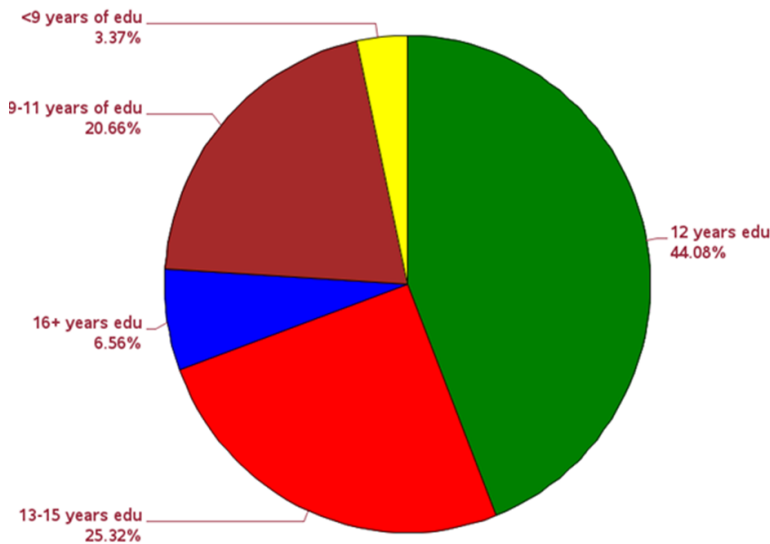
The majority of women (63.6%) enrolled in 2014 were between the ages of 20 and 29, 9.1% were 18-19 years old, 22.1% were 30-39 years old, 1.7% were over the age of 40 years and 0.2% were under the age of 15 years old (Figure 3). In 2013, over half of Michigan live births (54.1%) were to women ages 20 to 29 years old (MDHHS, 2013). There is an unmistakable pattern of increasing maternal age in WIC mothers over years. From 2008 to 2014, the youngest age group (<15) decreased by 50% and 15 to 17 years old decreased by 48.5%. Whereas, older women between the ages of 30 to 39 increased by 20.8%.

Figure 3: Distribution by maternal age, MI-PNSS 2014<sup>1-2</sup>



## Maternal Education

Figure 4: Years of education attained by women enrolled in Michigan WIC, MI-PNSS 2014<sup>1-2</sup>



The distribution of education attained by mothers enrolled in WIC shows a steady trend of higher education among women (Figure 4). Women enrollees with some college education increased from 17.9% in 2008 to 25.3% in 2014, an increase of 41.3%. Mothers with 16 plus years of higher education saw a 34.7% increase. On the contrary, enrollees with less than 9 years of education decreased from 8.1% in 2008 to 3.4% in 2014 and those with some high school education decreased from 25.1% to 20.7%.

<sup>1</sup> Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup> Excludes records with unknown data and errors



## Maternal Health and Behavior Indicators

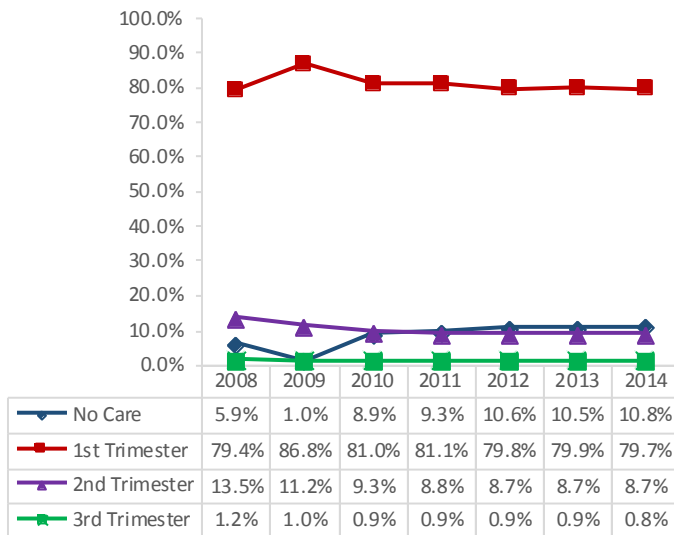
### Prenatal Care Enrollment

Early and consistent prenatal care is emphasized by many studies as a beneficial strategy to enhance the well-being of at-risk women on birth outcomes. Prenatal care aims to promote maternal and fetal health, monitor risk factors, and treat complications early (Soures, Silveira, & Rosa, 2014). Each year, approximately one million women in the United States do not receive sufficient prenatal care (HRSA, n.d.). Infants born to mothers who did not receive prenatal care are three times more likely to be born at low birth-

weight. In addition, infant mortality is five times greater for infants born to mothers who received no prenatal care compared to those who did in their first trimester (HRSA, n.d.).

Although women can enter into prenatal care at various times during their pregnancy, doing so within the first trimester is ideal. In 2013, 73.1% of Michigan live births were mothers whom received prenatal care in their first trimester (MDHHS, 2013). At WIC enrollment, 79.7% of Michigan mothers entered prenatal care during their 1<sup>st</sup> trimester of pregnancy, similar to 80.1% of women enrolled in MWR states and Hawaii (PNSS) in 2014 (Figure 5). The Healthy People 2020 goal for women to enroll in prenatal care during their first trimester is 77.9% (USHHS, 2010).

Figure 5: Trend of prevalence of prenatal care by trimester of entry among women enrolled in WIC\*, MI-PNSS 2008-2014<sup>1-2</sup>



Please note that, as recorded in PNSS, prenatal care refers to self-reported or from a medical record of a prenatal visit to a doctor or a certified nurse midwife. Also, the results reflect responses to prenatal care at the time of WIC enrollment. Some misclassification can occur for women who enter WIC prior to receiving prenatal care as receiving no prenatal care.

<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors \* No Care= No prenatal care at time of WIC enrollment



## MI-PNSS & PedNSS Report 2008-2014

Generally, the rate of WIC mothers entering prenatal care in their first trimester expanded with age. In 2014, young mothers (<15) were at the greatest risk of not receiving prenatal care (17.2%) and less likely to enroll early (37.6%). Asian/Pacific Islander participants had the highest proportion (82.8%) of women entering prenatal care in the first trimester followed by White, Non-Hispanic participants (81.3%) (Figure 6). There is also a correlation between early enrollment in prenatal care and higher education, however, the higher the education level, the greater the probability of the mother receiving prenatal care (IOM, 1988).

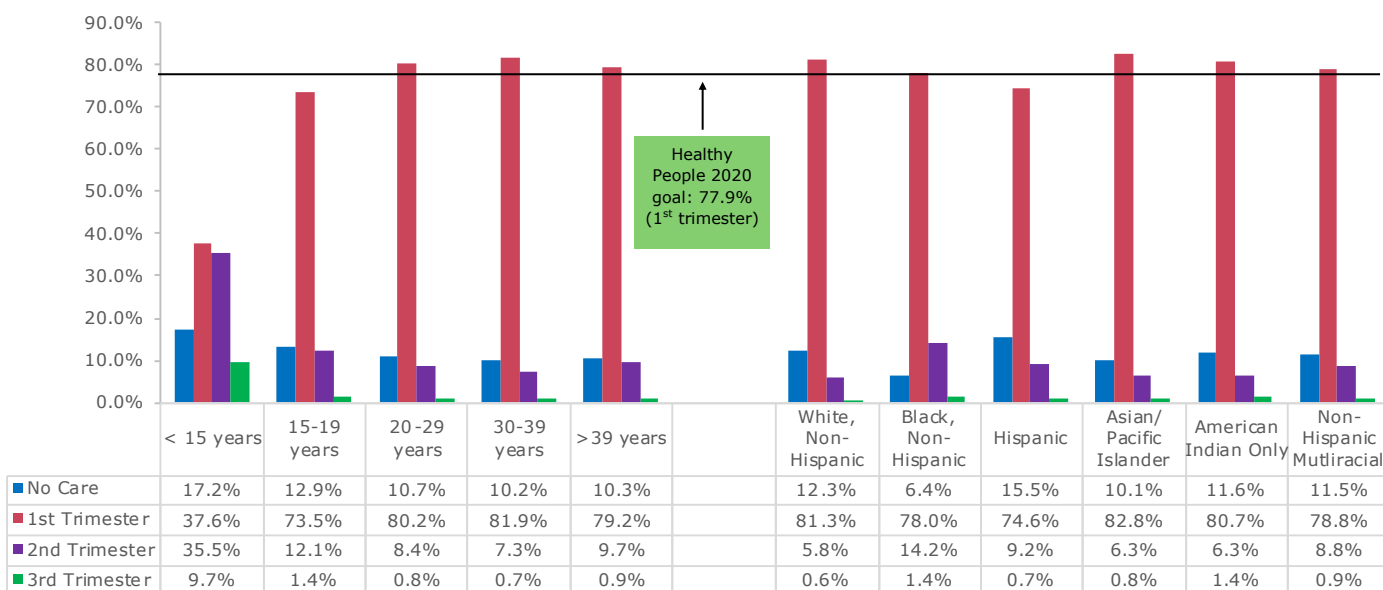
Early enrollment into prenatal care also varied by agency, as seen in Table 3. In 2014, the Jackson County Health Department reported the highest proportion of first trimester

prenatal care enrollment (90.0%) followed by Downriver Community Services with 89.2%. Conversely, the Saginaw County Department of Public Health reported the lowest prevalence of 1<sup>st</sup> trimester prenatal care enrollment with 59.8%.

Table 3: Prevalence of 1<sup>st</sup> trimester prenatal care enrollment among women enrolled in WIC by local agency, MI-PNSS 2014<sup>1-2</sup>

Highest Prevalence of 1st trimester PNC	
Agency	%
Jackson County HD	90%
Downriver Community Services	89.2%
Keweenaw Bay Indian Community	89.1%
Barry-Eaton DHD	88.9%
Wayne County HD	88.3%
Lowest Prevalence of 1st trimester PNC	
Agency	%
Benzie-Leelanau DHD	64.9%
Tuscola County HD	63.3%
St. Clair County HD	63.2%
Grand Traverse County HD	63%
Saginaw Co Dept. of Pub Health	59.8%

Figure 6: Prevalence of trimester of prenatal care enrollment by race/ethnicity or age among women enrolled in WIC\*, MI-PNSS 2014<sup>1-2</sup>

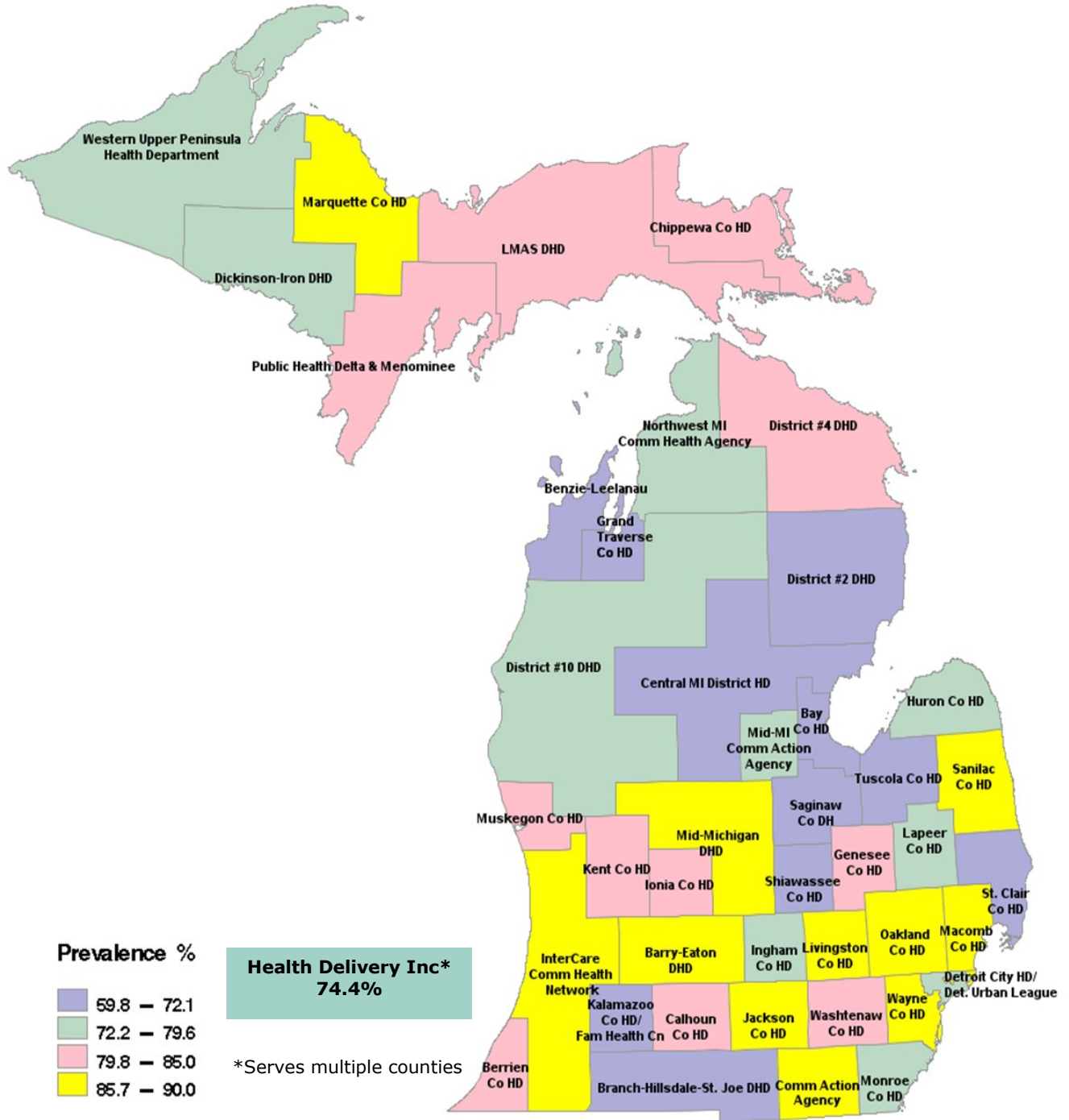


<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors \* No Care = No prenatal care at time of WIC enrollment



# MI-PNSS & PedNSS Report 2008-2014

## Figure 7: Prevalence of 1<sup>st</sup> trimester entry into prenatal care by local agency, MI-PNSS 2014





**WIC Enrollment**

The evidence of WIC effectiveness has been studied for many years. Research has shown that prenatal WIC participation helps improve birth outcomes. Higher birthweights, fewer premature births, and longer gestations especially for at-risk women are just a few of the benefits associated with participation in WIC during pregnancy (Carlson & Neuberger, 2015). In 2014, approximately 65.4% of Michigan WIC mothers enrolled during their first or second trimester compared to 52.2% of mothers enrolled in MWR states and Hawaii (PNSS). The proportion of first trimester enrollment into WIC increased from 31.2% in 2008 to 35.7% in 2014, a 14.4% increase (Figure 8, next page).

Trimester of WIC enrollment by maternal age and race/ethnicity among women is depicted in Figure 9. Young mothers (<15 years) were less likely to enter WIC during their first trimester (28.3%), however, the majority (83.8%) joined before giving birth. American Indian women had the highest prevalence (46.3%) of first trimester enrollment. On the contrary, 26.2% of Black, Non-Hispanic women enrolled during their first trimester.

Michigan’s WIC program established a five-year plan for six health outcome indicators that started January 2009. One objective was to increase first trimester entry into the WIC program to 35.0% by December 2013.

Thirty-six agencies exceeded this goal in 2014. Luce-Mackinac-Alger-Schoolcraft District Health Department had the highest prevalence of first trimester enrollment (59.1%), while Oakland County Health Division had the lowest (25.2%) (Table 4).

**MICHIGAN WIC FIVE YEAR PLAN**

Increase 1<sup>st</sup> trimester entry into WIC to 35.0% in 2013.

*36 Local Agencies exceeded this goal*

- ◆ Luce-Mackinac-Alger-Schoolcraft District Health Department had the highest prevalence of 1<sup>st</sup> trimester WIC enrollment (59.1%) (Table 4).
- ◆ 46.3% of American Indian and 42.3% of Hispanic women entered WIC during their 1<sup>st</sup> trimester (Figure 9).

Table 4: Prevalence of 1<sup>st</sup> trimester WIC enrollment among women enrolled in WIC by local agency, MI-PNSS 2014<sup>1-2</sup>

<b>Highest Prevalence of 1st trimester Entry</b>	
<b>Agency</b>	<b>%</b>
Luce-Mackinac-Alger-Schoolcraft DHD	59.1%
Chippewa County HD	57.8%
Keweenaw Bay Indian Community	53.8%
Public Health—Muskegon County	49.8%
Public Health Delta-Menominee	49.5%
<b>Lowest Prevalence of 1st trimester Entry</b>	
<b>Agency</b>	<b>%</b>
Wayne County HD	27.3%
Downriver Community Services	27.2%
Genesee County HD	26.9%
Detroit DHWP/Detroit Urban League	26.4%
Oakland County Health Division	25.2%

<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors



# MI-PNSS & PedNSS Report 2008-2014

Figure 8: Trend of trimester of WIC enrollment prevalence among women enrolled in WIC, MI-PNSS 2008-2014<sup>1-2</sup>

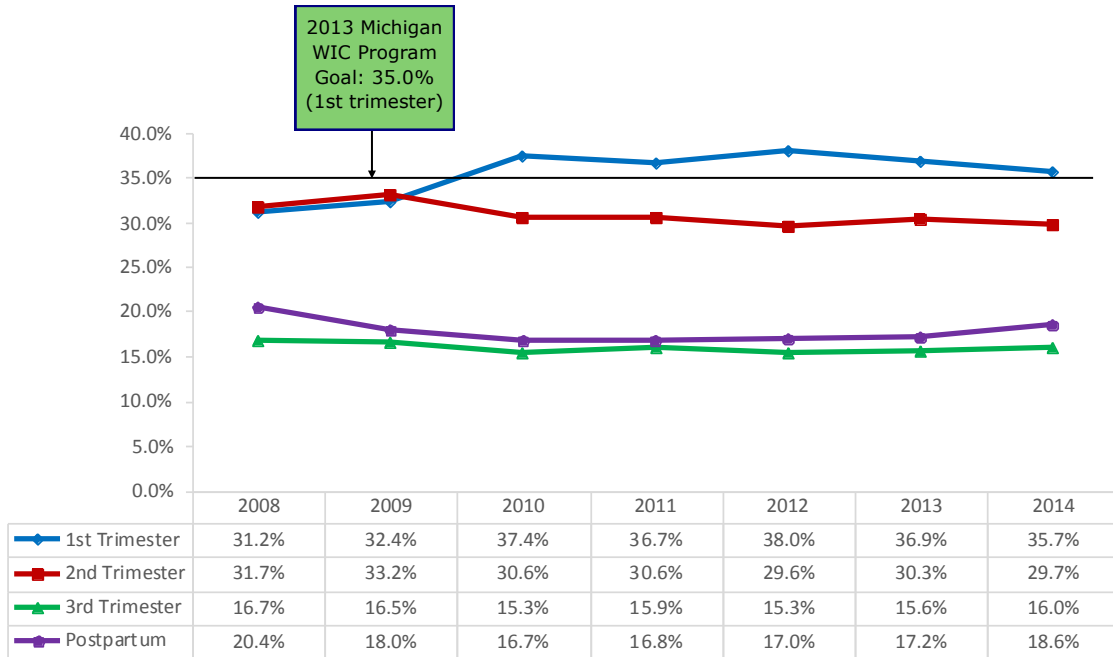
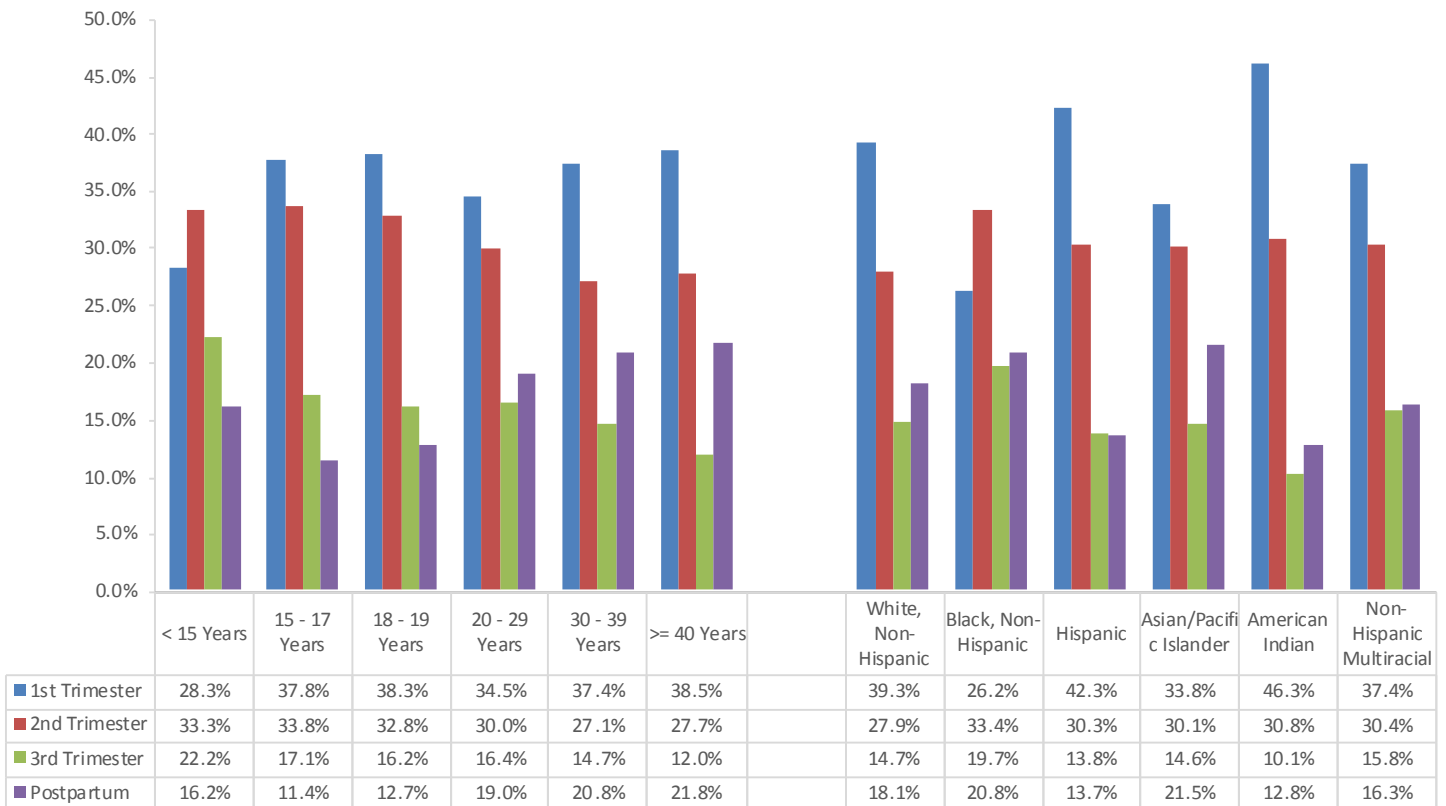


Figure 9: Prevalence of trimester of WIC enrollment by maternal age or race/ethnicity among women enrolled in WIC, MI-PNSS 2014<sup>1-2</sup>

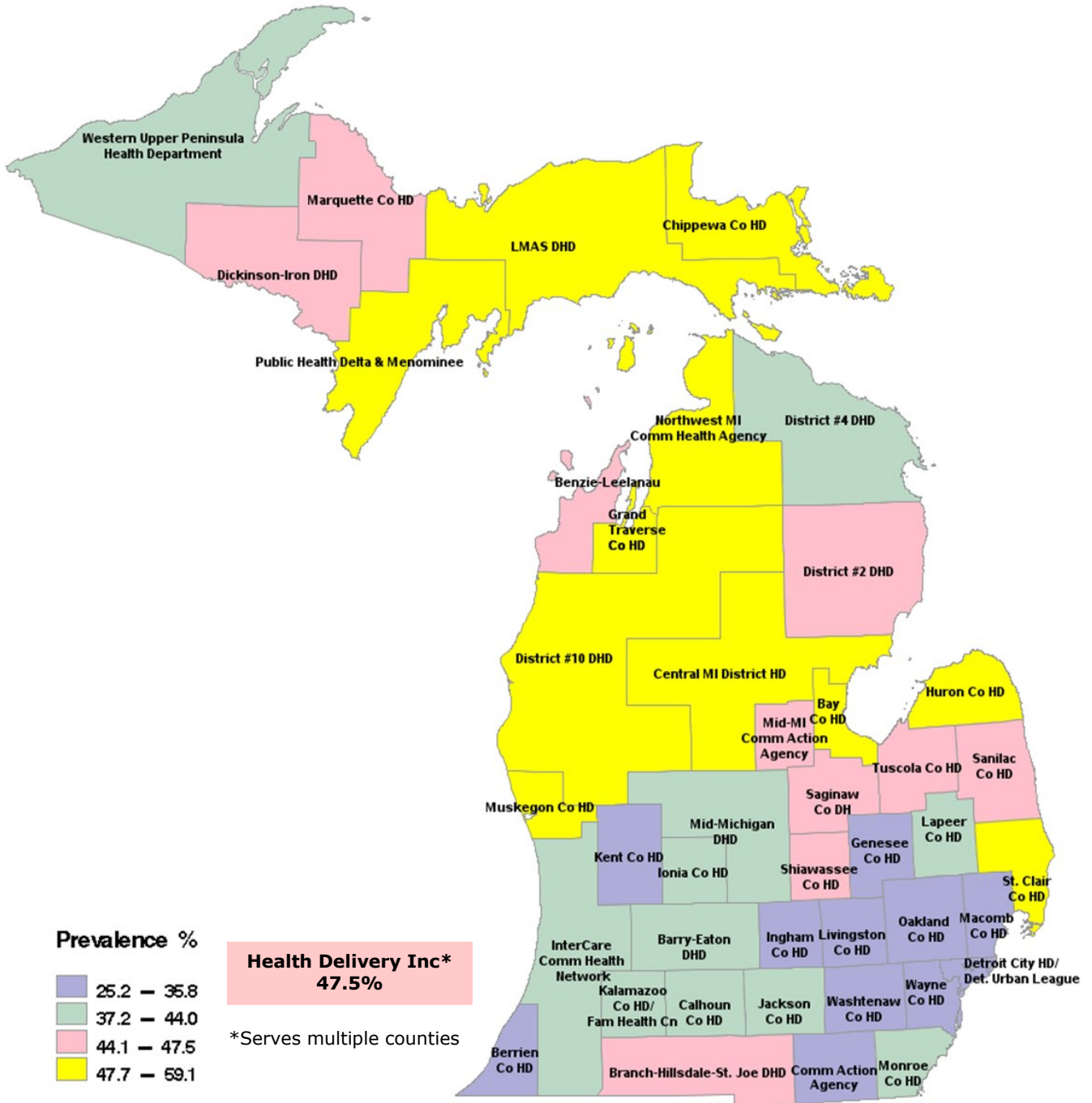


<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors



# MI-PNSS & PedNSS Report 2008-2014

**Figure 10: Prevalence of 1<sup>st</sup> trimester enrollment in WIC by local agency, MI-PNSS 2014**



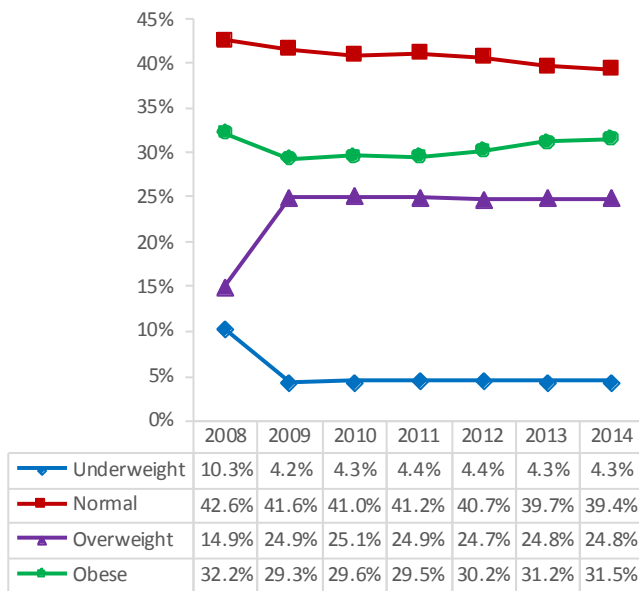


## MI-PNSS & PedNSS Report 2008-2014

### Maternal Pre-Pregnancy Body Mass Index

The prevalence of overweight and obese women of reproductive age has dramatically increased and has become a major public health concern (Vinturache, Moledina, McDonald, Slater, & Tough, 2014). Fetal and maternal complications, such as gestational diabetes, still-birth, fetal growth abnormalities and complicated labor have been associated with high pre-pregnancy BMI. On the contrary, low pre-pregnancy BMI is associated with a higher risk of a pre-term birth (Nohr, et al., 2008).

Figure 11: Trend of maternal pre-pregnancy BMI prevalence among women enrolled in WIC, MI-PNSS 2008-2014<sup>1-3</sup>



<sup>1</sup>Recording period is January 1st through December 31st <sup>2</sup>Excludes records with unknown data and errors <sup>3</sup>Based on 1990 IOM report, "Nutrition During Pregnancy" and 2009 IOM report "Weight Gain During Pregnancy: Reexamining the Guidelines"

Table 5: Weight classification based on pre-pregnancy BMI (IOM 1990)

Pre-pregnancy weight	BMI
Underweight	<19.8
Normal weight	19.8 – 26.0
Overweight	>26.0 – 29.0
Obese	>29.0

Table 6: New Recommendations for Weight classification based on pre-pregnancy BMI (IOM 2009)

Pre-pregnancy weight	BMI
Underweight	<18.5
Normal weight	18.5 – 24.9
Overweight	>25.0 – 29.9
Obese (includes all classes)	≥30.0

The weight for height measurement taken before pregnancy is pre-pregnancy body mass index. For year 2008, women were classified as underweight, normal weight, overweight or obese using the 1990 Institute of Medicine's guideline (Table 5). In 2009, the Institute of Medicine (IOM) released new maternal weight gain guidelines (Table 6). For year 2009-2014, women were classified using the new guideline. That explains the dramatic changes from 2008 to 2009 in Figure 11. Based on the new guideline, over half of Michigan mothers enrolled in WIC (56.3%) (Figure 11) were overweight or obese in 2014 which was consistent with the prevalence of women enrolled in MWR states and Hawaii (56.7%) (PNSS).





## MI-PNSS & PedNSS Report 2008-2014

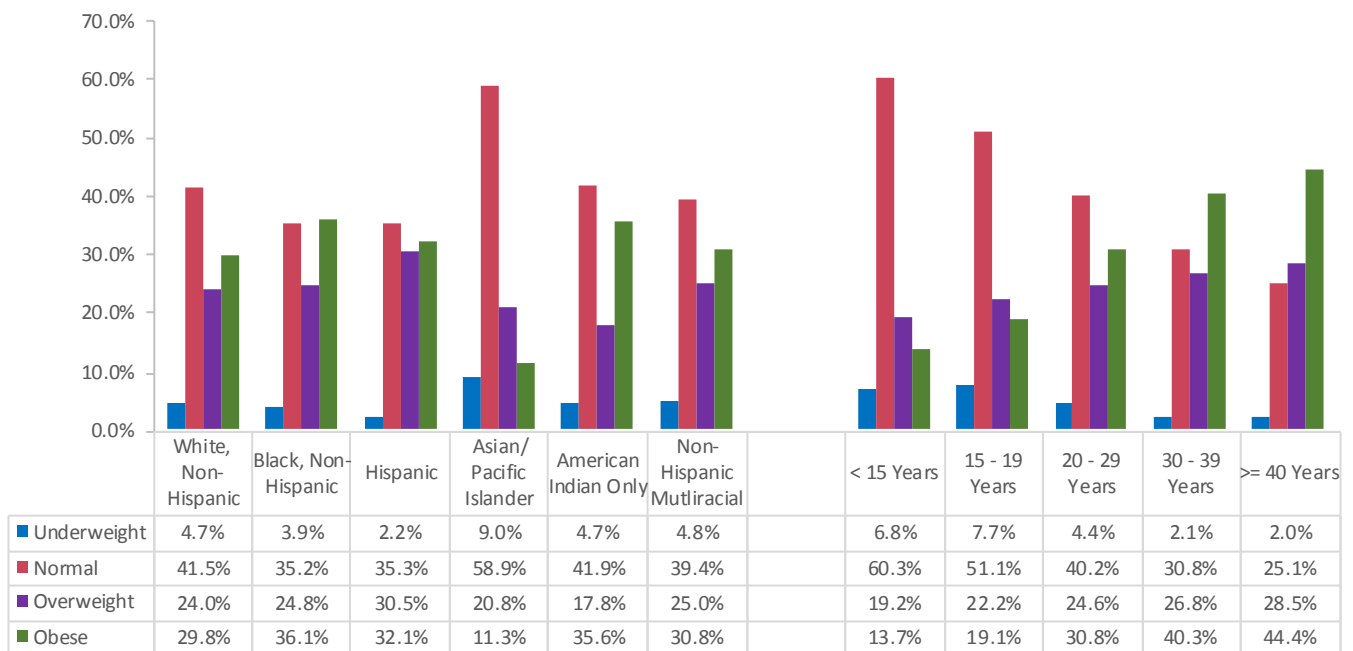
Nearly one-third of the women enrolled in Michigan’s WIC program in 2014 were classified as obese, while the prevalence of obesity increased by 7.5% from 29.3% in 2009 to 31.5% in 2014. Only 39.4% of the women were normal weight prior to pregnancy, a decrease of 5.3% from 2009.

The prevalence of prenatal BMI differed by age and race/ethnicity (Figure 12). Older women were more apt to be obese; 40.3% of 30 – 39 year olds and 44.4% of women 40 years old and older were obese. The highest prevalence of obesity was found among Black, Non-Hispanic (36.1%) and American Indian women

(35.6%), while the lowest prevalence of obesity was among Asian/Pacific Islander women (11.3%).

In 2014, the agencies with the highest prevalence of pre-pregnancy underweight were Shiawassee County Health Department, Grand Traverse County Health Department and Lapeer County Health Department, 6.5%, 6.4% and 6.3% respectively. On the contrary, Health Delivery, Inc (66.8%) and Detroit Urban League (62.0%) had the highest percentage of women who had pre-pregnancy overweight or obesity.

Figure 12: Prevalence of maternal pre-pregnancy BMI by race/ethnicity or age among women enrolled in WIC, MI-PNSS 2014<sup>1-3</sup>



<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors <sup>3</sup>Based on 2009 IOM report “Weight Gain During Pregnancy: Reexamining the Guidelines”.



# MI-PNSS & PedNSS Report 2008-2014

## Maternal Weight Gain

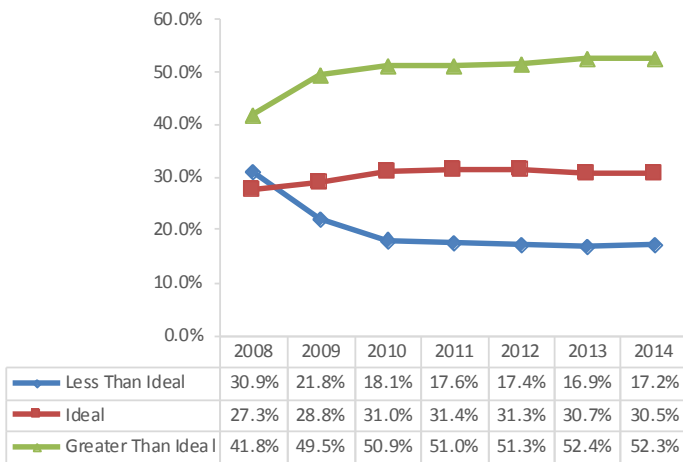
Maternal weight gain is considered an important determinant of infant mortality and morbidity, and is based on pre-pregnancy weight status (CDC, 2011). The Institute of Medicine (IOM) has recommendations for ideal maternal weight gain as there are health risks associated with weight gain less than and exceeding the recommendations. For example, excessive gestational weight gain is a risk factor for macrosomia, post-partum weight retention, maternal obesity, and childhood obesity, while inadequate gestational weight gain is associated with low birthweight (Deputy, Sharma, & Kim, 2015).

Table 7: Maternal weight gain categories based on the 2009 IOM recommendations (IOM, 2009)

Weight	Pre-pregnancy BMI	Total Weight Gain (lbs)	Rates of Weight Gain 2 <sup>nd</sup> and 3 <sup>rd</sup> Trimester (lbs/week)
Underweight	<18.5	28 – 40	1 (1 – 1.3)
Normal weight	18.5 – 24.9	25 – 35	1 (0.8 – 1)
Overweight	>25.0 – 29.9	15 – 25	0.6 (0.5 – 0.7)
Obese (includes all classes)	≥30.0	11 – 20	0.5 (0.4 – 0.6)

Monitoring a potentially modifiable risk factor, such as gestational weight gain, may prevent adverse consequences for the mother and child, and help achieve an ideal birthweight (Chihara, et al., 2014). When discussing maternal weight gain it is important to also include pre-pregnancy BMI, since some women classified as overweight or obese gain less during pregnancy.

Figure 13: Trend of pregnancy weight gain prevalence among women enrolled in WIC, MI-PNSS 2008-2014<sup>1-3</sup>



Because the data trends involve recommendations based on 1990 IOM report and the 2009 IOM report, the years which apply to each will be interpreted separately. From 2009 to 2014, the prevalence of ideal gestational weight gain among women enrolled in Michigan WIC changed little. There was a slight increase in women who gained more than the ideal weight during their pregnancy, 49.5% in 2009 and 52.3% in 2014, a 5.6% increase. Women who gained less than ideal weight during their pregnancy decreased from 21.8% in 2009 to 17.2% in 2014 (Figure 13).

<sup>1</sup> Recording Period January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup> Excluded records with unknown data or errors <sup>3</sup> Based on 1990 IOM report "Nutrition during pregnancy" and 2009 IOM report "Weight Gain During Pregnancy: Reexamining the Guidelines".



## MI-PNSS & PedNSS Report 2008-2014

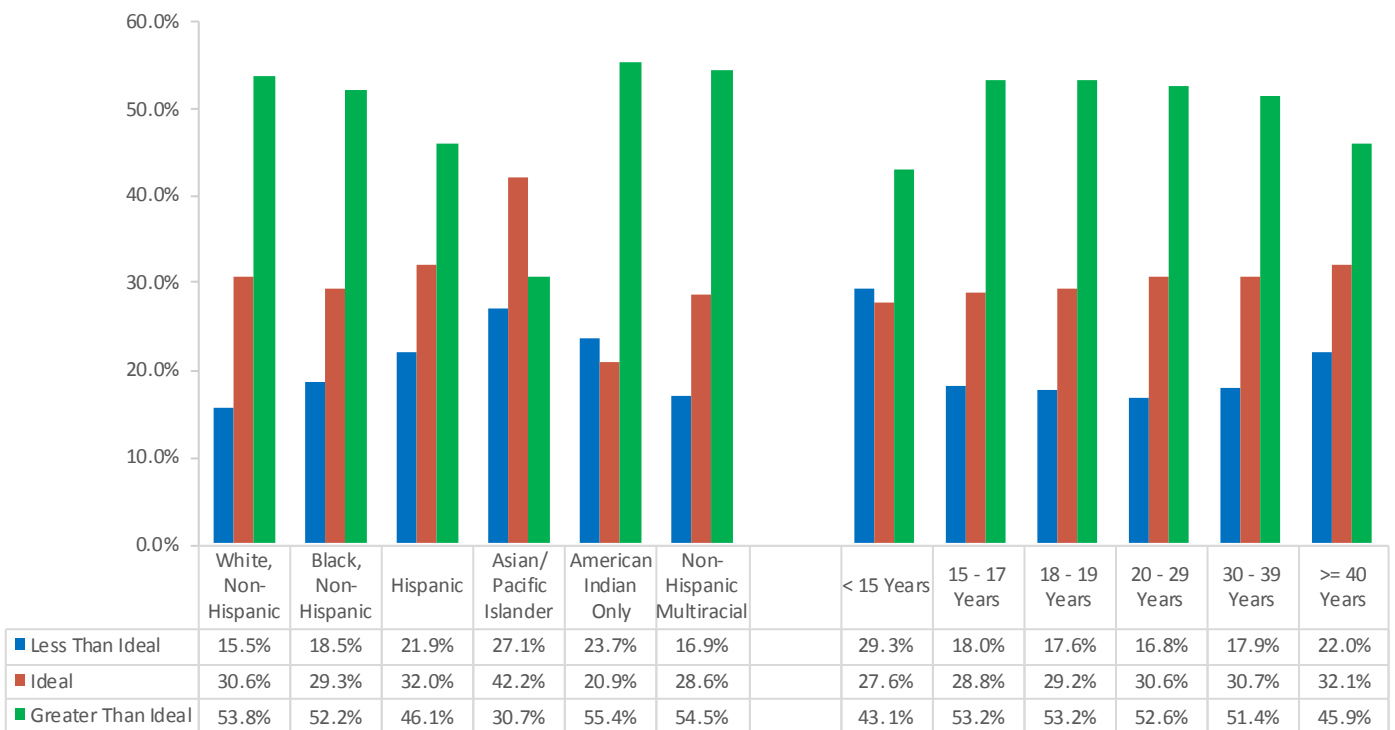
In 2014, a good portion of the women (69.5%) gained either less than ideal or greater than ideal weight during their pregnancy. From 2008 to 2009, there was a 20.7% decrease in the prevalence of women who gained too little weight during their pregnancy.

Asian/Pacific Islander women (27.1%) and mothers less than 15 years old (29.3%) gained less than the recommended amount of gestational weight compared to other age and racial/ethnic groups (Figure 14). American Indian women (55.4%) and mothers between the ages of 15 to

19 years old (53.2%) had the highest prevalence of weight gain above the 2009 IOM recommendations.

In 2014, Public Health Delta & Menominee reported the lowest (11.7%) prevalence of inadequate weight gain followed by Livingston County Department of Public Health (12.9%) whereas Health Delivery Inc. reported the highest (27.1%) (Figure 15). The highest prevalence of excessive weight gain (57.7%) was reported by Public Health Delta-Menominee.

Figure 14: Prevalence of pregnancy weight gain by race/ethnicity or age among women enrolled in WIC, MI-PNSS 2014<sup>1-3</sup>

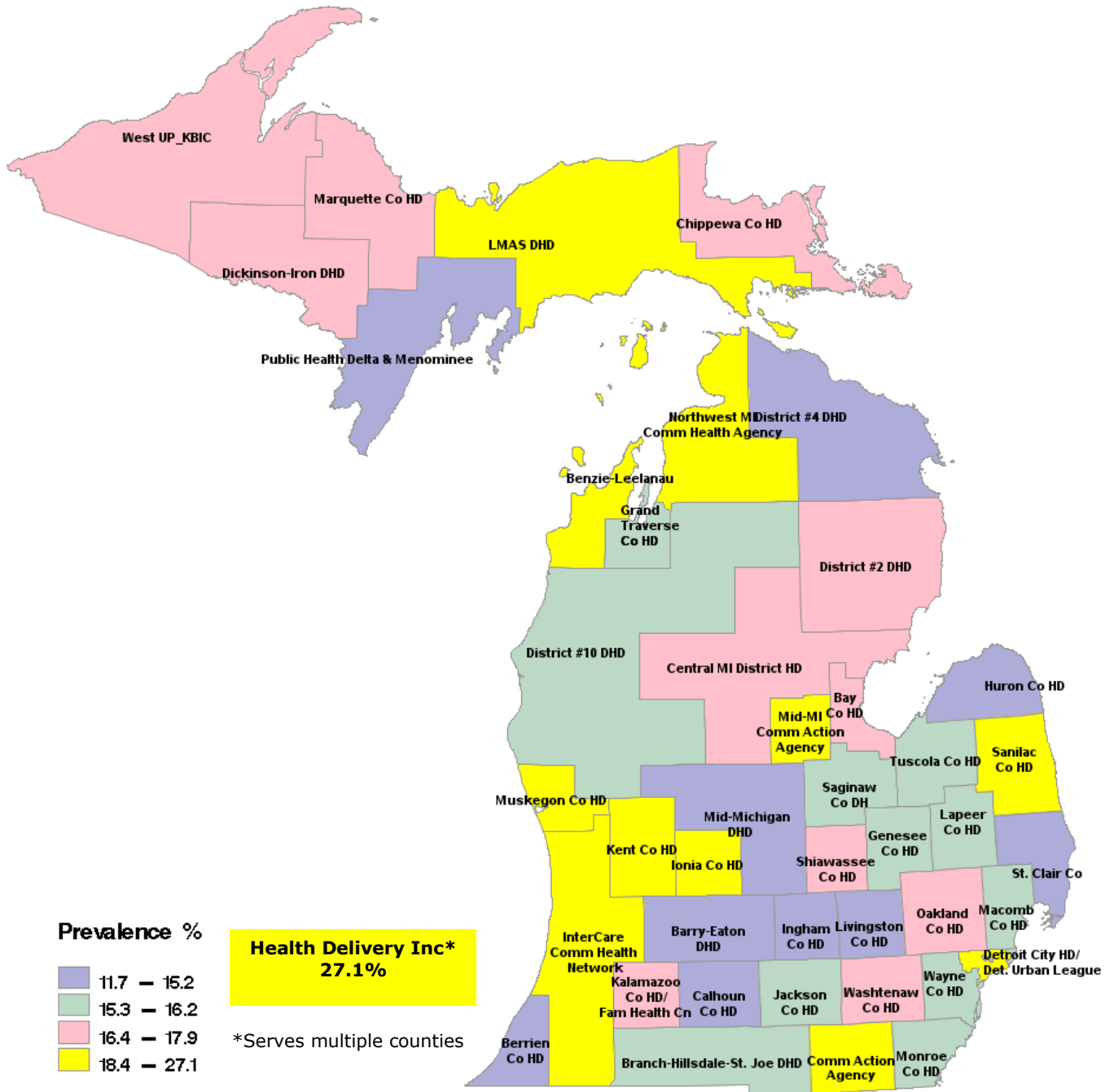


<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors <sup>3</sup>Based on 2009 IOM report "Weight Gain During Pregnancy: Reexamining the Guidelines".



# MI-PNSS & PedNSS Report 2008-2014

## Figure 15: Prevalence of less than ideal pregnancy weight gain by local agency, MI-PNSS 2014



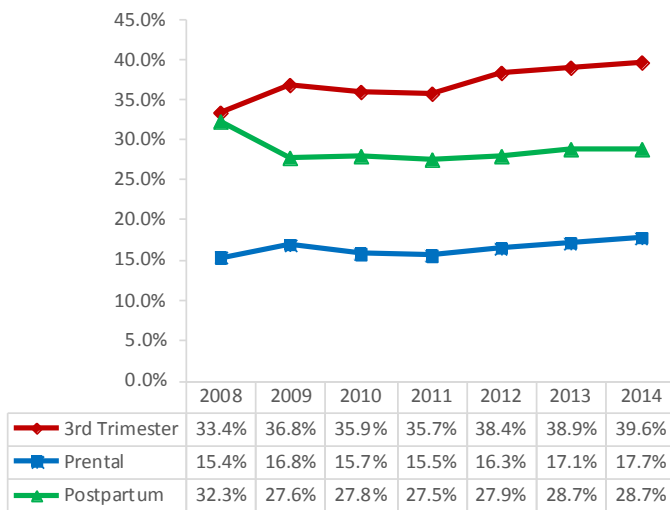


**Maternal Anemia**

Across the nation, mothers and infants with anemia and iron deficiency remain at epidemic levels. The prevalence of anemia, defined as a decreased level of hemoglobin in the blood, is highest among pregnant women, infants, and young children (ACCESS, 2006). Anemia during pregnancy is most commonly caused by iron deficiency (95% of the cases). Adequate intake of iron is important during pregnancy.

During the first and second trimester, there is an increase in the mother’s blood volume, as well as the manufacturing of blood cells by the infant, that in turn require sufficient iron levels or puts the mother at risk for anemia (Health, 2005). Many studies have shown that there is a higher prevalence of anemia that occurs during the third trimester of pregnancy. At the same time, an increased incidence of anemia in the infant during the first year of life is associated with maternal iron deficiency anemia, as well as low birthweight (Health, 2005).

Figure 16: Trend of maternal anemia prevalence among women enrolled in WIC, MI-PNSS 2008-2014<sup>1-3</sup>



<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors <sup>3</sup>Based on 1998 CDC MMWR, "Recommendations to Prevent and Control Iron Deficiency in the United States", altitude adjusted.

When a woman enrolls in WIC, her hemoglobin level or hematocrit is measured. To determine if she is anemic, trimester and age-specific cut-offs are used. These measurements reflect the health status of the women at the time of enrollment.

Among Michigan WIC enrollees, the prevalence of anemia during the third trimester was 39.6%, a 18.6% increase from 2008 (Figure 16). In 2014, the prevalence of third trimester anemia among Midwest region states and Hawaii was 26.6% (PNSS). The prevalence of anemia in 2014 among Michigan mothers was lower for women who enrolled prior to giving birth (17.7%).



## MI-PNSS & PedNSS Report 2008-2014

Figure 17: Prevalence of anemia by trimester by race/ethnicity or age among women enrolled in WIC, MI-PNSS 2014<sup>1-3</sup>



<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors <sup>3</sup>— Data insufficient for analysis

The prevalence of anemia during the third trimester exceeds the Healthy People 2020 goal of 14.5% for all age groups, as well as racial/ethnic groups with the exception of American Indian women (Figure 17). In 2014, over half of all Black, Non-Hispanic women (54.7%) who enrolled during their 3<sup>rd</sup> trimester were anemic (highest among race/ethnic categories). In contrast, less than one-tenth of American Indian women were anemic (9.5%).

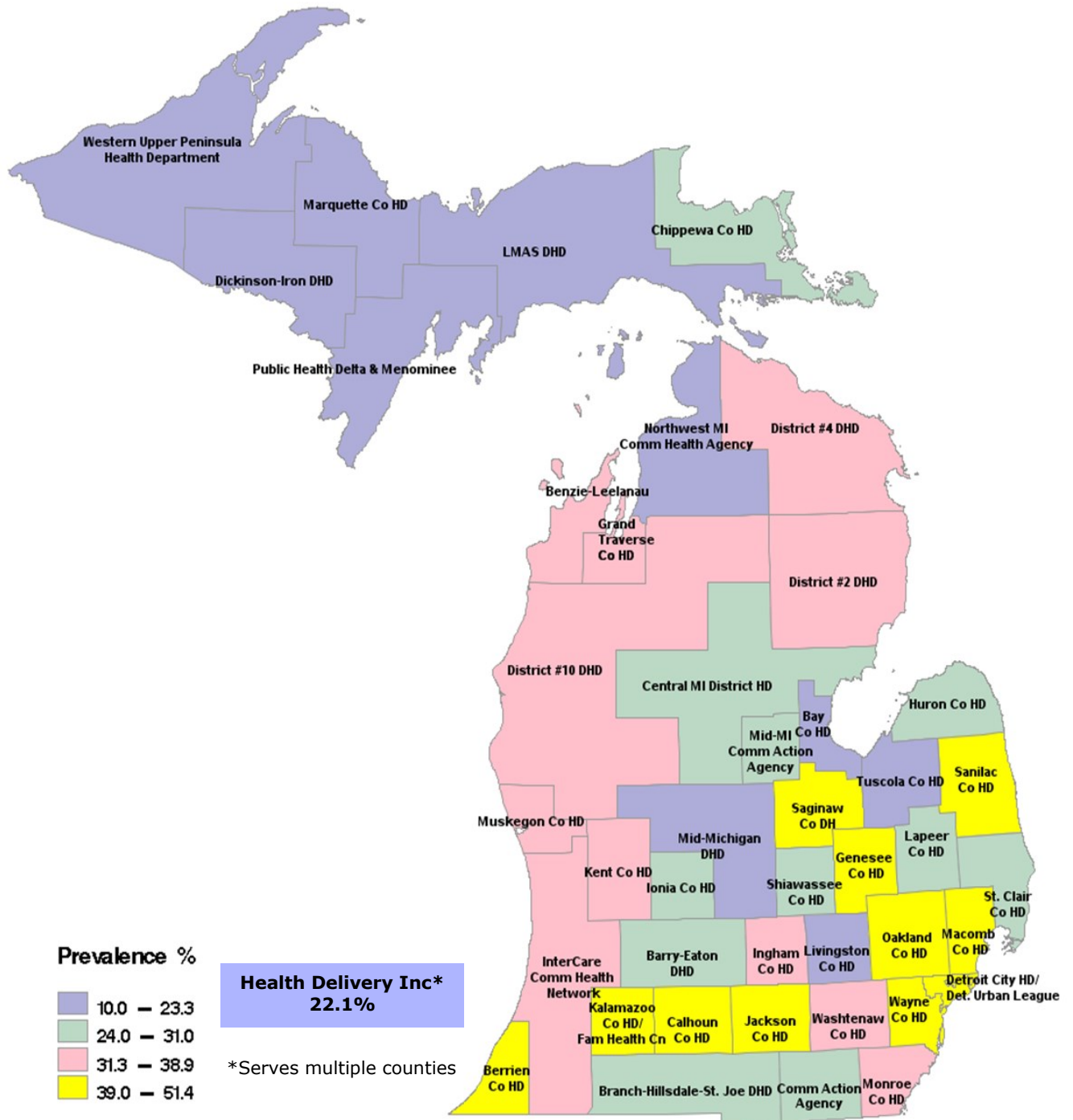
Among the age groups, the prevalence of anemia during the third trimester ranged from 36.4% among women less than 15 years old to 46.9% for women between the ages of 15 to 17 years old.

The prevalence of anemia during the third trimester varied by agency as well. (Figure 18). The Detroit Urban League reported the highest prevalence of third trimester anemia (59.4%) and Dickenson-Iron District Health Department reported the lowest (10.0%).



# MI-PNSS & PedNSS Report 2008-2014

**Figure 18: Prevalence of 3rd trimester anemia by local agency, MI-PNSS 2014**



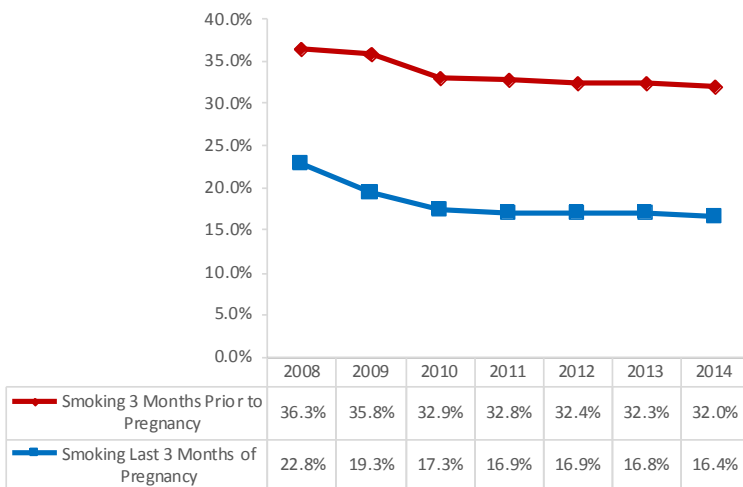


## MI-PNSS & PedNSS Report 2008-2014

### Maternal Smoking

Adverse developmental outcomes such as infant mortality, preterm birth and low birthweight are commonly associated with maternal smoking during pregnancy. In 2014, out of 95% of all births in the United States, roughly one in ten women smoked three months prior to pregnancy and approximately 8.4% of mothers smoked at any time during pregnancy (Curtin & Mathews, 2016). In addition, research has shown that there is also an indirect association between maternal smoking and the likelihood of partaking in other high-risk behaviors which ultimately lead to poor birth outcomes.

Figure 19: Trend of maternal smoking prevalence (before and during pregnancy) among women enrolled in WIC, MI-PNSS 2014<sup>1-2</sup>



<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors

The Healthy People 2020 objective is to increase the rate of abstinence from smoking during pregnancy to 98.6% (USHHS, 2010). To this end, the Michigan WIC program warns women of the detrimental effects associated with smoking, encourages abstinence for healthy fetal development, and provides information and referrals for smoking cessation classes.

#### HEALTHY PEOPLE 2020 OBJECTIVE

Increase the rate of abstinence of smoking during pregnancy to 98.6% (USHHS, 2010)

- ◆ The prevalence of smoking three months prior to pregnancy among women enrolled in the Michigan WIC program declined by 11.8% from 2008 to 2014.
- ◆ Over one third of women (39.4%) enrolled in WIC reported that they quit smoking by first prenatal visit and stayed off cigarettes.

Cigarette smoking is self-reported in PNSS and may be underreported and subject to recall bias. To be classified as a smoker, a woman must report smoking an average of one or more cigarettes per day. The prevalence of smoking three months prior to pregnancy among women enrolled in the Michigan WIC program declined by 11.8% from 2008 to 2014 (Figure 19). Nearly one in every six women (16.4%) smoked during the last three months of pregnancy; a 28.1% decrease from 2008. Among Michigan WIC enrollees, 32.0% of women smoked during the three months





## MI-PNSS & PedNSS Report 2008-2014

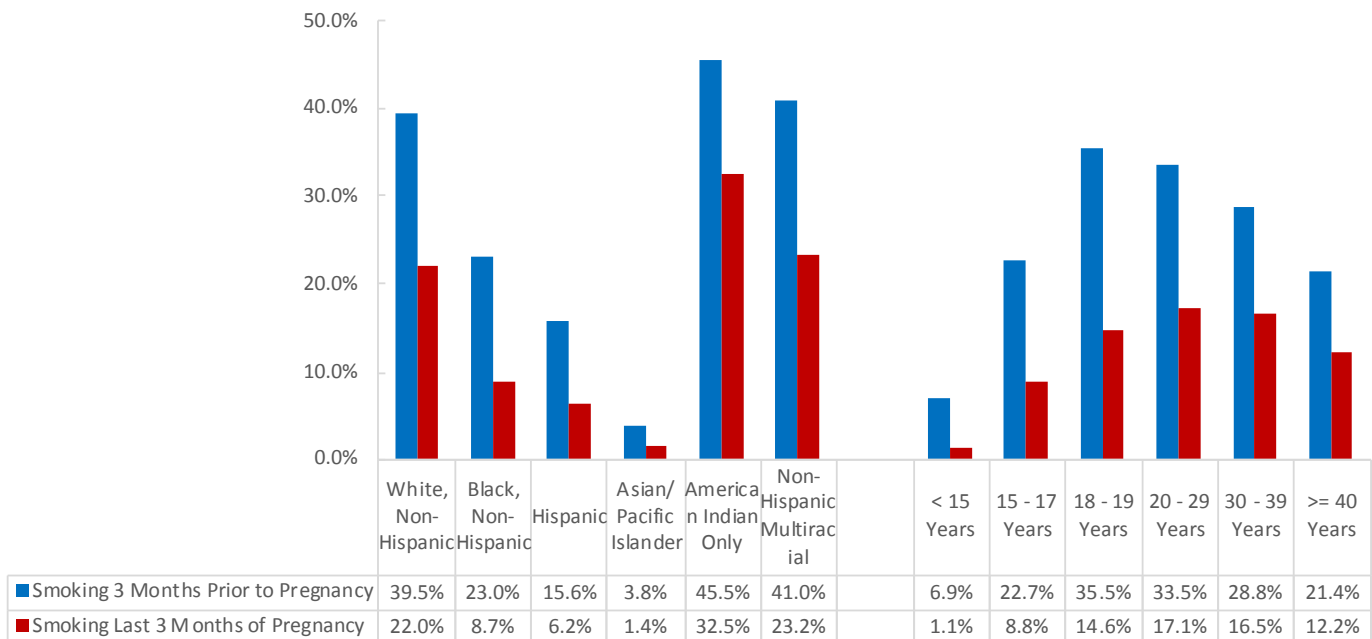
prior to pregnancy compared to 28.4% of women enrolled in MWR states and Hawaii (PNSS). Over one third of women (39.4%) enrolled in WIC reported that they quit smoking by first prenatal visit and maintained abstinent from cigarettes.

Among racial/ethnic groups, Asian/Pacific Islander women reported the lowest prevalence of smoking during their third trimester (1.4%), while American Indian women (32.5%) reported the highest prevalence (Figure 20).

The prevalence of maternal smoking did vary by agency (Figure 21). The Detroit Department of Health and Wellness Promotion reported the

lowest prevalence of smoking during the three months prior to pregnancy (22.6%), the lowest prevalence of smoking during the last three months (8.1%), and the highest prevalence of quitting smoking (57.1%). Over half the women (54.8%) enrolled at the District Health Department #4 reported smoking three months prior to pregnancy. Dickinson-Iron District Health Department had the highest prevalence of smoking during the last trimester (32.2%). Differences in maternal smoking prevalence among the agencies may likely be due to the difference in racial/ethnic distribution of the agencies as smoking rates differ by race/ethnicity.

Figure 20: Prevalence of smoking (3 months prior to pregnancy and during the last 3 months of pregnancy) among women enrolled in WIC by race/ethnicity or age MI-PNSS 2014<sup>1-2</sup>

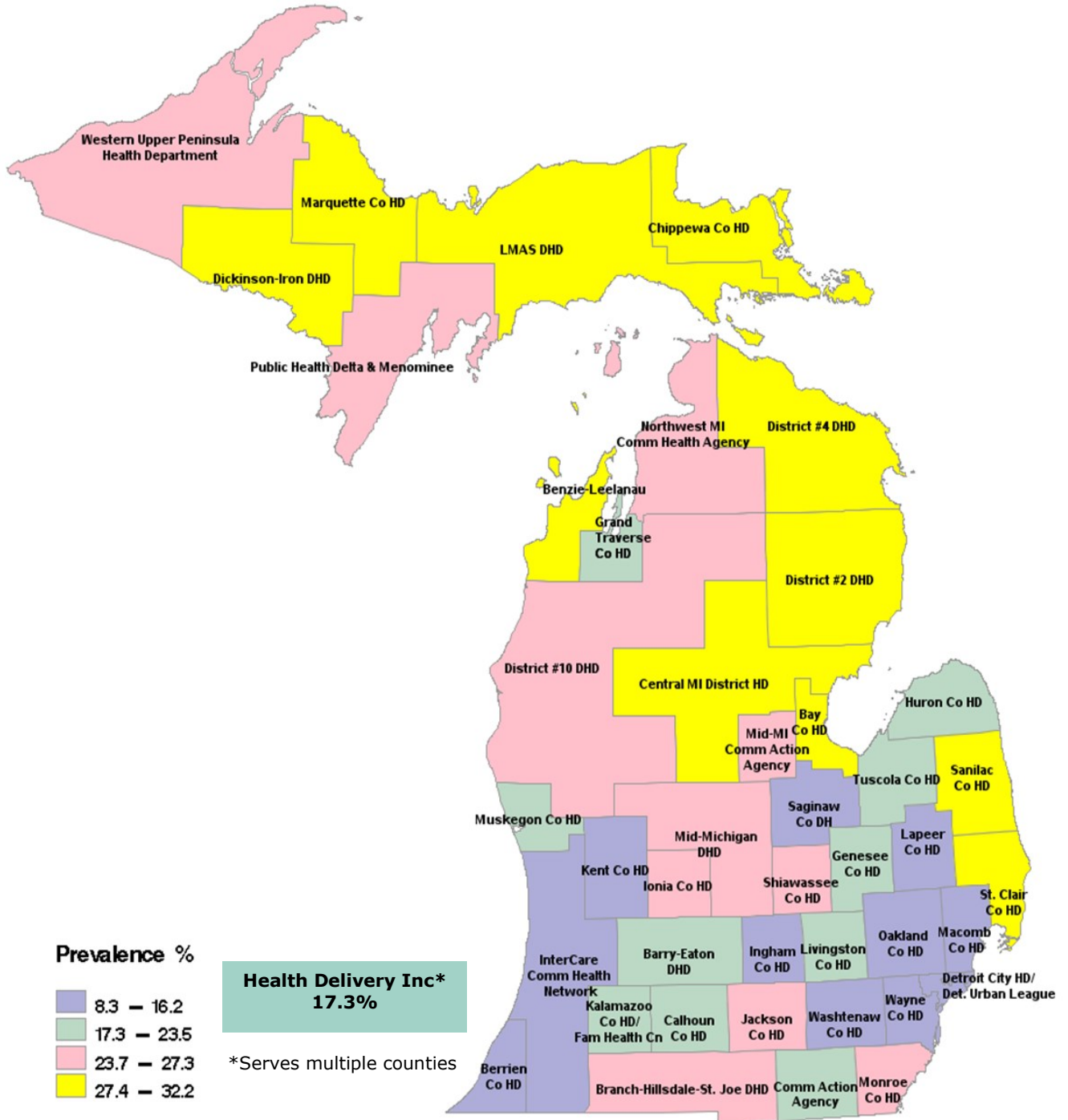


<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors



# MI-PNSS & PedNSS Report 2008-2014

**Figure 21: Prevalence of smoking during the last trimester by local agency, MI-PNSS 2014**





**Maternal Drinking**

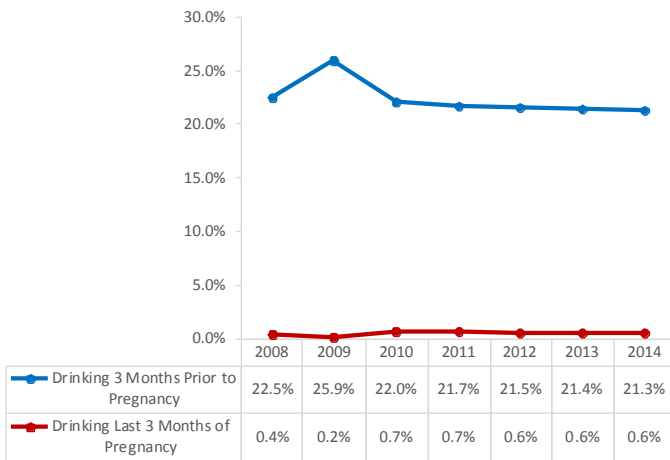
There is a large amount of evidence surrounding the detrimental effects of maternal drinking during pregnancy. While there is no known safe amount of alcohol to drink, the CDC recommends that women should not drink if they are pregnant or planning to become pregnant (CDC, 2015). Alcohol can easily cross the placenta and enter the bloodstream of the fetus when a woman consumes alcohol during pregnancy. Because the fetus cannot break down alcohol the way an adult can, the fetal blood level remains high for a longer period of time (SAMHSA, 2014). Fetal alcohol spectrum disorders (FASD) are caused by maternal consumption of alcohol. Low birthweight, abnormal facial features,

learning disabilities, vision or hearing problems, among others are all clinical signs and behaviors characterized by FASD (CDC, 2015). There is also an increased risk of miscarriage associated with alcohol consumption during the first three months of pregnancy (Nykjaer, et al., 2014).

During WIC enrollment, women are asked on average how many drinks per week they consumed three months prior to pregnancy and during the last three months of pregnancy. Because the data is self-reported, it is subject to recall bias and underreporting.

In 2014, 21.3% of women enrolled in WIC reported drinking prior to pregnancy, while 0.6% reported drinking during their last trimester of pregnancy (Figure 22). The rates have been stable from 2010 to 2014. The spike in 2009 could be related to the system change that occurred in 2009. The prevalence of drinking prior to pregnancy was lowest among teens 15 to 19 years of age (12.1%) while highest among women ages 20-29 (23.8%). More than one out of every five White and Black, Non-Hispanic women enrolled in WIC had reported drinking 3 months prior to pregnancy (22.2% and 22.6% respectively); only 4.5% of Asian/ Pacific Islander and American Indian women reported the drinking 3 months prior to pregnancy.

Figure 22: Trend of maternal drinking prevalence (before and during pregnancy) among women enrolled in WIC, MI-PNSS 2008-2014<sup>1-2</sup>



<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup>  
<sup>2</sup>Excludes records with unknown data and errors



## Pediatric Health Indicators

### Infant Low Birthweight

Low birthweight is defined as birthweight less than 2,500 grams (5 pounds and 8 ounces) regardless of gestational age. It is a well-established risk factor for neonatal and post-neonatal mortality and morbidity. A large body of evidence has shown that infants born with low birthweight present a higher risk of a variety of health problems including neurodevelopmental disabilities and respiratory disorders. In addition, infants with low birthweight who gain excessive weight during infancy and early childhood have a greater risk of developing metabolic syndromes such as obesity, hypertension, and diabetes which is associated with an increased of developing cardiovascular disease later in life (Gluckman, 2008, Casey, 2008;Euser et al., 2005; Barker, 2004; Hales & Ozanne, 2003; Vohr et al., 2000). Healthy People 2020 established a target incidence of 7.8% for low birthweight, a goal yet to be attained in the Michigan or National PNSS population.

Birthweight is reported in both PNSS and

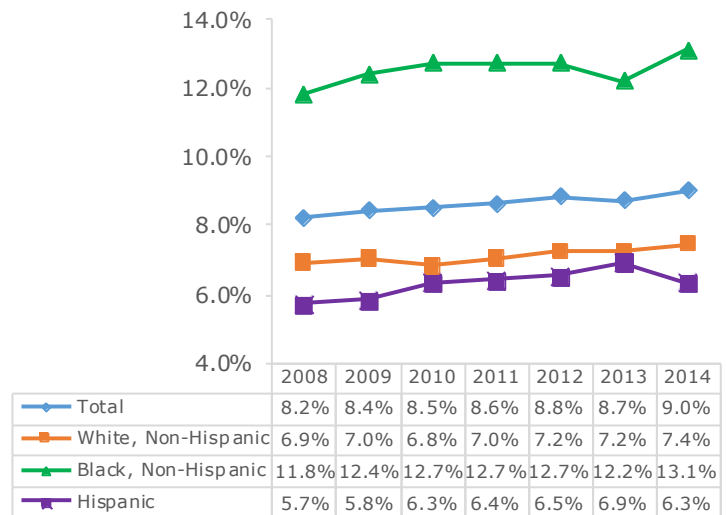
**HEALTHY PEOPLE 2020  
OBJECTIVE**

Reduce the incidence of low birthweight (<2,500 grams) to 7.8%

Reduce the incidence of very low birthweight (<1,500 grams) to 1.4%

PedNSS; PNSS reports infant demographics for infants whose mother enrolled in WIC, while PedNSS includes infants enrolled in WIC whose mother may or may not have enrolled in WIC. For this section, we report PNSS data only. In 2014, the incidence of low birthweight in Michigan PNSS population was 9.0%, higher than the National PNSS rate of 8.0% (CDC 2010 PNSS report) but lower than the 2013 MWR states and Hawaii at 11.8% (PNSS report 2013). The overall incidence of low birthweight among Michigan PNSS has increased 9.8% from 2008 to 2014 (Figure 23). The trend is consistently observed from different race/ethnic groups. Racial disparities persist as in 2003-2007 MI PNSS and PedNSS report. Among Black, Non-Hispanics, the rate remains excessively high at 13.1%, compared to 6.3% of Hispanic infants and 7.4% of White, non-Hispanic infants.

Figure 23: Trend in low birthweight incidence by race among infants born to mothers enrolled in WIC, MI PNSS 2008-2014<sup>1-4</sup>

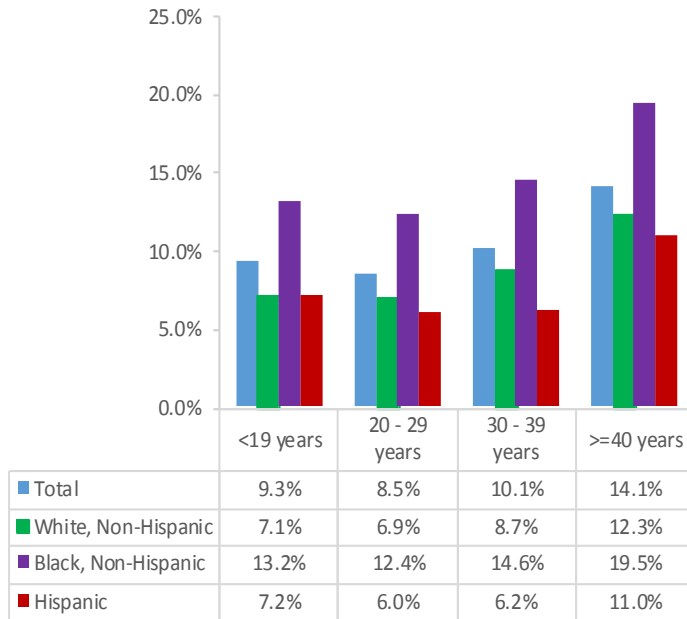


<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors frequency missing <sup>3</sup>Analyses based on one record per child. <sup>4</sup>Low birthweight (lbw) < 2,500 grams regardless of gestational age



## MI-PNSS & PedNSS Report 2008-2014

Figure 24: Incidence of low birthweight among infants born to mothers enrolled in WIC by maternal age and by maternal race/ethnicity, MI-PNSS 2014<sup>1-4</sup>

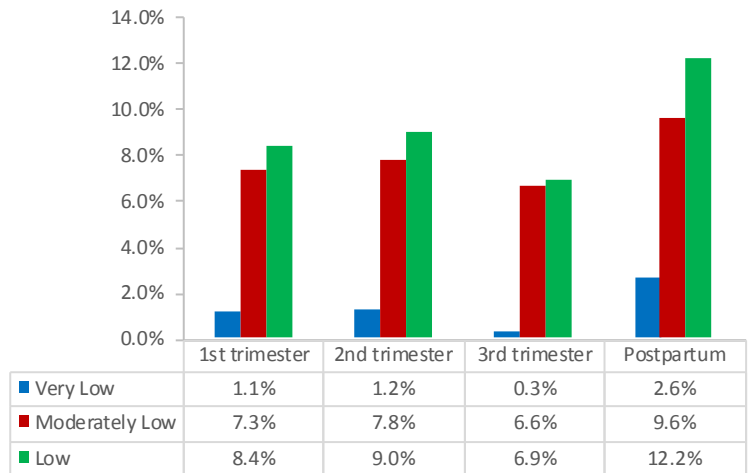


Analysis of low birthweight by selected maternal characteristics are presented in Figures 26–29 and Table 9. Overall, low birthweight incidence is highest among infants born to mothers older than 40 years and lowest among women ages 20–29 years (Figure 24).

There are obvious disparities by race/ethnicity groups. The highest incidence of low birthweight was reported by Black, Non-Hispanic women. The highest incidence (19.5%) was found among Black, Non-Hispanic women over the age of 40 years and lowest (6.0%) among Hispanic women ages 20–29 years.

Infant low birthweight incidence was lower among women who enrolled in WIC during their 3rd trimester (6.9%) compared to women enrolled at other times (Figure 25). This might be because women that enrolled in their 3rd trimester tend to have higher socioeconomic status, with a higher percentage of them being white.

Figure 25: Incidence of low birthweight among infants born to mothers enrolled in WIC by maternal trimester of entry into WIC, MI-PNSS 2014<sup>1-4</sup>

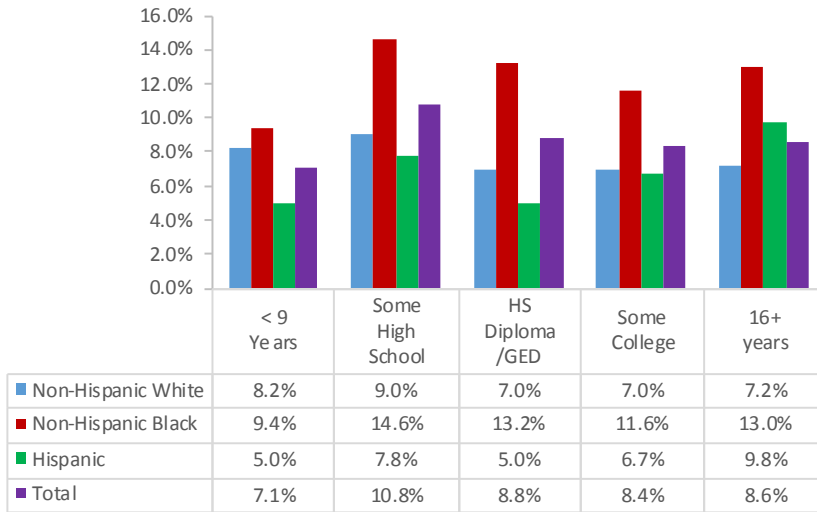


1Recording period is January 1st through December 31st 2Excludes records with unknown data and errors 3Analyses based on one record per child. 4Low birthweight (lbw) < 2,500 grams, moderately low birthweight (mlbw) <2,500 g and >1,500g, very low birthweight <1,500- regardless of gestational age.



## MI-PNSS & PedNSS Report 2008-2014

Figure 26: Incidence of low birthweight among infants born to mothers enrolled in WIC by maternal education and by maternal race/ethnicity, MI-PNSS 2014<sup>1-4</sup>

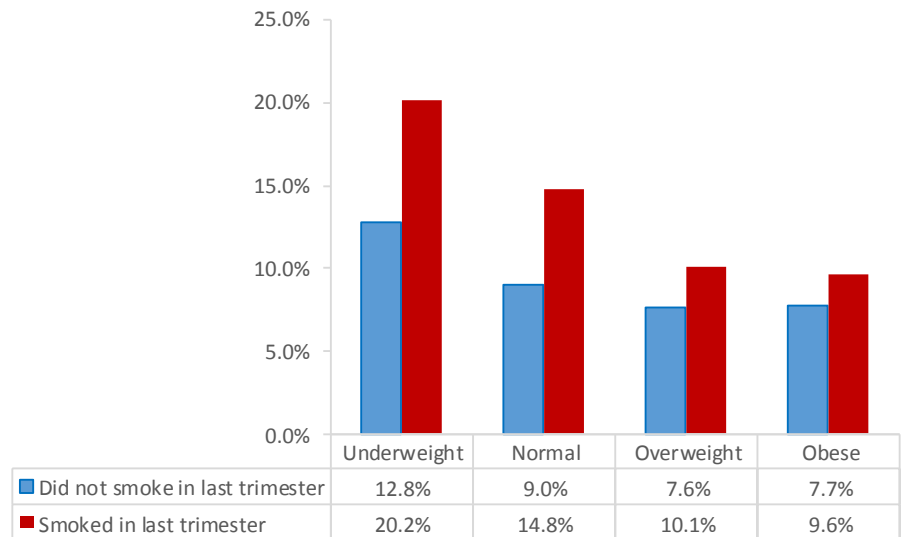


Among Non-Hispanic Whites and Blacks, the risk of low birthweight was the highest among mothers who had some high school education while for Hispanic mothers, those had the highest education (over 16 years of education) are at the greatest risk of delivering low birthweight infants (Figure 26).

One in every five infants born to mothers who smoked in the last trimester and were underweight pre-pregnancy had low birthweight (20.2%).

As shown in Figure 28, low maternal prenatal BMI and maternal smoking in the last trimester are both risk factors of infant low birthweight.

Figure 27: Incidence of low birthweight among infants born to mothers enrolled in WIC by maternal prenatal BMI and smoking, MI-PNSS 2014<sup>1-4</sup>

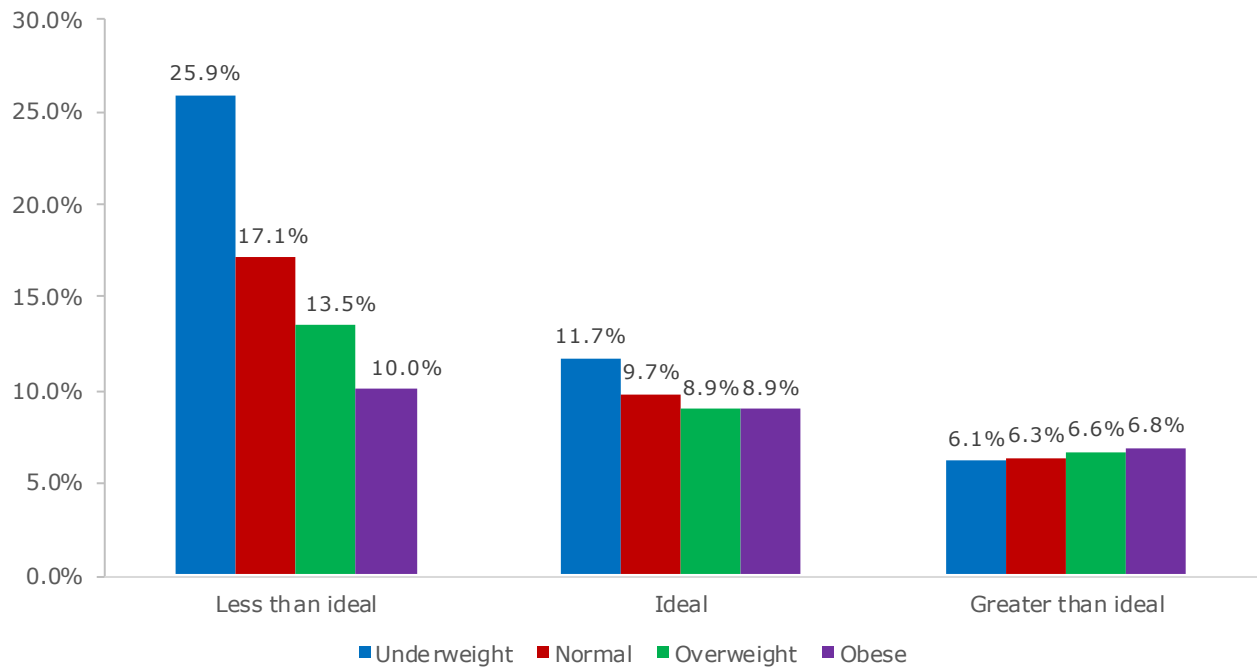


<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors frequency missing <sup>3</sup> Analyses based on one record per child. <sup>4</sup>Low birthweight (lbw) <2,500 grams



## MI-PNSS & PedNSS Report 2008-2014

Figure 28: Incidence of low birthweight among Michigan infants born to mothers enrolled in MI WIC by maternal prenatal BMI and maternal weight gain, MI-PNSS 2014<sup>1-4</sup>



<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors frequency missing

<sup>3</sup> Analyses based on one record per child. <sup>4</sup>Low birthweight (lbw) <2,500 grams

In Figure 28, low birthweight was stratified by both maternal prenatal BMI and maternal weight gain during pregnancy. Low birthweight incidence was especially high among women who were underweight and gained less than the recommend weight during their pregnancies.

Both maternal prenatal weight and gestational weight gain can have significant effects on the outcome of an infant's birthweight.



## MI-PNSS & PedNSS Report 2008-2014

The incidence of low birthweight varied by agencies. The highest incidence was found among infants born to mothers enrolled at the Detroit Department of Health and Wellness Program at 12.2% while lowest incidence was from infants from Keweenaw Bay Indian Community at 2.3% (Table 8). Some agencies achieved the Healthy People 2020 objective but further efforts are needed to lower rates throughout Michigan.

Table 9: Adjusted Odds ratio estimates for Low Birthweight by maternal factors, MI-PNSS 2014<sup>1</sup>

Effect	Point Estimate	95% Confidence Limits	
Maternal age 30-39 years vs 20-29 years	1.246	1.146	1.355
Maternal age > 39 years vs 20-29 years	1.756	1.372	2.249
Black, Non-Hispanic vs White, Non-Hispanic	2.072	1.922	2.235
Hispanic vs White, Non-Hispanic	0.815	0.701	0.946
Asian/Pacific Islander vs White, Non-Hispanic	1.317	1.025	1.694
Education less than vs greater than High School	1.116	1.009	1.233
WIC third trimester enrollment vs first trimester enrollment	0.715	0.64	0.799
WIC postpartum enrollment vs first trimester enrollment	1.344	1.227	1.472
Smoking vs no smoking during last trimester	1.715	1.572	1.871
Pregnancy weight gain more than ideal vs Ideal	0.697	0.643	0.756
Pregnancy weight gain less than ideal vs Ideal	1.647	1.507	1.8
Maternal prenatal BMI underweight vs normal	1.382	1.2	1.59
Maternal prenatal BMI overweight vs normal	0.891	0.814	0.974
Maternal prenatal BMI obese vs normal	0.822	0.755	0.896

Multinomial regression of low birthweight vs. normal birthweight infant. Model includes: Maternal age, Maternal race & ethnicity, Maternal education, Maternal pre-pregnancy weight, Pregnancy weight gain, PNC enrollment, WIC Enrollment and Smoking during the last trimester

Table 8: Incidence of low birthweight among Michigan infants born to mothers enrolled in MI WIC by local agency, MI-PNSS 2014<sup>1</sup>

Lowest Incidence of Low Birthweight	
Agency	%
Keweenaw Bay Indian Community	2.3%
Chippewa County HD	3.1%
Benzie-Leelanau DHD	4.2%
Dickinson-Iron DHD	4.7%
Western Upper Penin DHD	4.9%
Highest Incidence of Low Birthweight	
Agency	%
Health Delivery, Inc	11.0%
Detroit Urban League	11.2%
Mid-MI Community Action Agency	11.7%
Genesee County HD	11.7%
Detroit DHWP	12.2%
MI-PNSS 2014	

<sup>1</sup> LBW < 2,500 grams regardless of gestational age

### Maternal Factors that increased the odds of a low birthweight infant (Table 9)

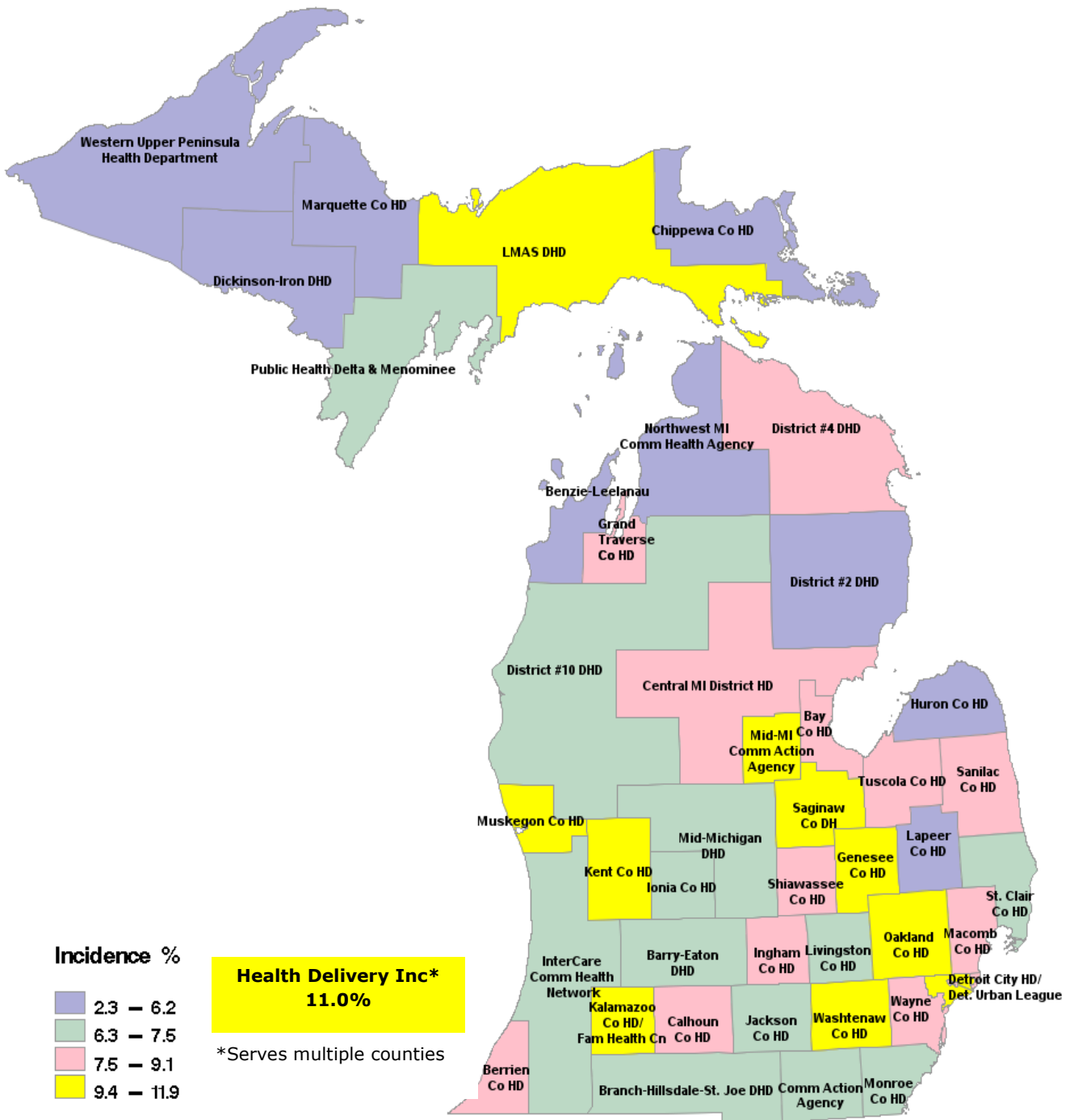
- Maternal age 30–39 and 40 years older - increased odds by 1.25 times and 1.76 times than that of a 20-29 year old woman
- Black, Non-Hispanic women- more than twice the risk of having LBW infant than White, Non-Hispanic women
- WIC enrollment postpartum are 1.34 times more likely to have LBW outcome than enrollment during the 1<sup>st</sup> trimester
- Underweight prenatal BMI- 1.4 times that of normal weight women
- Pregnancy weight gain less than ideal are 1.65 times more likely to have LBW infant than a women who gained the ideal amount during pregnancy
- Maternal smoking during the last trimester - 1.7 times more likely to have LBW infant than non-smoker





# MI-PNSS & PedNSS Report 2008-2014

### Figure 29: Incidence of infant low birthweight by local agency, MI-PNSS 2014

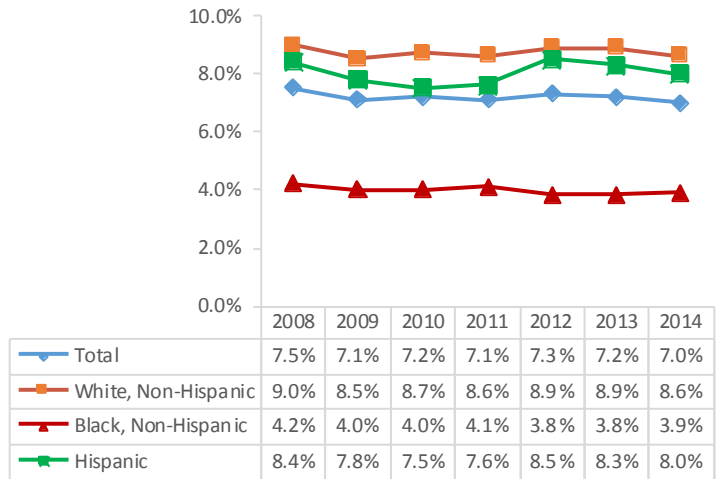




## Infant High Birthweight

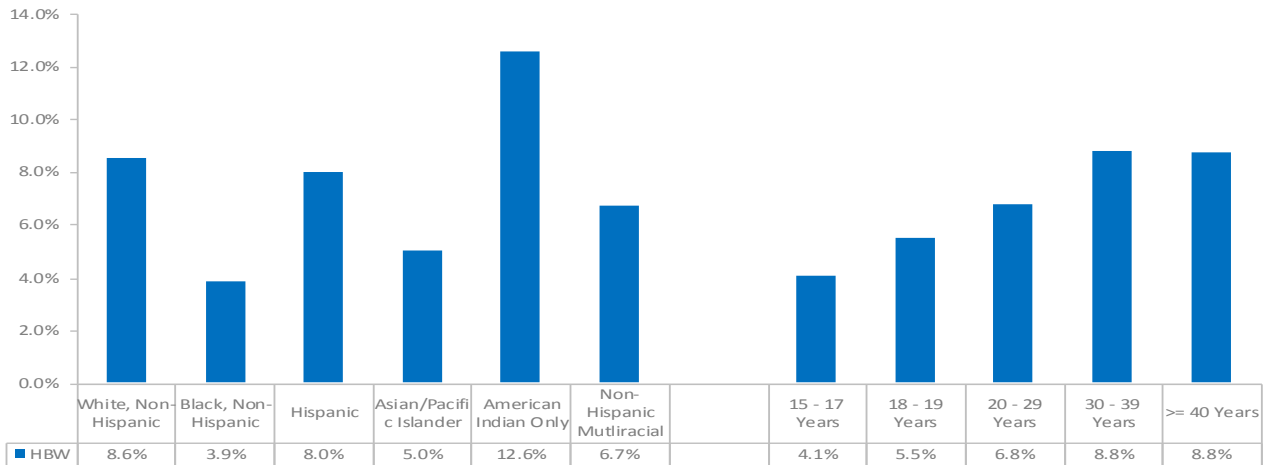
High birthweight (weighing more than 4,000 grams at birth or 8 pounds and 13 ounces) is associated with difficult labor and delivery. It increases the risk of shoulder dystocia, skeletal fractures, and brachial plexus injury (Siggelkow, Boehm et.al, 2008a, Melendez, Bhatia, Callis, Woolf, & Yoong, 2009). There are two main reasons why babies are large for gestational age. It might be due to an underlying medical problem (e.g. mother had gestational diabetes) or family genetics. Overweight mothers, excessive maternal weight gain during pregnancy, gestational diabetes or insulin-dependent diabetes mellitus are risk factors for having high birthweight babies (Kramer et al., 2002). The incidence of high birthweight among infants enrolled in WIC in 2014 was 7.0%, a 6.7% decline from 2008 (Figure 30). The incidence of high birthweight varies by maternal race/ethnicity and age group (Figure 31).

Figure 30: Trend high birthweight incidence by race/ethnicity among infants born to mothers enrolled in WIC, MI-PNSS 2014<sup>1-4</sup>



The high birthweight incidence was lowest among Black, Non-Hispanic infants (3.9%), which was a 7.1% decline from 2008. The highest incidence was found among American Indian infants (12.6%). There is also a trend of high birthweight incidence increasing with maternal age.

Figure 31: Incidence of high birthweight by maternal age group and race/ethnicity, MI-PNSS 2014<sup>1-4</sup>

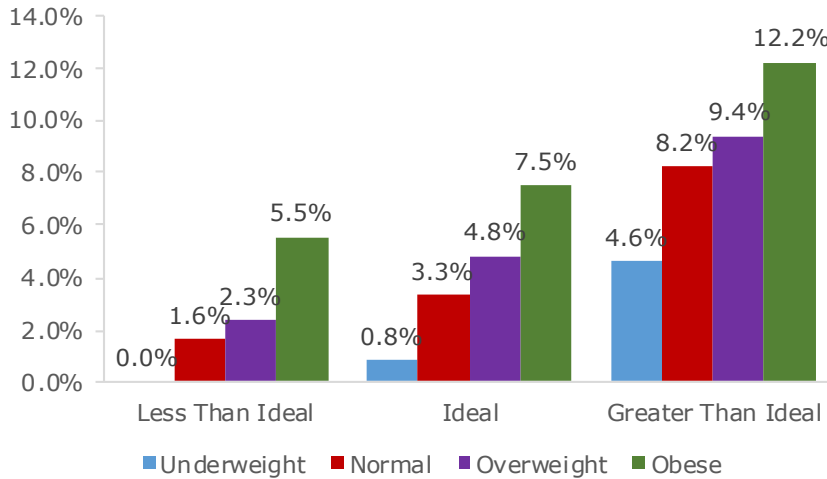


<sup>1</sup>Recording period is January 1st through December 31st. <sup>2</sup>Excludes records with unknown data and errors frequency missing. <sup>3</sup>Analyses based on one record per child, born during the reporting period. <sup>4</sup>High birthweight >4,000 grams regardless of gestational age. Note: Data is not sufficient for <15 years group, no estimate is provided.



## MI-PNSS & PedNSS Report 2008-2014

Figure 32: Incidence of high birthweight by maternal prenatal BMI and maternal gestational weight gain among infants born to mothers enrolled in WIC, MI-PNSS 2014<sup>1-6</sup>



Both prenatal BMI and weight gain during pregnancy were associated with the risk of high birthweight. Women who were overweight or obese had a higher incidence of infant high birthweight (Figure 32).

High birthweight incidence was especially high among women who were overweight/obese and gained more than the recommended weight during their pregnancies.

Table 10: Incidence of high birthweight among Michigan infants born to mothers enrolled in WIC by local agency, MI-PNSS 2014<sup>6</sup>

As shown in Table 10, among local WIC agencies, the Detroit Department of Health Wellness and Promotion reported the lowest incidence of high birthweight (4.8%), while the West Upper Peninsula Health Department reported the highest (16.3%).

Highest Incidence of High Birthweight	
Agency	%
Keweenaw Bay Indian Community	16.3%
Chippewa County HD	13.9%
Public Health Delta & Menominee	13.0%
Huron County HD	11.7%
Benzie-Leelanau DHD	10.5%
Lowest Incidence of High Birthweight	
Agency	%
Health Delivery, Inc	5.5%
Ionia County HD	5.5%
Genesee County HD	5.1%
Detroit Urban League	4.9%
Detroit DHWP	4.8%

MI-PNSS 2014

<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors <sup>3</sup>Analyses based on one record per child, born during the reporting period <sup>4</sup>Based on 1990 IOM report, "Nutrition During Pregnancy" <sup>5</sup>Based on 2009 IOM report "Weight Gain During Pregnancy: Reexamining the Guidelines".

# MI-PNSS & PedNSS Report 2008-2014

## Breastfeeding Initiation and Duration

It is well documented that breastfeeding conveys significant benefits to both moms and children. Breastfeeding reduces risk of cancer, metabolic profiles, and benefits moms psychologically (Gunderson et al., 2012; Tiggas, Sunehag, & Haymond, 2002 ). Breastfeeding also benefits children both short and long term in areas such as infectious diseases, inflammatory diseases, neurological development, and cancer prevention (Schack-Nielsen & Michaelsen, 2007; Martin RM 2005). Since the 2003-2007 PNSS and PedNSS report, more literature has been published on breastfeeding and child-

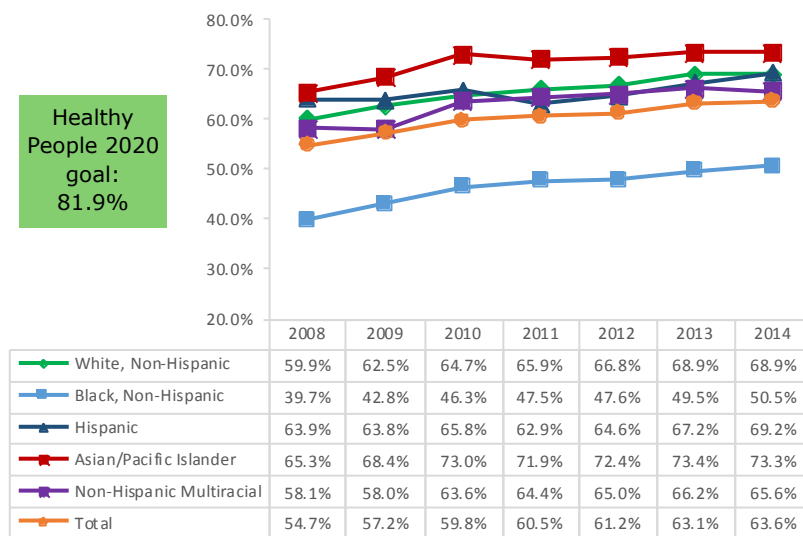
hood obesity but the association remains inconclusive. More evidence has been accumulating which suggest a modest protective effect of breastfeeding on childhood obesity (Stettler, 2007; Horta, Victora, Menezes, & Barros, 1997; ) while other studies reported no protective effects. Despite the lack of consensus, other benefits of breastfeeding have been established and it is essential that Michigan WIC program continues to promote breastfeeding.

**HEALTHY PEOPLE 2020 OBJECTIVE**

Increase the prevalence of breastfeeding initiation to 81.9%

Healthy People 2020 target for mothers breastfeeding to 6 months is 60.6% and 34.1% to 12 months.

Figure 33: Trend of breastfeeding initiation prevalence by maternal race and ethnicity among infants born to mothers enrolled in WIC, MI-PNSS 2008- 2014<sup>1-2</sup>



In 2014, the prevalence of infants ever breastfed among women enrolled in MWR states and Hawaii (PNSS) was 69.0% and 63.6% among Michigan women.

Although the prevalence of breastfeeding has not reached the Healthy People 2020 recommended 81.9%, prevalence has continued to increase. For instance, the prevalence of breastfeeding initiation among Black, Non-Hispanic women increased by 27.2% from 2008 to 2014, while the overall prevalence increased by 16.3% (Figure 33).

<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data



## MI-PNSS & PedNSS Report 2008-2014

Among infants enrolled in WIC during 2014, the prevalence of breastfeeding to 6 months was 18.5% (a 17.1% increase from 2008) and 9.9% were breastfed to 12 months. The prevalence among Black, non-Hispanic children increased by 11.2% (Figure 34).

Among infants who were enrolled in 2014 and born to a mother who was enrolled in WIC, the prevalence of breastfeeding for at least 6 months was 28.6% and 14.9% of infants were breastfed to 12 months. Half of WIC women who initiated breastfeeding stopped breastfeed after two months (Figure 35).

Figure 34: Trend of breastfeeding for 6 months by race and ethnicity among infants enrolled in WIC, MI-PedNSS 2008-2014<sup>1-3</sup>

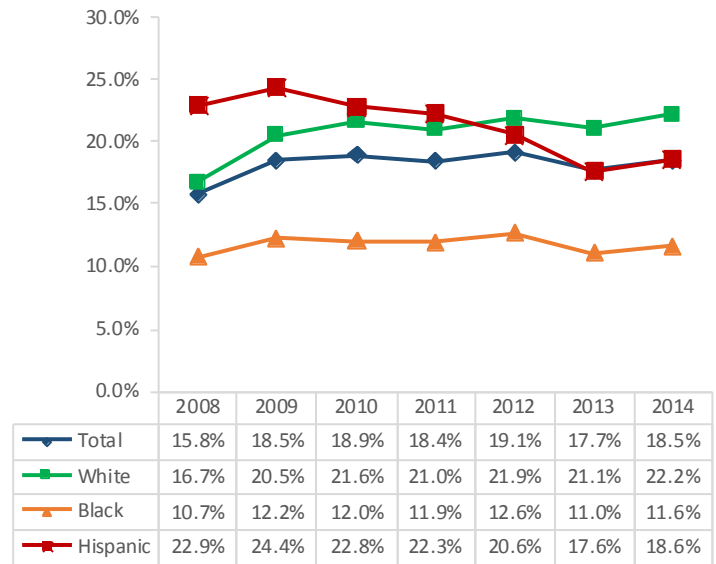
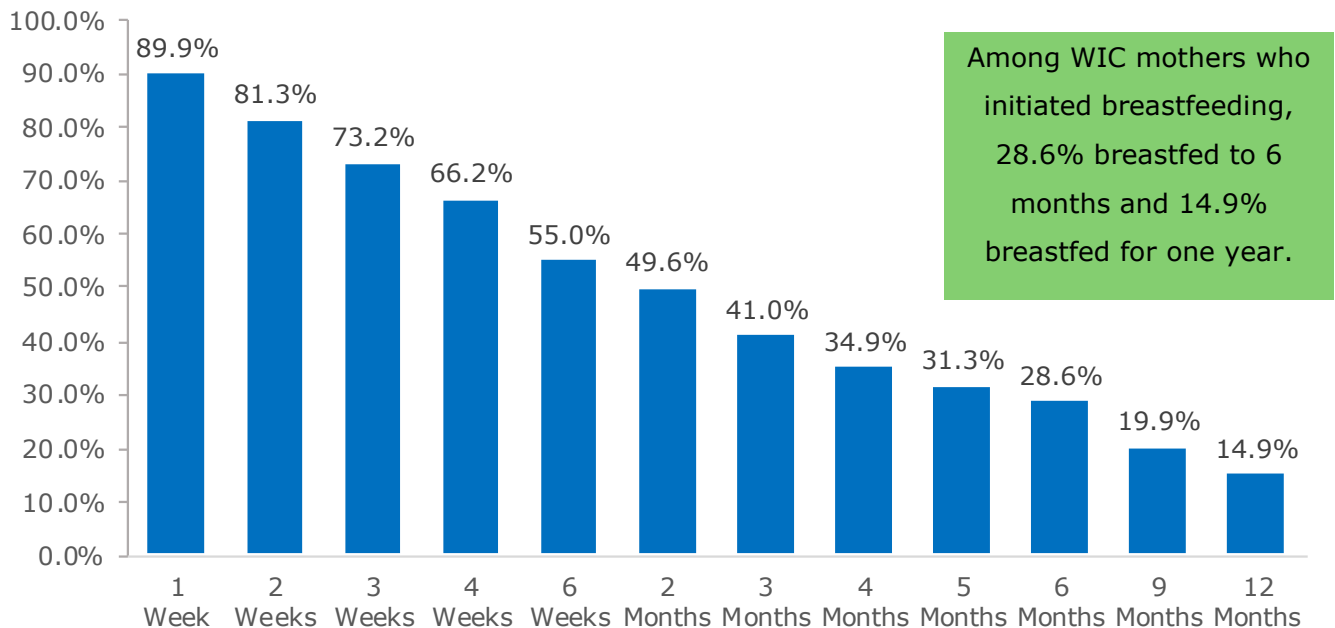


Figure 35: Prevalence of breastfeeding duration among infants enrolled in WIC and born to mothers enrolled in WIC that initiated breastfeeding, MI-PNSS/PedNSS 2014<sup>1-3</sup>



<sup>1</sup>Recording period is January 1st through December 31st <sup>2</sup>Excludes records with unknown data and errors. <sup>3</sup> Analyses based on one record per child.

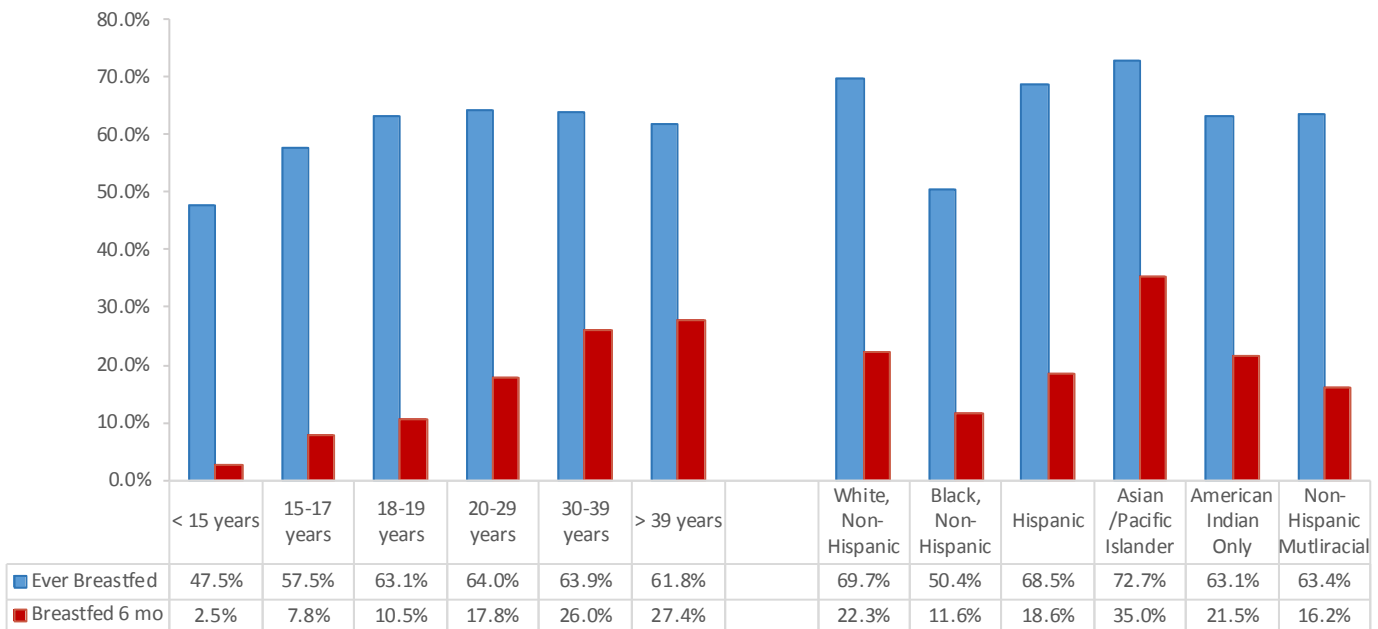


## MI-PNSS & PedNSS Report 2008-2014

Both breastfeeding initiation and duration varied by maternal age and race/ethnicity (Figure 36). In general, middle-aged mothers have higher prevalence of ever breastfeeding. Women 20-39 years old had the highest prevalence of ever breastfeeding (64%) compared to the lowest prevalence of 47.5% among mothers younger than 15 years of age. Prevalence of breastfeeding to 6 months increases with maternal age, the highest rate was found among moms older than 39 years (27.4%).

Breastfeeding was most prevalent among Asian/Pacific Islander (72.7%), followed by White, Non-Hispanic women (69.7%) and Hispanic (68.5%). Black, Non-Hispanic women had the lowest prevalence of breastfeeding (50.4%). Asian/Pacific Islander (35.0%) women had the highest prevalence of breastfeeding to 6 months, the lowest prevalence was reported by Black, Non-Hispanic women (11.6%).

Figure 36: Prevalence of being breastfed (ever or to 6 months of age) by maternal race/ethnicity and by age among infants born to mothers enrolled in WIC, MI-PNSS/PedNSS 2014<sup>1-3</sup>



<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors. <sup>3</sup> Analyses based on one record per child.



## MI-PNSS & PedNSS Report 2008-2014

The prevalence of breastfeeding initiation and breastfeeding to 6 months by selected maternal characteristics are summarized in Table 11. Breastfeeding rates increased with age and were highest among women over 39 years of age. Rates tended to be higher among women with at least 12 years of education (60.3% and above). Women who were either underweight or obese prior to their pregnancies had a lower prevalence of ever breastfeeding or breastfeeding to 6 months compared to normal weight or overweight women. Women that gained less than ideal amount of weight during pregnancy have lower prevalence of initiation and breastfed to 6 months compared to women who gained greater than the ideal amount or gained the ideal amount (Table 11).

Although 51.8% of women who smoked during their last trimester initiated breastfeeding, only 7.8% breastfed their infants to 6 months. Finally, more than half (51.2%) of women with anemia during pregnancy initiated breastfeeding, while fewer than 15% breastfed to 6 months.

Table 11: Prevalence of breastfeeding initiation and breastfed to 6 months among infants whose mothers enrolled in Michigan WIC in 2014 by selected maternal characteristics, MI-PNSS/PedNSS 2014<sup>1-3</sup>

	Ever Breastfed	Breastfed 6 months
<b>Maternal Education</b>		
<9 years	57.5%	20.7%
9-11 years	49.0%	9.0%
12 years	60.3%	15.8%
13-15 years	71.9%	24.7%
16+ years	82.8%	43.4%
<b>Maternal Weight Gain</b>		
Less than Ideal	57.7%	16.2%
Ideal	61.5%	19.1%
Greater than Ideal	62.5%	18.0%
<b>Smoking 3rd Trimester</b>		
No	64.0%	20.7%
Yes	51.8%	7.8%
<b>Maternal Prenatal BMI</b>		
Underweight	56.6%	15.5%
Normal	62.0%	18.9%
Overweight	62.0%	18.8%
Obese	60.0%	15.1%
<b>Anemia 3rd Trimester</b>		
No	61.3%	19.4%
Yes	51.2%	14.1%
<b>MI-PNSS/PedNSS 2014</b>		

<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors. <sup>3</sup>Analyses based on one record per child.



## MI-PNSS & PedNSS Report 2008-2014

Three agencies exceeded the Healthy People 2020 objective (81.9%) for breastfeeding initiation (Table 12 and Figure 37). The Benzie-Leelanau District Health Department reported 86.0% of women initiated breastfeeding. Contrarily, the lowest prevalence of breastfeeding initiation was reported by the Detroit Urban League at 43.9%.

The Grand Traverse County Health Department reported the highest prevalence (32.1%) for 6 months duration of

Table 13: Prevalence of breastfeeding to 6 months by local agency among infants enrolled in WIC 2014 and born to mothers enrolled in WIC that initiated breastfeeding, MI-PNSS/PedNSS 2014<sup>1-3</sup>

Highest Prevalence of Breastfeeding to 6 months	
Agency	%
Grand Traverse County HD	31.7%
Benzie-Leelanau DHD	30.6%
Western Upper Peninsula DHD	30.2%
Washtenaw County HD	29.9%
Dickinson-Iron	29.8%
Lowest Prevalence of Breastfeeding to 6 months	
Agency	%
Saginaw County Dept. of Public Health	13.3%
St. Clair County HD	12.9%
Detroit DHWP	12.3%
Health Delivery, Inc	10.9%
Detroit Urban League	10.0%

**MI-PNSS/PedNSS 2014**

Table 12: Prevalence of ever breastfed among infants born to mothers enrolled in WIC 2014 by local agency, MI-PNSS 2014<sup>1-3</sup>

Highest Prevalence of Breastfeeding Initiation	
Agency	%
Benzie-Leelanau DHD	86.0%
Grand Traverse County HD	85.6%
Mid-Michigan DHD	82.0%
Marquette County HD	80.7%
Washtenaw County HD	80.7%
Lowest Prevalence of Breastfeeding Initiation	
Agency	%
Macomb County HD	57.1%
Genesee County HD	56.1%
Wayne County HD	53.1%
Detroit DHWP	46.1%
Detroit Urban League	43.9%

**MI-PNSS 2014**

breastfeeding (Table 13 and Figure 38). In contrast, the Detroit Urban League also reported the lowest prevalence of breastfeeding for 6 months (9.1%).

Data for breastfeeding initiation was gathered from infants born to mothers who enrolled in WIC during 2014 (PNSS). Data for 6 months duration was gathered from infants with breastfeeding data in PedNSS 2014 and whose mothers were enrolled in WIC during 2014.

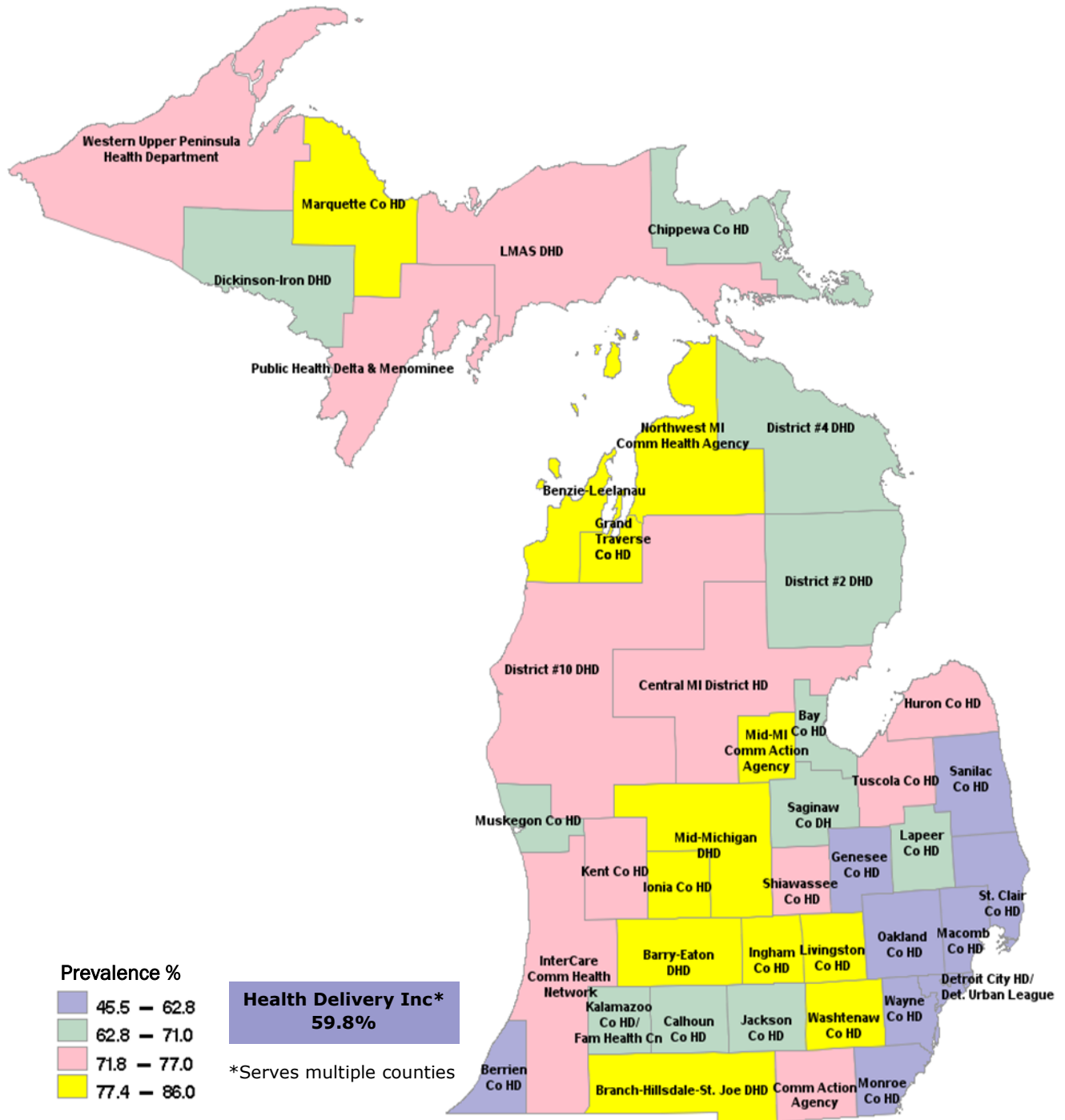
<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors. <sup>3</sup>Analyses based on one record per child.





# MI-PNSS & PedNSS Report 2008-2014

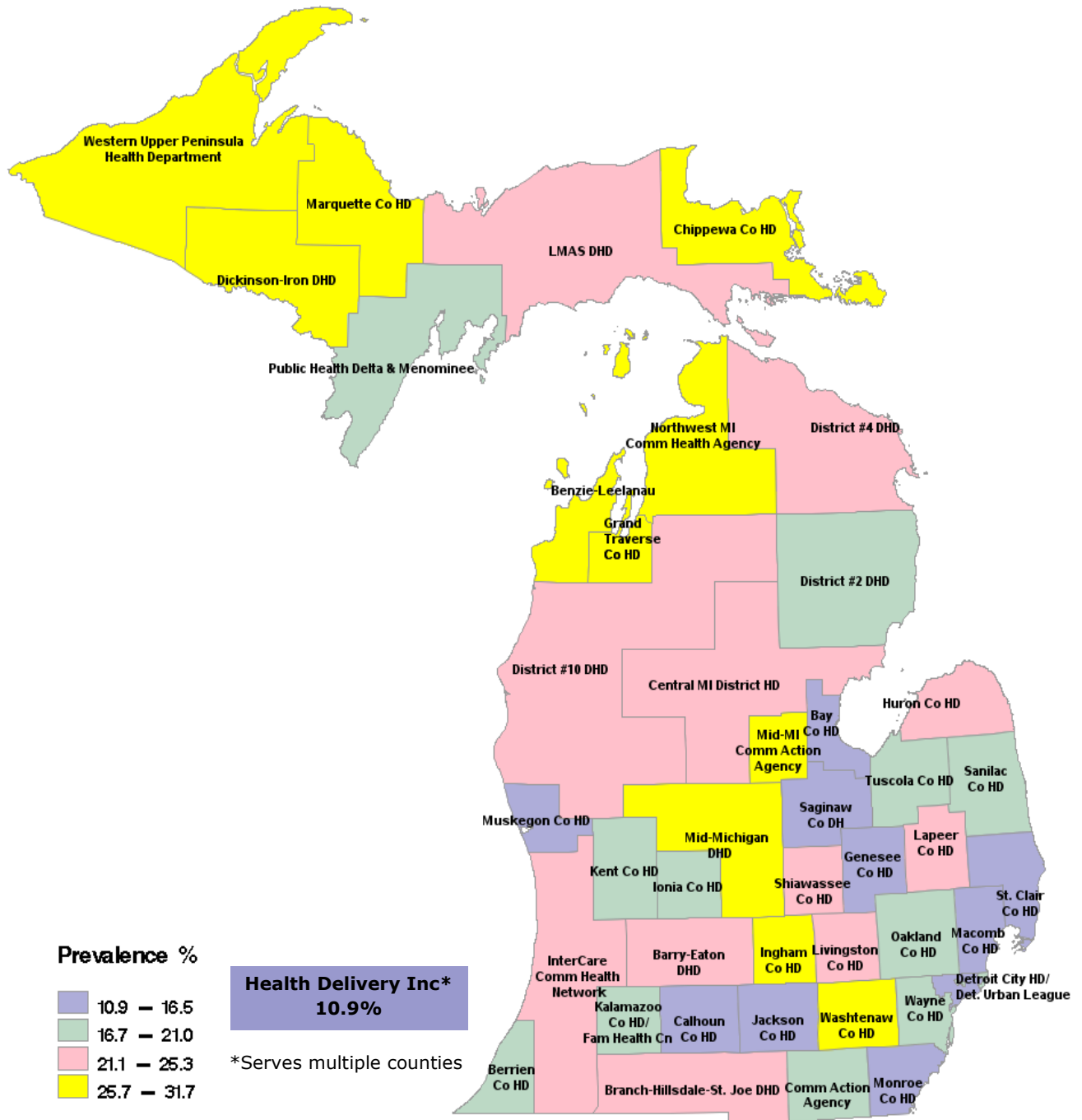
Figure 37: Prevalence of breastfed (ever) by local agency, MI-PNSS 2014





# MI-PNSS & PedNSS Report 2008-2014

**Figure 38: Prevalence of breastfed to 6 months by local agency, MI-PNSS/ PedNSS 2014**





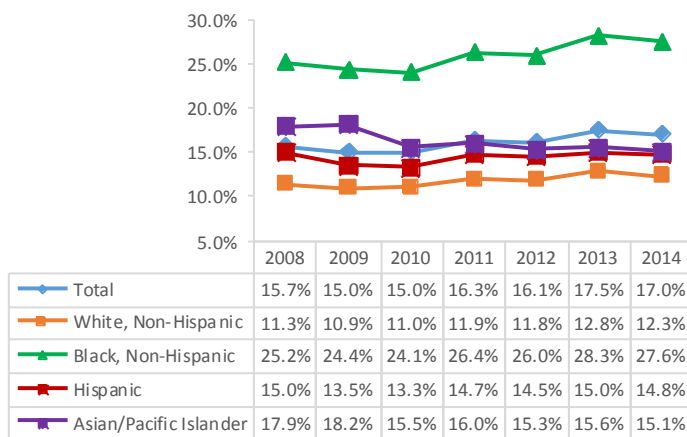
# MI-PNSS & PedNSS Report 2008-2014

## Anemia

Anemia is a condition marked by a deficiency of red blood cells or of hemoglobin in the blood. It may be related to nutritional deficiencies of vitamins B<sub>12</sub>, B<sub>6</sub>, C, folate, copper, or iron and other conditions such as thalassemia, sickle cell disease, bone marrow suppression, or lead poisoning. In children, anemia is associated with poverty, malnutrition, malabsorption, and inadequate dietary intake thus children enrolled in WIC may be at higher risk of anemia. Previous evidence suggests iron deficiency is associated with poorer motor function in infants (Shafir et al., 2008) and poorer infant social-emotional behavior (Carter et al., 2010).

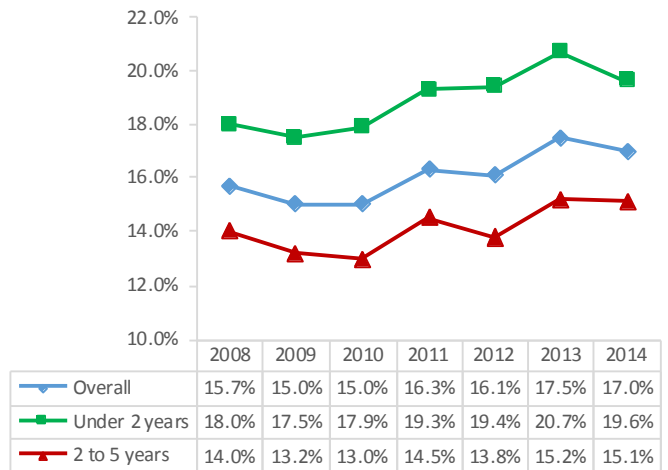
Infants and children enrolled in WIC are not tested specifically for iron deficiency but either their hematocrit (Hct) or hemoglobin (Hb) is measured

Figure 40: Trend of pediatric anemia prevalence by race/ethnicity among children <5 years enrolled in WIC, MI-PedNSS 2008-2014<sup>1-4</sup>



<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors. <sup>3</sup> Analyses based on one record per child. <sup>4</sup>Based on 1998 CDC MMWR, "Recommendations to Prevent and Control Iron Deficiency in the United States", altitude adjusted.

Figure 39: Trend of pediatric anemia prevalence among children <5 years enrolled in WIC, MI-PedNSS 2008-2014<sup>1-4</sup>



and adjusted for clinic altitude. In PedNSS, children ages 6 months to 2 years are considered anemic if their Hb is less than 11.0g/dl or their Hct is less than 32.9%. Children 2 to 5 years of age are considered anemic if their Hb is less than 11.1g/dl or their Hct is less than 33.0%.

From 2008 to 2014, the prevalence of anemia among all children 5 years and younger increased by 8.3%. The overall prevalence of anemia in children in 2014 was 17.0%. It was especially high among children under 2 years of age (19.6%) (Figure 39).

The prevalence of anemia among Black, Non-Hispanic children was significantly higher than other race/ethnicity groups. In 2014, the prevalence of Black, Non-Hispanic (27.6%) was more than double that of White, Non-Hispanic children (12.3 %) (Figure 40).

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Black, Non-Hispanic children born to mothers enrolled in WIC during their 1<sup>st</sup> trimester had a lower prevalence of anemia compared to those with mothers enrolled later in pregnancy. Among Hispanics and White, Non-Hispanic children anemia levels were slightly lower in those whose mothers enrolled at a earlier time (Figure 41).

Because of racial disparities in anemia prevalence, agencies with a higher

Figure 41: Prevalence of pediatric anemia by maternal race/ethnicity and trimester of WIC enrollment among children <5 years enrolled in WIC, MI-PNSS 2010-2014/PedNSS 2014<sup>1-4</sup>

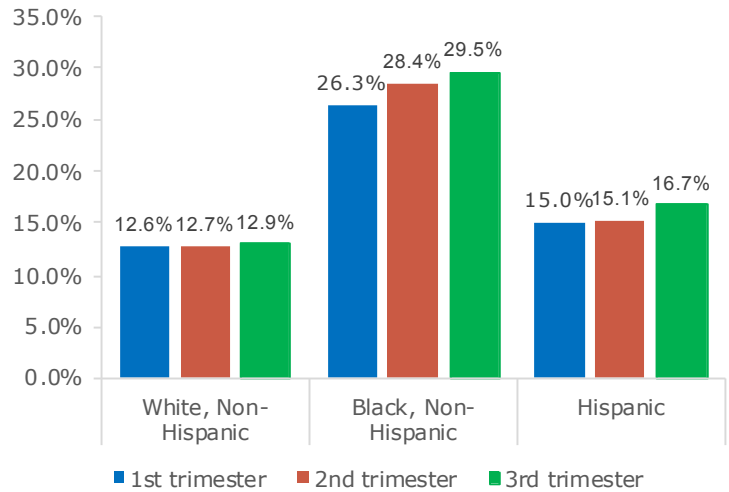


Table 14: Prevalence of anemia among children <5 years enrolled in WIC by local agency, MI-PedNSS 2014<sup>1-4</sup>

Lowest Prevalence of Anemia - Children 5 years or younger	
Agency	%
Huron County HD	5.6%
Branch-Hillsdale-St. Joseph DHD	5.2%
Tuscola County HD	4.8%
Mid-Michigan DHD	4.0%
Public Health Delta & Menominee	2.8%
Highest Prevalence of Anemia - Children 5 years or younger	
Agency	%
Detroit Urban League	33.2%
Kalamazoo County HD	26.2%
Kalamazoo Family Health Center	26.2%
InterCare Community Health Network	24.4%
Detroit DHWP	23.8%

**MI-PedNSS 2014**

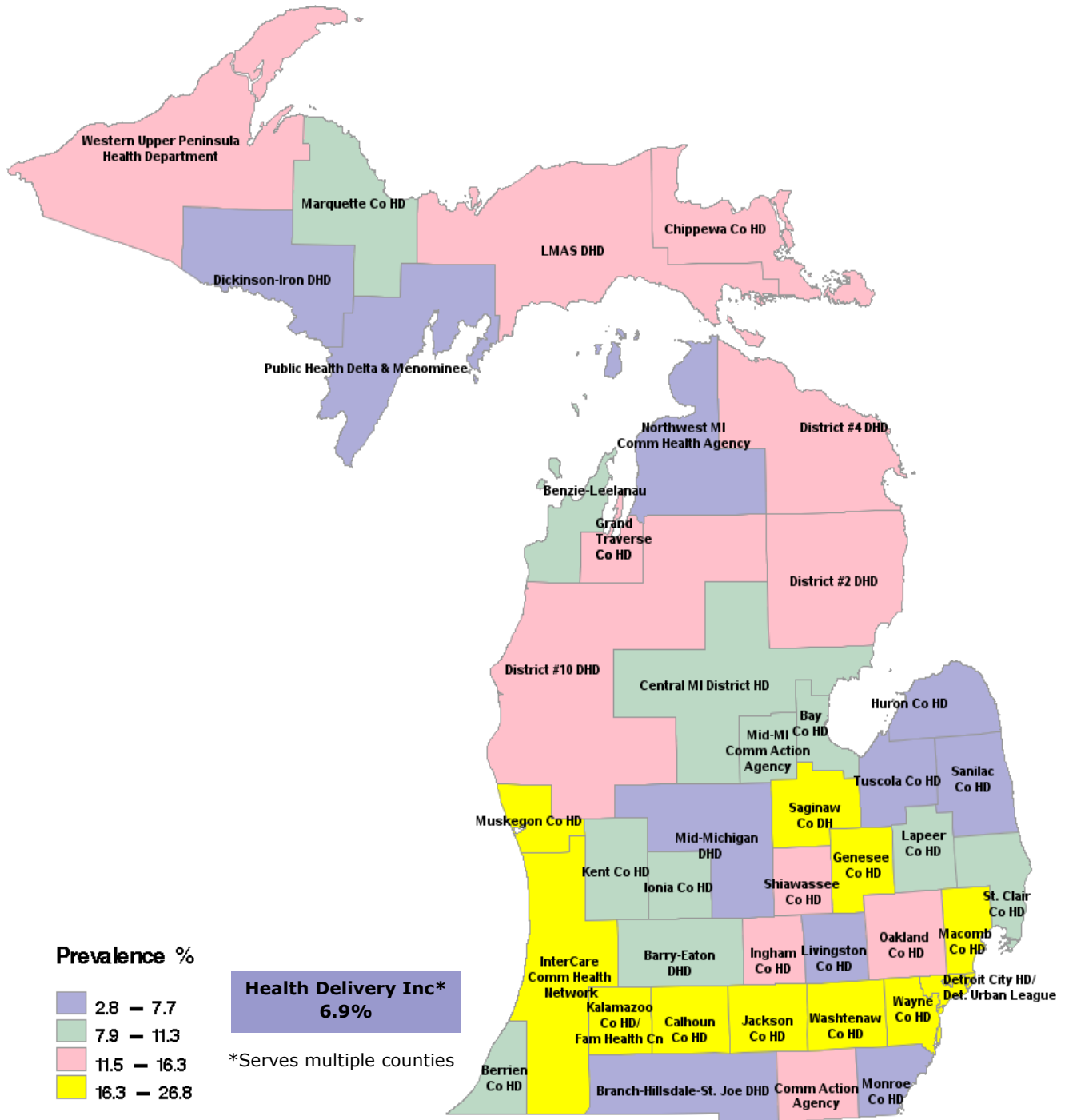
proportion of Black, Non-Hispanic children tended to have a higher prevalence of anemia (Table 14 and Figure 42). More than one-quarter (33.2%) of the children enrolled at the Detroit Urban League were anemic, where 70.5% of children are Black, Non-Hispanic. Although the proportion of Black, Non-Hispanic children enrolled at the Kalamazoo County Health Department is lower (17.8%), the anemia prevalence was the 2nd highest in the state (26.2%).

Furthermore, agencies with the lowest prevalence of anemia enrolled less than 1% of Black, Non-Hispanic children. Public Health Delta and Menominee Counties reported the lowest prevalence of anemia among children (2.8%).

<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors. <sup>3</sup> Analyses based on one record per child. <sup>4</sup> Based on 1998 CDC MMWR, "Recommendations to Prevent and Control Iron Deficiency in the United States", altitude adjusted.

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**Figure 42: Prevalence of pediatric anemia by local agency, MI-PedNSS 2014**





## **Undernutrition**

Undernutrition among children has long been recognized as a major public health problem, it is a serious and growing challenge especially in low and middle income classes.

Undernutrition has been associated with increased mortality, increased susceptibility to infectious diseases, impaired cognitive development, poor school performance, delayed physical growth, and motor development (Fishman et al., 2004, Haas, Murdoch, Rivera, & Martorell, 1996).

Infancy and early childhood are a period of intense growth, thus most vulnerable to nutrient deficiency. Improving health outcomes by improving the level of nutrition remains an imperative public health objective and is part of the Michigan WIC program’s mission.

Two anthropometric measures, height-for-age and weight-for-height, are used in PedNSS to assess the health status of infants and children in Michigan’s WIC population. Because the WIC population is by definition ‘at nutritional risk,’ the expected prevalence of short stature may be higher than what would be expected among the general population. Height or length is measured and recorded for every child at their certification or recertification visit.

### **HEALTHY PEOPLE 2020 GOAL**

Decrease the prevalence of short stature among low income children under 5 years of age to 5.0%

Local agencies achieved this goal in 2014:

- Luce-Mackinac-Alger-Schoolcraft DHD (2.6%)
- Benzie-Leelanau DHD (3.0%)
- Keweenaw Bay Indian Tribe (3.4%)
- Grand Traverse County HD (3.9%)
- Jackson County HD (4.6%)
- Barry-Eaton DHD (4.7%)
- InterCare Comm Health Network (4.7%)
- Chippewa County HD (4.8%)

### **Undernutrition - Short Stature**

Short stature (low length/height-for-age) may be associated with short parental stature, low birthweight, or may result from growth retardation, which in turn has been associated with chronic malnutrition and chronic illnesses (WHO, 1996). Before 2010, short stature is defined as <5th percentile based on length-for-age for children under 2 years of age and height-for-age for children 2 years of age and older using CDC 2000 growth chart. Since 2010, for children less than 2 years, short stature is defined as length-for-age<=2.3rd percentile based on WHO 2006 growth chart. For children 2 years and older, short stature is defined as if they are less than the 5<sup>th</sup> percentile height-for-age using the 2000 CDC gender-specific growth chart.



## MI-PNSS & PedNSS Report 2008-2014

From 2008 to 2014, the prevalence of short stature among children less than 2 years of age in the Michigan WIC population decreased from 9.6% to 8.4% (Figure 43). Prevalence of short stature remains consistently higher among Black, non-Hispanic children.

The prevalence of short stature decreased most among Asian/Pacific Islanders over these years (19.8%).

Figure 43: Trend of short stature prevalence by race/ethnicity among the children <2 years enrolled in WIC, MI-PedNSS 2008-2014<sup>1-4</sup>

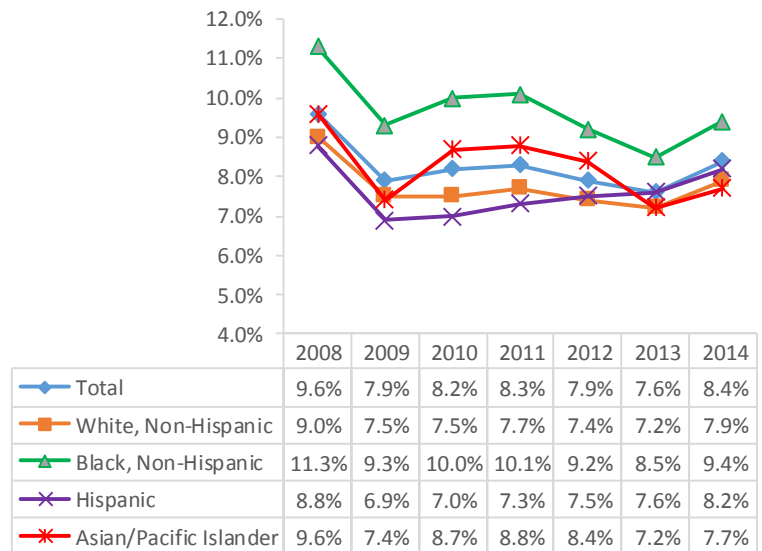
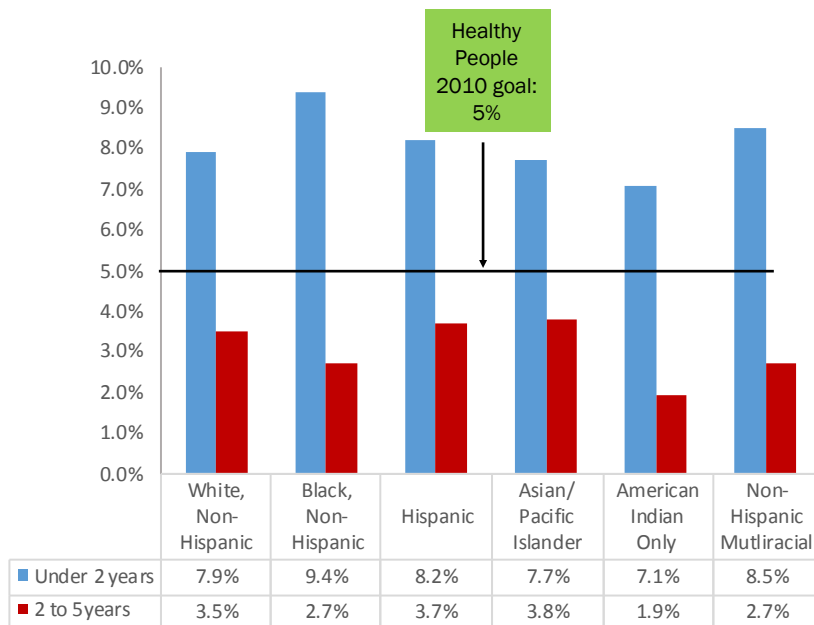


Figure 44: Prevalence of short stature among children <5 years enrolled in WIC by race/ethnicity and age group, MI-PedNSS 2014<sup>1-4</sup>



Short stature is less prevalent among children ages 2 to 5 years than among children under 2 years of age (Figure 44). By the age of 2 years, the prevalence of short stature was below the Healthy People 2010 objective for all racial/ethnic groups.

Many children enrolled in 2014 with short stature were born with low birthweight (43%).

<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data & errors <sup>3</sup>Analyses based on one record per child. <sup>4</sup>For children under 2 years of age; short stature is defined as length-for-age<=2.3rd percentile based on 2006 WHO growth chart percentiles. For children 2 years of age and older, short stature is defined as length-for-age<5th percentile based on 2000 CDC growth chart percentiles for height-for-age.

## MI-PNSS & PedNSS Report 2008-2014

Table 15: Prevalence of short stature among children <5 years enrolled in WIC by local agency, MI-PedNSS 2014<sup>1-4</sup>

<b>Highest Prevalence of short stature children 5 years or younger</b>	
<b>Agency</b>	<b>%</b>
Genesee County HD	8.4%
Mid-MI Community Action Agency	8.2%
Health Delivery, Inc	7.7%
Calhoun County HD	7.4%
Monroe County HD	7.3%
<b>Lowest Prevalence of short stature children 5 years or younger</b>	
<b>Agency</b>	<b>%</b>
Jackson County HD	4.6%
Grand Traverse County HD	3.9%
Keweenaw Bay Indian Tribe	3.4%
Benzie-Leelanau DHD	3.0%
Luce-Mackinac-Alger-Schoolcraft DHD	2.6%
<b>MI-PedNSS 2014</b>	

Logistic regression was performed to assess the association between short stature and child/maternal characteristics. Several factors were significantly associated with short stature including: maternal smoking at the prenatal visit, low maternal weight gain, maternal enrollment in WIC after the 1<sup>st</sup> trimester and children of Black, Non-Hispanic women (Table 16).

The prevalence of short stature varied by local WIC agency and ranged from 2.6% reported by the Luce-Mackinac-Alger-Schoolcraft District Health Department and Keweenaw Bay Indian Community to

to 8.4% at Genesee County Health Department. (Table 15).

After accounting for race and other factors, women who enroll in WIC during their 1<sup>st</sup> trimester have lower odds of having a short stature child than women who enroll during 3<sup>rd</sup> trimester.

Table 16: Adjusted Odds ratios for short stature among children <2 years of age by child and maternal effects, MI-PNSS 2012-2014/PedNSS 2014<sup>1-4</sup>

<b>Effect</b>	<b>OR Estimate</b>	<b>95% Confidence Limits</b>	
<b>WIC enrollment: 2nd trimester vs. 1st trimester</b>	1.05	0.99	1.12
<b>WIC enrollment: 3rd trimester vs. 1st trimester</b>	1.09	1.001	1.18
<b>Maternal gestational weight gain: Greater than ideal vs. ideal</b>	0.90	0.84	0.96
<b>Maternal gestational weight gain: Less than ideal vs. ideal</b>	1.20	1.11	1.3
<b>White, Non-Hispanic vs Black, Non-Hispanic</b>	1.07	0.99	1.15
<b>Hispanic vs Black, Non-Hispanic</b>	1.24	1.12	1.36
<b>Asian/Pacific Islander vs Black, Non-Hispanic</b>	0.99	0.77	1.27
<b>American Indian Only vs Black, Non-Hispanic</b>	1.15	0.69	1.9
<b>Non-Hispanic Multiracial vs Black, Non-Hispanic</b>	1.05	0.91	1.15
<b>Smoking at prenatal visit vs non-smoker</b>	1.32	1.23	1.41
<b>High birthweight vs normal birthweight</b>	0.17	0.13	0.22
<b>Low birthweight vs normal birthweight</b>	8.53	7.95	9.14
<b>Very low birthweight vs normal birthweight</b>	22.75	19.08	27.1
<b>MI-PNSS 2012-2014/PedNSS 2014</b>			

<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors frequency <sup>3</sup> Analyses based on one record per child. <sup>4</sup>For children under 2 years of age; short stature is defined as length-for-age<=2.3rd percentile based on 2006 WHO growth chart percentiles. For children 2 years of age and older, short stature is defined as length-for-age<5th percentile based on 2000 CDC growth chart percentiles for height-for-age.





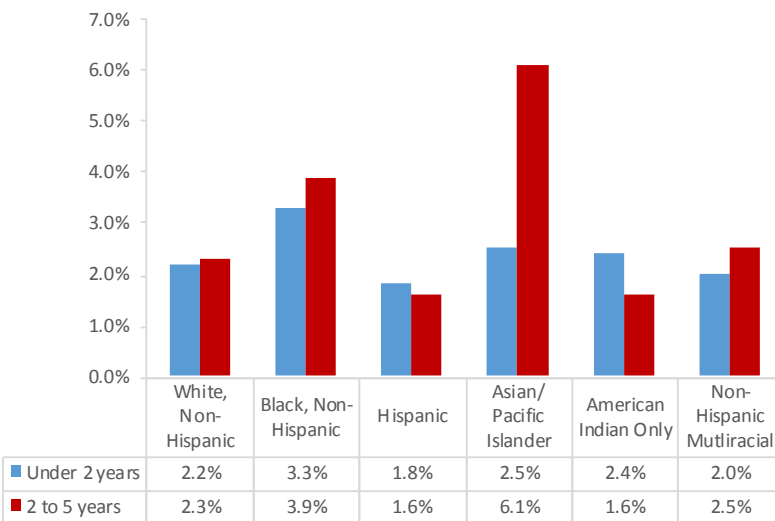
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## Undernutrition- Underweight

Underweight is a health indicator related to undernutrition. For children under 2 years of age, underweight is defined as weight-for-length  $\leq 2.3$  percentile based on 2006 WHO growth chart. For children 2 to 5 years of age, underweight is defined as weight-for-height  $< 5^{\text{th}}$  percentile based on 2000 CDC growth chart.

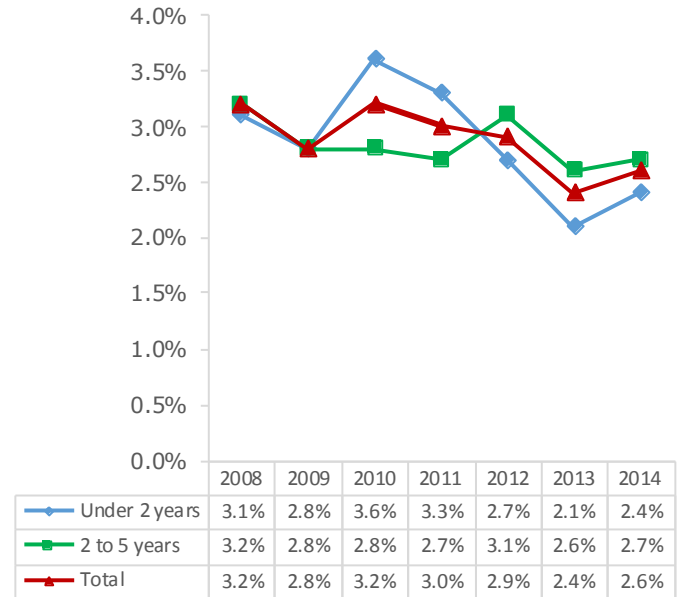
The 2014 overall prevalence for Michigan (2.6%) is lower than the expected prevalence 5%. Among children younger than 2 years of age, the prevalence is at 2.4% and among those 2 to 5 years old the prevalence is 2.7%

Figure 46: Prevalence of underweight by race/ethnicity and age group among children <5 years enrolled in WIC, MI-PedNSS 2014<sup>1-4</sup>



<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors <sup>3</sup>Analyses based on one record per child. <sup>4</sup>Based on 2006 WHO growth chart percentiles for children under 2 years of age, underweight is defined as weight-for-length  $\leq 2.3^{\text{rd}}$  percentile. For children 2 years of age, underweight is defined as BMI  $< 5^{\text{th}}$  percentile based on 2000 CDC growth chart.

Figure 45: Trend of underweight prevalence by age group among children <5 years of age enrolled in WIC, MI-PedNSS 2008-2014<sup>1-4</sup>



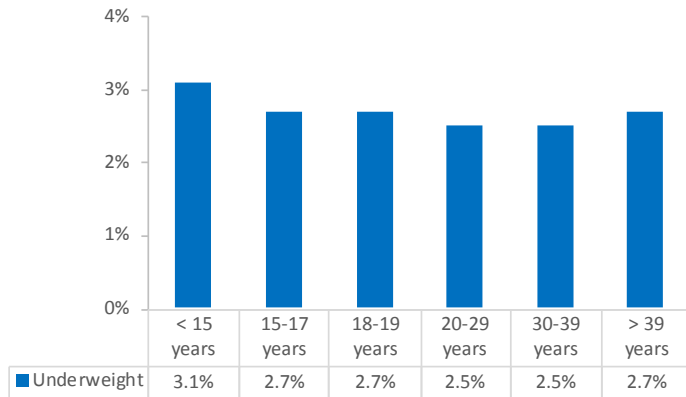
(Figure 45). Overall, the prevalence of underweight among children in WIC declined from 3.2% in 2008 to 2.6% in 2014. The change is both observed among children ages 2 to 5 (15.6% decrease) and children younger than 2 years of age (22.5% decrease).

The prevalence of underweight among children of both age groups varied by race/ethnicity (Figure 46). Among children under 2 years age, Black, Non-Hispanic had the highest prevalence (3.3%) followed by Asian/Pacific Islander children (2.5%). Among children 2 to 5 years old, the prevalence was highest among Asian/Pacific Islander at 6.1%.



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Figure 47: Prevalence of underweight among children <5 years of age enrolled in WIC by maternal age group MI-PNSS 2010-2014/ PedNSS 2014<sup>1-4</sup>



As shown in Figure 47, the prevalence of underweight among children was lower for those mothers aged 20-39 years (2.5%). The prevalence was highest for mothers younger than 15 years of age at birth (3.1%).

Dickinson-Iron District Health Department reported the lowest prevalence of underweight at 1.1%. Detroit Urban League reported the highest prevalence at 5.1% (Table 17).

### Highlight

The reported prevalence of underweight was less than or equal to 5% for nearly all agencies in Michigan during 2014.

Detroit Urban League was the only exception with prevalence of 5.1%.

Table 17: Prevalence of underweight among children <5 years of age enrolled in WIC by local agency, MI-PedNSS 2014<sup>1-4</sup>

Lowest Prevalence of Underweight	
Agency	%
District Health Dept. #4	
District Health Dept. #10	
Lapeer County HD	1.6%
Livingston County HD	
Marquette County HD	
Sanilac County HD	
Mid-Michigan DHD	1.5%
Public Health Delta & Menominee	1.5%
Mid-MI Community Action Agency	1.2%
Dickinson-Iron DHD	1.1%
Highest Prevalence of Underweight	
Agency	%
Detroit Urban League	5.1%
Jackson County HD	4.7%
Luce-Mackinac-Alger-Schoolcraft DHD	4.6%
Grand Traverse County HD	4.6%
Keweenaw Bay Indian Community	4.2%

MI-PedNSS 2014

<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup>. <sup>2</sup>Excludes records with unknown data and errors. <sup>3</sup>Analyses based on one record per child. <sup>4</sup>Based on 2006 WHO growth chart percentiles, for children under 2 years of age, underweight is defined as weight-for length<=2.3rd percentile. For children older than 2 years of age, underweight is defined as BMI for age <5<sup>th</sup> percentile based on 2000 CDC growth chart.



**Overweight and Obesity**

Overweight is defined as having excess body weight for a particular height from fat, muscle, bone, water, or a combination of these factors. Obesity is defined as having excess body fat. Similar to adults, obesity in

**MICHIGAN WIC PROGRAM FIVE YEAR PLAN**

Decrease the prevalence of obesity among children to 12.0% by December 2013.

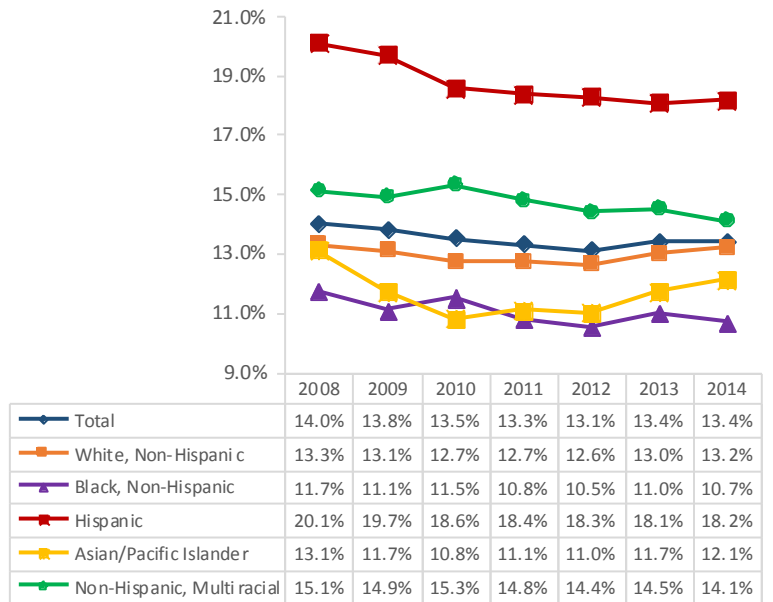
- In 2014, 6 local agencies have reached the 12.0% goal.

children has become an epidemic in the United States and in other industrialized countries. Childhood obesity has dou-

bled in the past 30 years. Obesity in children has been associated with a variety of adverse health effects which include increased risk of cardiovascular disease, prediabetes, bone and joint problems, asthma, sleep disorders, and skin infections. Obese children tend to have lower self-esteem and self confidence than non-obese children and may be stigmatized, bullied or marginalized by their peers (van Geel, Vedder, & Tanilon, 2014). Research has found that obesity during childhood can lead to obesity in adulthood and have both immediate and long term effects on their health (Van

Dijk & Innis, 2009). Although somewhat controversial, the concept that events in utero or early infancy can increase the risk of childhood and adult obesity has been proposed (Barker, 2004; Stettler, 2007). For example, the rate of weight-gain in infancy has been associated with childhood obesity (Stettler, Zemel, Kumanyika, & Stallings, 2002). Other factors, however, could confound this association (e.g. maternal BMI, low birthweight infants and the concept of catch-up growth). Nevertheless, higher childhood BMI was found to be associated with increased risk of coronary heart disease in adulthood.

Figure 48: Trend of obesity prevalence by race/ethnicity among children ages 2 to 5 years enrolled in WIC, MI-PedNSS 2008-2014<sup>1-4</sup>



<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors. <sup>3</sup>Analyses based on one record per child. <sup>4</sup>Based on 2000 CDC growth chart percentiles for children 2 years of age and older.



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The association increased with age and was stronger for boys than for girls (Baker, Olsen, & Sorensen, 2007). Childhood obesity remains an important public health issue, one that the WIC program continues to address with improved food packages and nutritional counseling. Using the new guidelines from the American Academy of Pediatrics and the CDC gender specific BMI for age chart, a child with a BMI percentile above 95% is considered obese (previously referred to as 'overweight'). Children with a BMI percentile over 85% and less than or equal to 95% are considered overweight (previously 'risk of overweight') (American Academy of Pediatrics, 2009). By definition, 5% of children are expected to be above the 95th percentile due to

Figure 50: Prevalence of obese and overweight among children ages 2 to 5 years enrolled in WIC by race/ethnicity, MI-PedNSS 2014<sup>1-4</sup>

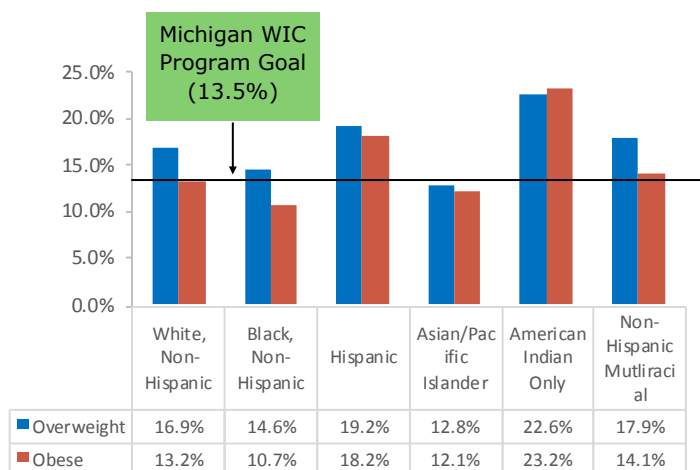
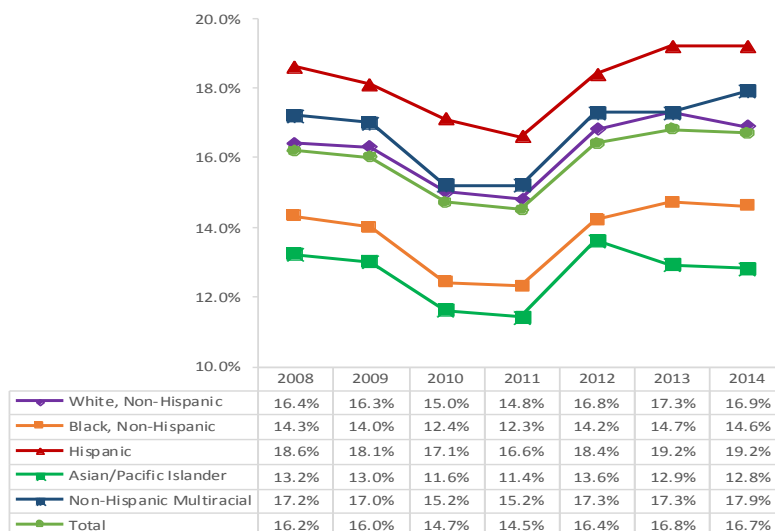


Figure 49: Trend of overweight prevalence by race/ethnicity among children 2 to 5 years enrolled in WIC, MI-PedNSS 2008-2014<sup>1-4</sup>



normal variation, thus a prevalence of obesity greater than 5% indicates that there is a higher than usual proportion of children who are obese. In 2014, the overall prevalence of obesity among children ages 2 to 5 years enrolled in Michigan WIC was 13.4%. Although higher than the 5% expected level, the increasing trend found in the 2003-2007 report has leveled off and the prevalence in 2014 is even lower than that in 2008 at 14.0% (Figure 48). The prevalence was consistently higher among Hispanic children and American Indian children while lower among Black, Non-Hispanic and Asian children.

<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors. <sup>3</sup>Analyses based on one record per child. <sup>4</sup>Based on 2000 CDC growth chart percentiles for children 2 years of age and older.



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Bi-variate analysis was conducted to assess the association between selected maternal, child characteristics and BMI among young children enrolled in MI WIC.

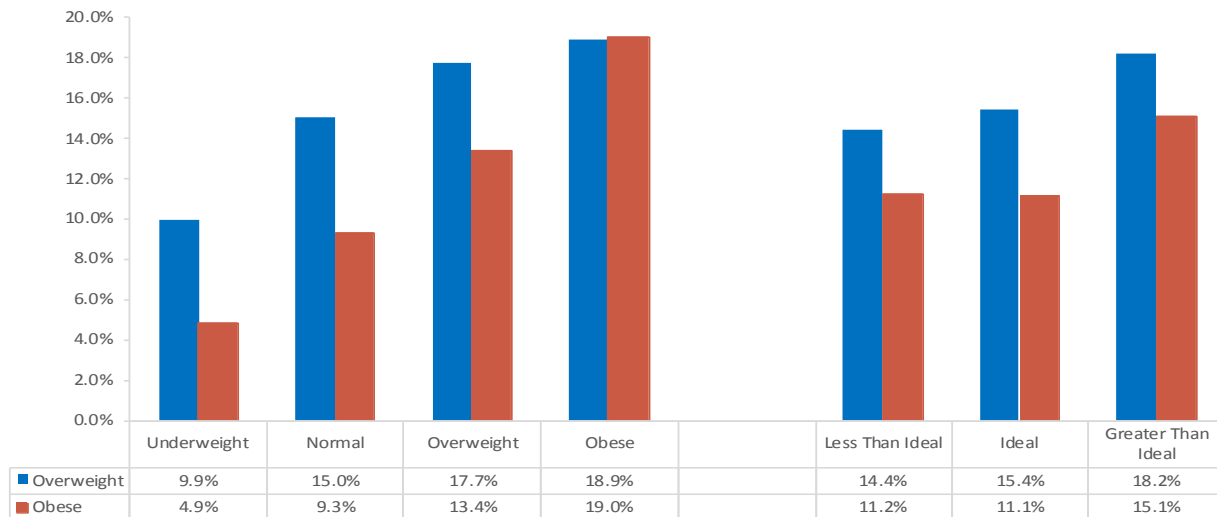
Analysis of pediatric overweight and obesity by selected maternal and infant characteristics yielded results outlined in Table 18 and Figure 51.

The association was tested by using chi-square statistics. Never breastfed, maternal smoking during the last trimester put the child at higher risk of becoming overweight and obese. Being female, having higher maternal education and born with low birthweight (full term) reduces the risk of becoming overweight or obese during the age 2 to 5 years.

Table 18: Prevalence of overweight and obese among children ages 2 to 5 enrolled in MI WIC by selected maternal and infant characteristics, MI-PNSS 2010-2012/PedNSS 2014<sup>1-6</sup>

	Over-weight %	Obese %
<b>Maternal Education</b>		
<12 yrs	17.9%	14.5%
12 yrs	17.1%	13.7%
>12 yrs	16.1%	12.3%
<b>Gender</b>		
Male	17.5%	13.8%
Female	16.5%	13.2%
<b>Breastfeeding ever</b>		
No	17.3%	14.7%
Yes	16.8%	12.7%
<b>Smoking 3rd trimester</b>		
No	16.5%	12.9%
Yes	19.5%	16.7%
<b>Full term low birthweight</b>		
No	17.3%	13.7%
Yes	9.3%	8.1%

Figure 51: Prevalence of obesity and overweight by maternal prenatal BMI or maternal gestational weight gain among 2-5 years old children enrolled in WIC and born to mothers enrolled in WIC, MI-PNSS 2010-2012/PedNSS 2014<sup>1-5</sup>



<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors. <sup>3</sup>Analyses based on one record per child. <sup>4</sup>Gestation weight gain is defined based on 1990 IOM report "Nutrition during pregnancy" <sup>5</sup>Based on 2000 CDC growth chart percentiles for weight-for-length for children 2 years of age and older.



**FOCUS ON PEDIATRIC OBESITY**

A Multiple logistic regression model was used to estimate the odds of a child having a BMI categorized as overweight (>85th percentile), obese (>95th percentile). The model takes into account both maternal effects (maternal prenatal BMI, gestational weight gain, education level, and prenatal smoking) and child effects (race/ethnicity, gender, birthweight and ever breastfed). Analysis results are shown in Table 19. Some characteristics are positively associated with the child’s BMI increases. For example, the adjusted odds ratio for the effect of obese maternal prenatal BMI on a child having a BMI 85<sup>th</sup> percentile or greater is 1.44 (compared to a child whose mother had a BMI categorized as normal). The effect of maternal obesity increases to 2.42 for children whose BMI is in the 95th percentile. Other characteristics which were significantly associated with an increased risk of a child being overweight or obese were: Hispanic ethnicity, American Indian ethnicity, high birthweight (>4,000g), maternal education less than high school, maternal BMI either obese or overweight, maternal gestational weight gain greater than ideal, and prenatal smoking. In contrast, infant low birthweight and

underweight maternal prenatal BMI were found to be protective against obesity. Furthermore, ever breastfed as an infant was mildly protective.

Table 19: Adjusted Odds ratios for Child BMI >85<sup>th</sup> percentile and >95<sup>th</sup> percentile by infant, child & maternal effects among children ages 2 to 5 years, MI-PNSS 2010-2014/PedNSS 2014

Effect	Odds Ratio Estimates			>85th		>95th	
	AOR	95% Confidence Limits		AOR	95% Confidence Limits		
<b>Breastfed</b>							
Ever vs never	0.92	0.87	0.97	0.82	0.77	0.87	
<b>Maternal Education</b>							
HS vs >HS	1.07	1.01	1.14	1.1	1.03	1.18	
<HS vs >HS	1.18	1.1	1.27	1.19	1.1	1.28	
<b>Maternal Smoking</b>							
Smoking at prenatal visit vs not	1.28	1.2	1.36	1.49	1.39	1.59	
<b>Maternal Weight Gain</b>							
>Ideal vs Ideal	1.17	1.11	1.24	1.24	1.17	1.33	
<Ideal vs Ideal	0.96	0.89	1.04	1	0.92	1.09	
<b>Maternal Prenatal Weight</b>							
Underweight vs Normal	0.64	0.55	0.74	0.48	0.38	0.59	
Overweight vs Normal	1.23	1.16	1.31	1.49	1.39	1.61	
Obese vs Normal	1.44	1.35	1.53	2.42	2.26	2.59	
<b>Child Gender</b>							
Male vs Female	1.07	1.01	1.12	1.03	0.98	1.09	
<b>Race/Ethnicity</b>							
Black, Non-Hispanic vs White, Non-Hispanic	0.81	0.76	0.86	0.74	0.69	0.79	
Hispanic vs White, Non-Hispanic	1.23	1.14	1.33	1.43	1.32	1.55	
Asian/Pacific Islander vs White, Non-Hispanic	0.99	0.77	1.28	1.57	1.21	2.03	
American Indian Only vs White, Non-Hispanic	1.51	1.02	2.22	1.71	1.14	2.54	
Non-Hispanic Multiracial vs White, Non-Hispanic	0.99	0.91	1.09	0.98	0.89	1.09	
<b>Infant Birthweight</b>							
Very Low vs Normal	0.59	0.43	0.81	0.28	0.17	0.46	
Low vs Normal	0.63	0.56	0.7	0.67	0.59	0.76	
High vs Normal	1.68	1.54	1.84	1.96	1.79	2.15	

Model includes : maternal prenatal weight, gestational weight gain, education, and prenatal smoking and child's race/ethnicity, gender, birthweight and ever breastfed



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Prevalence of obesity and overweight varied by local agency (Figures 52 & 53; Tables 20 & 21). Both highest prevalence of overweight and obesity were reported by Keweenaw Bay Indian Community (22.9% and 27.5% respectively). The lowest prevalence of overweight among children was reported by the Detroit Urban League (14.4%) and the lowest prevalence of obesity among children was reported by Western Upper Peninsular District Health Department (9.9%).

Table 20: Prevalence of overweight among children 2 to 5 years of age enrolled in WIC by local agency, MI-PedNSS 2014<sup>1-4</sup>

Highest Prevalence of Overweight	
Agency	%
Keweenaw Bay Indian Community	22.9%
Sanilac County HD	22.1%
Jackson County HD	21.2%
Lapeer County HD	20.0%
District Health Dept. #10	19.6%
Lowest Prevalence of Overweight	
Agency	%
Oakland County HD	15.3%
Wayne County HD	15.3%
Western Upper Peninsula DHD	15.1%
Detroit DHWP	15.1%
Benzie-Leelanau DHD	14.8%
Detroit Urban League	14.4%
<b>MI-PedNSS 2014</b>	

Table 21: Prevalence of obesity among children 2 to 5 years of age enrolled in WIC by local agency, MI-PedNSS 2014<sup>1-4</sup>

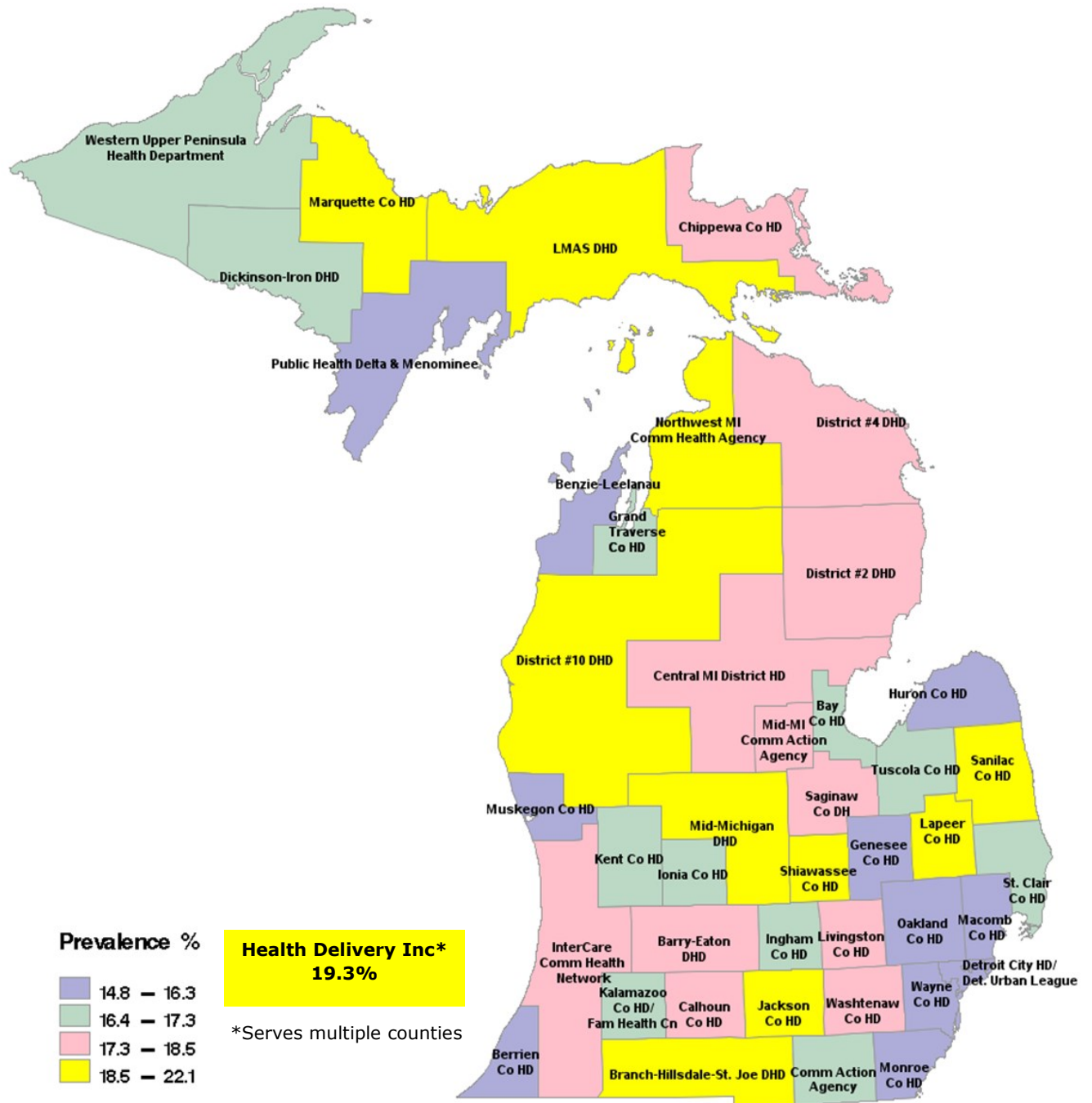
Highest Prevalence of Obesity	
Agency	%
Keweenaw Bay Indian Community	27.5%
Huron County HD	20.4%
Community Action Agency	17.2%
Sanilac County HD	16.3%
District Health Dept. #4	16.2%
Lowest Prevalence of Obesity	
Agency	%
Oakland County HD	11.9%
Wayne County HD	11.9%
Marquette County HD	11.8%
Livingston County HD	11.5%
Western Upper Peninsula DHD	9.9%
Luce-Mackinac-Alger-Schoolcraft DHD	9.9%
<b>MI-PedNSS 2014</b>	

<sup>1</sup>Recording period is January 1<sup>st</sup> through December 31<sup>st</sup> <sup>2</sup>Excludes records with unknown data and errors. <sup>3</sup>Analyses based on one record per child. <sup>4</sup>Based on 2000 CDC growth chart percentiles for children 2 years of age and older, overweight is defined as BMI-for-age  $\geq$  85th to < 95th percentile, and obesity is defined as height-for-age < 5th percentile.



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**Figure 52: Prevalence of overweight among children ages 2 to 5 years by local agency, MI-PedNSS 2014**

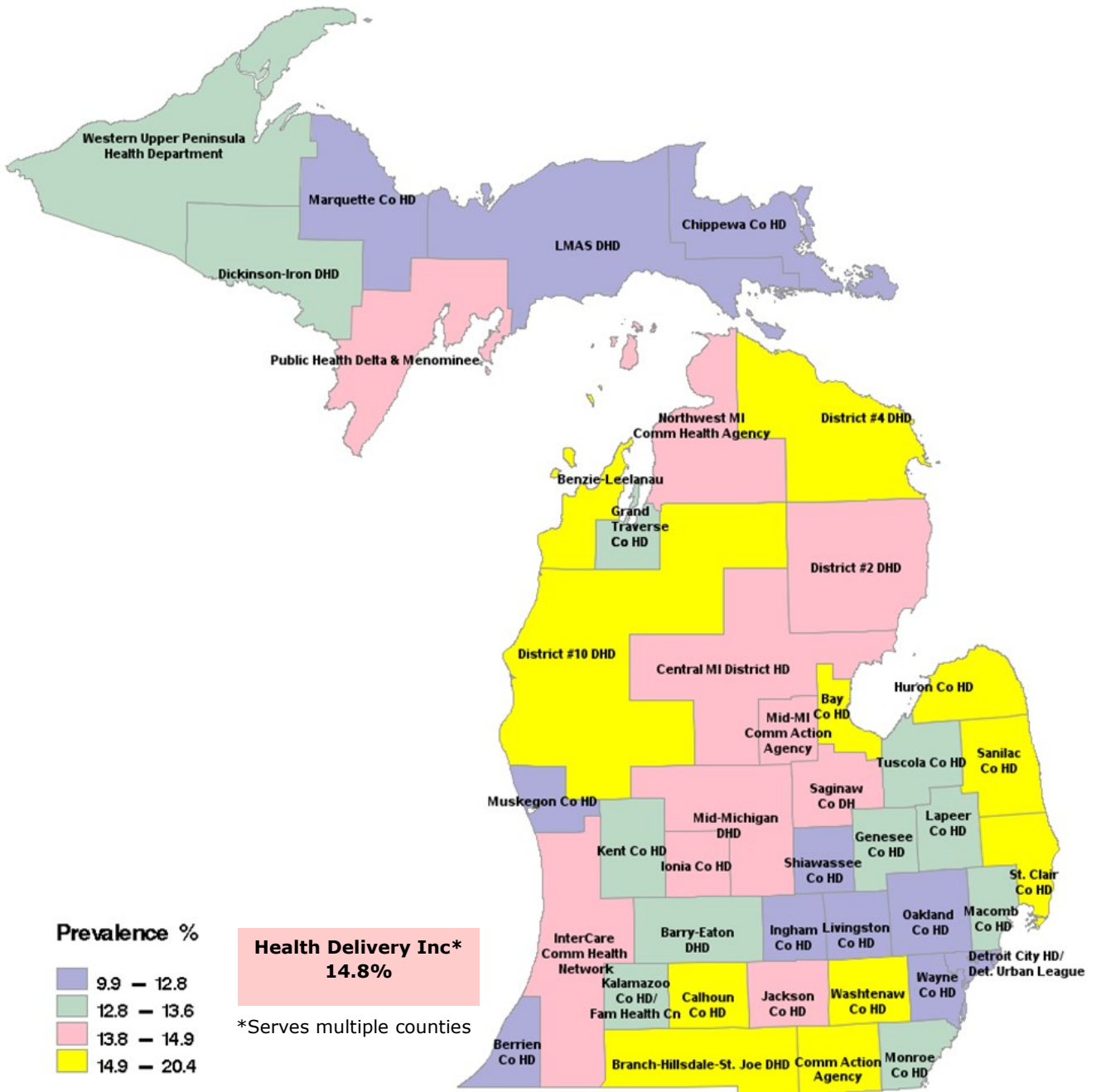






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**Figure 53: Prevalence of obesity among children ages 2 to 5 years by local agency, MI-PedNSS 2014**





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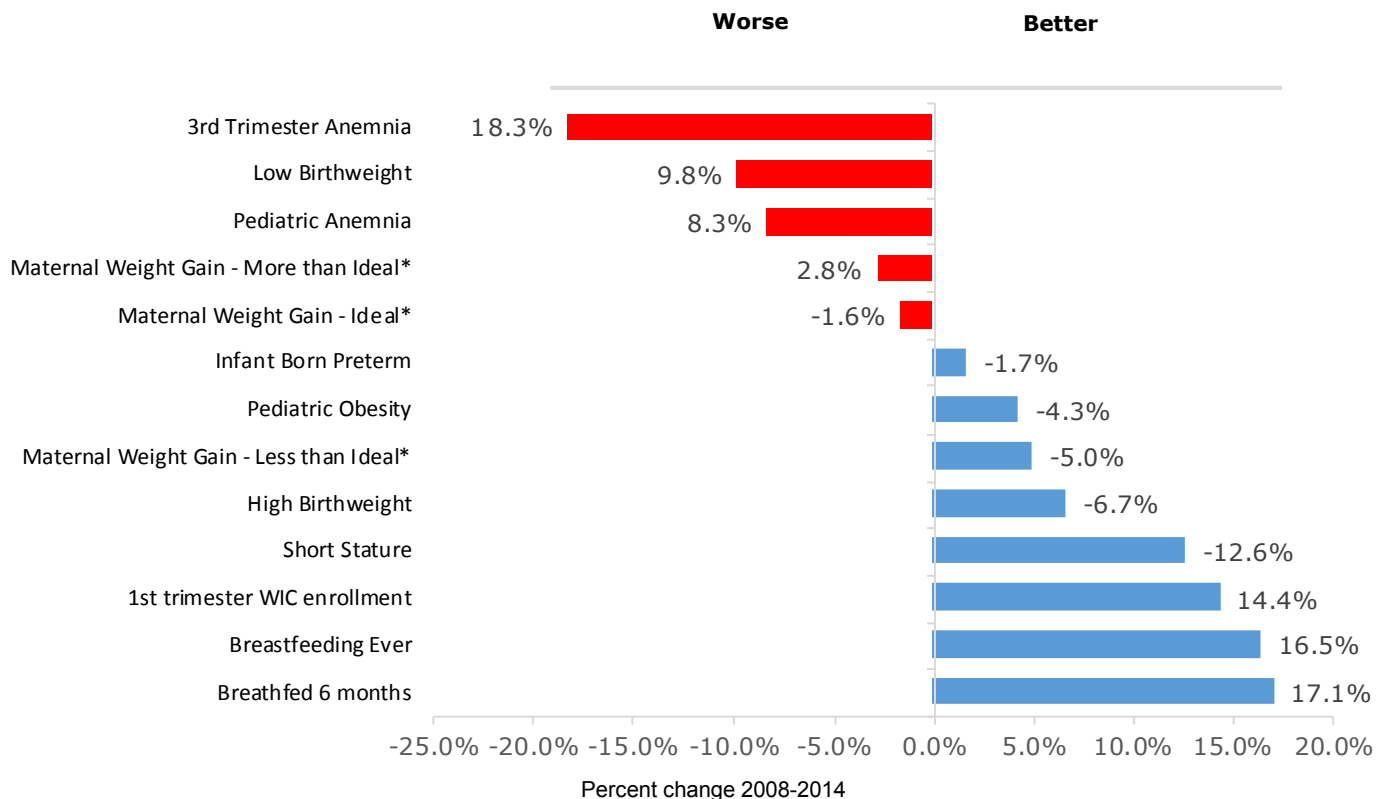
Both maternal and child health indicators were observed among the Michigan WIC population from 2008 to 2014. Changes of key indicators were summarized below over this period.

Improvements were seen in several health indicators notably: Breastfeeding initiation increased by 16.5% and breastfeeding to 6 months increased by 17.1%. WIC first trimester enrollment increased by 14.4%. Pediatric short stature decreased by 12.6%. High birthweight declined by 6.7% (Figure

54). Modest improvements were observed among high birthweight (6.7% decline), maternal weight gain less than ideal (5% decline), and pediatric obesity (4.3% decline) and pre-term birth (1.7% decline).

Despite this progress, there are areas of concern. Maternal 3<sup>rd</sup> trimester anemia increased by 18.3% and anemia among children increased 9.3%. Low birthweight incidence increased 9.8%. The prevalence of women gaining more than ideal weight during pregnancy increased by 2.8% while the prevalence for gaining ideal weight decreased by 1.6%.

Figure 54: Changes in maternal, infant and child health status, MI-PNSS/PedNSS 2008-2014\*



Note: \*Includes data from 2010–2014 due to limited quality data in 2008 and 2009



### Maternal & Pediatric Nutrition Recommendations

Results of the analysis of the Michigan PNSS and PedNSS data provide an important knowledge base that enhances our ability to identify needs and prioritize public health programs. Our analysis results support the following actions:

- ◆ Mothers with low prenatal BMI and those who gain less than ideal weight are especially at high risk for delivering low birthweight babies. Programs to improve nutrition status and promote healthier behaviors during pregnancy for those moms that are at higher risk of delivering low birth weight babies are needed.
- ◆ Prenatal counseling should be provided about the importance of appropriate weight gain during pregnancy and the health risks of excess weight gain and post-partum weight gain retention, especially to women who are overweight or obese prior to conception.
- ◆ Black, Non-Hispanic women present a significantly lower rate of initiating breastfeeding compared to other race/ethnicity groups. Effort should be continued to promote breastfeeding initiation. E.g. Form partnerships with hospitals and primary care providers to promote breastfeeding initiation.
- ◆ Despite the prevalence of breastfeeding for 6 months increasing overall, it was mainly driven by the increase in White, Non-Hispanic mothers. There was a slight increase in Black, Non-Hispanic mothers whereas the prevalence among Hispanic mothers decreased over the years. More effective programs are needed to promote breastfeeding duration among Black, Non-Hispanic women and Hispanic women.
- ◆ Diet is the most important way to prevent and treat iron deficiency. Increased consumption of food rich in iron in young children is needed to reduce pediatric anemia.
- ◆ Help WIC participants understand the benefits of their food packages and how to implement it in their diets.
- ◆ WIC staff should consider the physical and social determinants of health for each WIC participant. Develop and implement direct programs to achieve positive changes in dietary and physical activity.
- ◆ Continue to promote the intake of fruits, vegetables, and whole grains with food packages.
- ◆ In order to compare Michigan on a national level, MI-PNSS and PedNSS needs to be expanded to all states.
- ◆ Produce data reports that provide sufficient evidence that causes a catalyst for action in developing or implementing policies.
- ◆ Extend the eligibility for children to participate in WIC until their 6<sup>th</sup> birthday.
- ◆ Expand women up to 2 years to cover interpregnancy and postpartum to increase breastfeeding.



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## **Appendix A: Map of Local Agencies and Agency Trend Tables**



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## Geographic area of local WIC agencies, MI 2014



**Table A-1. Selected indicators by Local WIC Agency, Michigan PNSS & PedNSS 2012**

	PNSS N	PedNSS N	Total N <sup>a</sup>	Race/Ethnicity <sup>a</sup>				1st Trimester WIC Enrollment <sup>b</sup>	Weight Gain <sup>b</sup>		Low Birthweight <sup>b</sup>		
				White	Black	Hispanics	Multiracial		<Ideal	>Ideal	Total	White	Black
<b>Michigan</b>	67,975	256,681	324,656	51.7%	26.5%	13.0%	6.8%	38.0%	17.4%	51.3%	8.8%	7.2%	12.7%
<b>Barry-Eaton DHD</b>	809	3,122	3,931	84.9%	2.6%	6.4%	5.4%	46.3%	14.6%	54.0%	8.8%	8.7%	*
<b>Bay County HD</b>	679	2,785	3,464	72.5%	2.1%	14.8%	10.2%	54.2%	20.6%	48.0%	9.0%	9.4%	*
<b>Benzie-Leelanau DHD</b>	154	677	831	71.3%	0.5%	18.6%	6.9%	47.7%	15.5%	52.7%	7.0%	9.1%	*
<b>Berrien County HD</b>	1,201	4,227	5,428	47.2%	38.6%	6.0%	7.1%	35.7%	14.8%	53.1%	8.0%	5.6%	12.2%
<b>Branch-Hillsdale-St. Joe DHD</b>	1,314	5,497	6,811	77.8%	1.8%	14.9%	5.3%	44.5%	19.4%	50.4%	7.6%	7.6%	*
<b>Calhoun</b>	1,234	4,878	6,112	53.6%	19.2%	10.5%	12.2%	44.4%	19.0%	49.1%	8.1%	8.2%	10.5%
<b>Central MI District HD</b>	1,254	5,128	6,382	88.7%	1.4%	3.7%	5.3%	51.0%	16.4%	50.0%	5.3%	4.8%	*
<b>Chippewa County HD</b>	272	1,160	1,432	51.2%	0.5%	3.2%	30.0%	58.5%	13.9%	54.3%	5.1%	4.0%	
<b>Community Action Agency</b>	632	2,253	2,885	69.3%	1.3%	22.8%	6.5%	34.0%	16.9%	51.7%	7.0%	6.5%	*
<b>Delta-Menominee</b>	394	1,528	1,922	85.0%	0.1%	3.2%	10.8%	51.0%	14.5%	49.7%	5.9%	5.6%	*
<b>Detroit City</b>	8,257	30,772	39,029	8.3%	73.6%	14.6%	2.3%	31.6%	19.8%	50.9%	12.1%	10.0%	13.3%
<b>Detroit Urban League</b>	3,441	13,680	17,121	18.6%	66.2%	11.0%	2.8%	28.8%	19.4%	48.2%	10.7%	6.3%	12.4%
<b>Dickinson-Iron DHD</b>	248	1,034	1,282	90.1%	0.2%	2.7%	6.8%	56.1%	19.0%	48.0%	10.5%	10.4%	*
<b>District Health Department #10</b>	2,238	8,643	10,881	79.1%	1.2%	14.2%	5.2%	49.0%	17.5%	48.9%	7.8%	7.7%	*
<b>District Health Department #2</b>	450	1,724	2,174	92.2%	0.2%	2.8%	4.6%	49.7%	16.7%	54.3%	3.8%	3.8%	*
<b>District Health Department #4</b>	464	1,800	2,264	89.4%	0.5%	2.0%	7.5%	51.1%	18.3%	49.0%	8.6%	7.9%	*
<b>Downriver Community Serv</b>	851	3,238	4,089	69.1%	9.1%	11.9%	8.0%	33.1%	14.9%	52.7%	8.0%	7.7%	11.3%
<b>Genesee County HD</b>	3,225	11,186	14,411	47.3%	38.5%	5.7%	8.1%	25.3%	15.6%	53.1%	10.4%	8.6%	14.1%
<b>Grand Traverse County HD</b>	561	2,077	2,638	86.7%	0.8%	5.8%	5.7%	47.5%	16.4%	50.2%	6.1%	6.4%	*
<b>Health Delivery, Inc.</b>	568	2,416	2,984	11.0%	54.1%	31.1%	3.6%	52.4%	22.3%	48.8%	10.7%	5.8%	14.7%
<b>Huron</b>	201	884	1,085	92.0%	0.3%	4.9%	2.6%	50.3%	16.1%	54.2%	6.8%	6.1%	*
<b>Ingham County HD</b>	2,077	7,275	9,352	39.7%	25.4%	18.7%	11.1%	37.9%	14.5%	54.8%	9.3%	6.7%	12.4%
<b>Intercare Comm. Health Network</b>	3,518	14,020	17,538	59.7%	3.3%	30.8%	5.0%	45.1%	20.8%	47.4%	7.0%	6.5%	14.9%
<b>Ionia County HD</b>	433	1,870	2,303	84.7%	0.3%	11.0%	3.7%	51.0%	18.0%	47.1%	7.7%	8.0%	*
<b>Jackson County HD</b>	1,296	5,061	6,357	64.9%	12.7%	8.7%	13.4%	45.9%	15.8%	53.2%	9.3%	8.6%	10.8%
<b>Kalamazoo County HD</b>	872	3,093	3,965	60.1%	16.6%	10.9%	11.2%	43.4%	12.1%	56.4%	7.0%	6.5%	10.1%
<b>Kalamazoo Family Health Center</b>	927	3,847	4,774	34.3%	41.2%	13.1%	10.8%	47.5%	21.2%	50.2%	8.2%	5.7%	11.8%
<b>Kent</b>	5,213	20,327	25,540	35.9%	20.6%	31.9%	8.7%	41.5%	22.9%	46.7%	8.1%	7.1%	13.1%
<b>Keweenaw Bay WIC Program</b>	66	273	339	4.7%	*	4.4%	7.7%	52.3%	16.9%	32.2%	10.0%	*	*
<b>Lapeer County HD</b>	531	2,012	2,543	86.1%	0.4%	6.6%	6.8%	41.7%	14.6%	60.3%	5.7%	5.7%	*
<b>Livingston County HD</b>	580	2,086	2,666	89.6%	0.5%	4.6%	4.0%	31.7%	11.7%	57.5%	6.5%	7.0%	*
<b>LMAS</b>	198	915	1,113	70.1%	0.2%	0.9%	25.7%	58.7%	14.6%	48.5%	9.2%	7.9%	*
<b>Macomb County HD</b>	3,206	10,755	13,961	56.6%	25.9%	3.6%	8.6%	27.9%	14.7%	55.2%	8.8%	7.3%	12.6%
<b>Marquette County HD</b>	370	1,356	1,726	82.3%	0.5%	3.8%	12.4%	46.1%	17.2%	51.1%	6.6%	5.6%	*
<b>Mid-Michigan Comm.</b>	471	2,031	2,502	88.7%	1.2%	3.6%	5.4%	46.8%	18.4%	51.8%	6.6%	6.3%	*
<b>Mid-Michigan DHD</b>	1,035	3,988	5,023	85.0%	0.6%	10.8%	3.2%	43.4%	16.7%	51.2%	7.3%	7.6%	*
<b>Monroe County HD</b>	913	3,380	4,293	81.5%	4.4%	7.1%	6.7%	41.4%	18.3%	53.1%	8.0%	8.1%	*
<b>Muskegon County HD</b>	1,703	6,939	8,642	54.6%	23.6%	11.5%	9.9%	49.0%	17.5%	50.2%	8.5%	7.3%	12.9%
<b>Northwest MI Comm Health Agency</b>	750	2,987	3,737	88.6%	0.3%	3.0%	6.7%	51.8%	18.4%	51.6%	4.6%	4.7%	*
<b>Oakland</b>	4,437	16,143	20,580	48.1%	30.9%	12.7%	6.0%	29.7%	15.3%	53.8%	8.9%	7.3%	11.4%
<b>Saginaw County Depart PH</b>	1,272	4,713	5,985	50.0%	28.0%	15.4%	6.2%	49.2%	19.8%	51.1%	9.3%	8.5%	11.0%
<b>Sanilac County HD</b>	257	1,052	1,309	89.2%	0.2%	7.6%	3.0%	50.0%	18.8%	44.2%	9.0%	9.8%	*
<b>Shiawassee County HD</b>	503	1,935	2,438	87.8%	0.4%	6.4%	5.1%	44.7%	16.1%	50.8%	8.5%	8.1%	*
<b>St Clair County HD</b>	981	3,685	4,666	76.5%	4.8%	7.6%	10.8%	47.5%	14.2%	54.1%	8.7%	8.9%	*
<b>Tuscola County HD</b>	383	1,564	1,947	88.0%	0.8%	7.3%	3.8%	49.5%	14.4%	51.3%	7.9%	7.9%	*
<b>Washtenaw County HD</b>	1,513	5,589	7,102	34.8%	37.7%	11.9%	11.0%	36.1%	17.9%	51.3%	9.8%	7.3%	12.6%
<b>Wayne</b>	5,509	19,526	25,035	59.9%	23.9%	5.2%	7.3%	26.2%	14.6%	52.1%	8.8%	6.8%	13.0%
<b>Western Upper Penin DHD</b>	366	1,550	1,916	88.2%	0.6%	2.5%	6.5%	43.1%	15.6%	46.5%	5.0%	4.8%	*

<sup>a</sup> PNSS & PedNSS combined data (Distribution of American Indian/Alaska Native & Asian/Pacific Islander available in Local Agency Briefs). <sup>b</sup> PNSS Data. \*Data insufficient for analysis

**Table A-1 (continued) Selected indicators by Local WIC Agency, Michigan PNSS & PedNSS 2012**

	Breastfeeding <sup>c</sup>		Overweight <sup>d,e</sup>				Obese <sup>d,e</sup>				Anemia < 5yrs <sup>d</sup>
	Initiation <sup>b</sup>	6 months duration <sup>d</sup>	Total	White	Black	Hispanic	Total	White	Black	Hispanic	
Michigan	61.2%	19.1%	16.5%	16.8%	14.2%	18.4%	13.1%	12.6%	10.5%	18.3%	16.1%
Barry-Eaton DHD	72.2%	21.9%	17.5%	16.7%	*	21.3%	13.6%	13.3%	*	15.0%	5.9%
Bay County HD	50.5%	17.0%	17.4%	16.9%	*	14.4%	14.7%	14.7%	*	15.5%	7.3%
Benzie-Leelanau DHD	75.4%	36.7%	20.1%	22.5%	*	15.2%	15.4%	13.1%	*	25.8%	11.4%
Berrien County HD	52.6%	16.0%	16.5%	16.1%	16.6%	17.6%	13.1%	13.0%	13.0%	14.8%	11.8%
Branch-Hillsdale-St. Joe DHD	71.9%	22.2%	16.5%	16.3%	16.7%	16.5%	13.7%	12.3%	13.0%	18.7%	7.5%
Calhoun	59.4%	13.9%	18.1%	19.2%	15.3%	23.9%	15.2%	14.7%	13.8%	21.0%	15.6%
Central MI District HD	71.9%	20.9%	18.3%	18.2%	25.0%	14.8%	14.7%	14.2%	14.3%	23.5%	8.4%
Chippewa County HD	69.7%	29.2%	18.3%	14.0%	*	*	14.2%	12.7%	*	*	7.7%
Community Action Agency	70.7%	21.4%	20.0%	19.4%	*	21.4%	17.1%	15.4%	*	21.4%	8.8%
Delta-Menominee	67.8%	17.2%	14.6%	14.2%	*	*	16.0%	14.6%	*	*	2.3%
Detroit City	43.1%	13.5%	14.6%	15.0%	13.3%	20.2%	11.4%	13.3%	9.5%	18.7%	24.6%
Detroit Urban League	37.2%	12.4%	15.1%	16.2%	14.2%	16.7%	12.8%	13.0%	11.1%	19.5%	27.0%
Dickinson-Iron DHD	66.7%	22.6%	18.4%	17.9%	*	*	14.5%	14.5%	*	*	7.9%
District Health Department #10	76.8%	20.8%	18.8%	18.2%	*	21.0%	15.0%	13.0%	*	22.5%	16.1%
District Health Department #2	63.0%	23.3%	18.0%	17.9%	*	*	15.0%	14.5%	*	*	12.3%
District Health Department #4	61.5%	21.8%	16.7%	16.9%	*	*	16.9%	17.1%	*	*	6.3%
Downriver Community Serv	67.3%	19.5%	18.2%	17.8%	15.0%	22.0%	15.6%	14.6%	14.2%	22.5%	11.2%
Genesee County HD	55.7%	11.5%	15.4%	15.3%	14.2%	19.9%	12.6%	12.7%	11.3%	18.3%	16.7%
Grand Traverse County HD	83.6%	33.8%	18.8%	17.4%	*	16.7%	12.5%	11.4%	*	13.6%	11.7%
Health Delivery, Inc.	59.8%	13.4%	19.2%	20.6%	17.8%	20.5%	13.8%	14.4%	9.7%	19.9%	8.2%
Huron	62.1%	16.3%	15.4%	15.3%	*	*	15.1%	16.2%	*	*	6.9%
Ingham County HD	73.2%	22.8%	15.9%	17.0%	14.7%	16.3%	14.1%	12.3%	12.2%	20.5%	11.9%
Intercare Comm. Health Network	74.3%	25.3%	17.0%	16.3%	12.2%	18.8%	13.6%	10.6%	11.7%	18.4%	26.2%
Ionia County HD	75.9%	18.7%	16.6%	15.8%	*	18.2%	12.9%	12.6%	*	17.0%	8.1%
Jackson County HD	64.1%	17.9%	17.8%	18.2%	14.3%	19.8%	13.9%	13.2%	12.1%	17.7%	16.2%
Kalamazoo County HD	71.4%	30.4%	19.0%	19.9%	21.1%	10.9%	12.8%	12.9%	9.3%	16.0%	23.6%
Kalamazoo Family Health Center	62.9%	19.9%	15.9%	14.7%	16.1%	16.3%	12.6%	8.9%	11.1%	23.6%	26.8%
Kent	68.2%	21.4%	16.9%	17.1%	15.7%	18.5%	13.1%	9.6%	11.5%	17.8%	12.8%
Keweenaw Bay WIC Program	64.4%	15.0%	21.9%	33.3%	*	*	14.9%	33.3%	*	*	25.6%
Lapeer County HD	67.7%	25.6%	16.3%	15.6%	*	27.0%	13.5%	13.2%	*	20.6%	10.1%
Livingston County HD	74.8%	26.0%	15.7%	16.0%	*	*	15.2%	14.1%	*	*	6.4%
LMAS	70.2%	17.5%	13.1%	14.8%	*	*	15.9%	15.9%	*	*	7.1%
Macomb County HD	57.6%	14.7%	15.1%	16.5%	12.4%	11.1%	13.6%	14.1%	10.1%	20.6%	18.3%
Marquette County HD	76.5%	24.9%	17.4%	17.6%	*	*	14.9%	12.6%	*	*	5.4%
Mid-Michigan Comm.	82.5%	24.5%	17.5%	17.7%	*	*	13.1%	12.5%	*	*	11.6%
Mid-Michigan DHD	76.8%	22.9%	16.1%	15.7%	*	17.2%	14.0%	13.3%	*	18.8%	4.6%
Monroe County HD	66.7%	15.2%	17.4%	17.2%	15.4%	16.5%	12.8%	12.6%	7.7%	11.9%	8.1%
Muskegon County HD	55.9%	13.5%	18.0%	17.8%	18.1%	21.5%	12.4%	11.4%	11.4%	16.2%	19.0%
Northwest MI Comm Health Agency	79.2%	24.8%	19.5%	19.3%	16.7%	*	12.6%	12.1%	33.3%	*	9.3%
Oakland	58.6%	19.8%	15.6%	16.5%	12.6%	17.2%	12.0%	11.3%	9.3%	18.4%	14.2%
Saginaw County Depart PH	62.5%	13.8%	15.5%	15.1%	14.6%	16.3%	16.6%	16.7%	15.6%	18.3%	13.4%
Sanilac County HD	66.2%	22.7%	19.7%	18.1%	*	*	14.0%	14.6%	*	*	5.6%
Shiawassee County HD	71.7%	23.5%	16.1%	15.6%	*	21.0%	15.3%	14.7%	*	24.2%	6.1%
St Clair County HD	58.1%	13.7%	15.5%	15.0%	18.1%	19.5%	12.5%	11.8%	13.9%	11.7%	4.3%
Tuscola County HD	67.3%	17.5%	14.7%	14.3%	*	15.4%	11.9%	12.1%	*	11.5%	7.2%
Washtenaw County HD	78.3%	31.3%	16.7%	16.7%	15.9%	20.1%	13.3%	13.7%	12.1%	16.3%	18.8%
Wayne	57.0%	21.6%	15.9%	16.9%	13.2%	17.1%	11.7%	11.9%	9.7%	15.6%	18.6%
Western Upper Penin DHD	75.0%	25.3%	20.4%	20.9%	*	*	12.9%	12.7%	*	*	4.4%

<sup>b</sup> PNSS Data. <sup>c</sup> Analysis limited to children < 2 years of age. <sup>d</sup> PedNSS data. <sup>e</sup> Analysis limited to children older than 24 months and up to 60 months. \*Data insufficient for analysis

**Table A-2. Selected indicators by Local WIC Agency, Michigan PNSS & PedNSS 2013**

	PNSS N	PedNSS N	Total N <sup>a</sup>	Race/Ethnicity <sup>a</sup>				1st Trimester WIC Enrollment <sup>b</sup>	Weight Gain <sup>b</sup>		Low Birthweight <sup>b</sup>		
				White	Black	Hispanics	Multiracial		<Ideal	>Ideal	Total	White	Black
<b>Michigan</b>	67,200	253,815	321,015	51.0%	27.2%	12.9%	6.9%	36.9%	16.9%	52.4%	8.7%	7.1%	12.2%
<b>Barry-Eaton DHD</b>	740	2,886	3,626	86.6%	2.3%	6.0%	4.5%	37.8%	13.4%	53.9%	5.7%	5.6%	*
<b>Bay County HD</b>	658	2,728	3,386	72.4%	2.4%	14.7%	10.3%	51.7%	19.9%	46.8%	6.9%	5.9%	*
<b>Benzie-Leelanau DHD</b>	164	685	849	68.1%	1.2%	19.6%	7.9%	44.4%	16.3%	57.0%	8.5%	8.7%	*
<b>Berrien County HD</b>	1,178	4,333	5,511	44.8%	39.8%	7.1%	7.2%	29.7%	16.8%	51.9%	8.1%	6.0%	10.8%
<b>Branch-Hillsdale-St. Joe DHD</b>	1,454	5,456	6,910	77.9%	1.5%	14.7%	5.7%	45.5%	14.5%	55.2%	7.8%	7.6%	*
<b>Calhoun</b>	1,211	4,737	5,948	52.4%	20.6%	10.1%	11.8%	44.3%	16.0%	52.9%	7.9%	7.5%	9.5%
<b>Central MI District HD</b>	1,234	5,023	6,257	88.5%	1.4%	3.7%	5.6%	50.1%	18.3%	53.5%	6.3%	6.0%	*
<b>Chippewa County HD</b>	295	1,175	1,470	52.7%	0.4%	3.0%	28.0%	54.2%	17.0%	53.6%	4.1%	4.3%	*
<b>Community Action Agency</b>	660	2,190	2,850	69.1%	1.3%	22.8%	6.8%	37.3%	21.0%	50.1%	8.0%	7.8%	*
<b>Delta-Menominee</b>	391	1,500	1,891	87.9%	0.2%	3.8%	7.2%	48.4%	15.3%	54.6%	7.1%	7.2%	*
<b>Detroit City</b>	8,330	31,029	39,359	8.0%	74.0%	14.4%	2.1%	29.6%	17.8%	55.1%	11.3%	7.4%	12.5%
<b>Detroit Urban League</b>	3,322	13,189	16,511	17.8%	67.1%	11.1%	2.8%	29.6%	18.2%	51.3%	11.4%	6.0%	13.2%
<b>Dickinson-Iron DHD</b>	278	1,033	1,311	89.7%	0.2%	2.3%	7.4%	53.3%	19.1%	50.0%	13.5%	12.9%	*
<b>District Health Department #10</b>	2,028	8,341	10,369	79.9%	1.3%	13.2%	5.4%	48.2%	16.9%	55.0%	7.4%	7.7%	*
<b>District Health Department #2</b>	449	1,722	2,171	90.5%	0.3%	3.5%	5.4%	42.5%	16.2%	48.0%	5.0%	5.2%	*
<b>District Health Department #4</b>	427	1,672	2,099	88.4%	0.3%	2.2%	8.4%	46.3%	17.3%	56.5%	5.8%	5.8%	*
<b>Downriver Community Serv</b>	821	3,096	3,917	69.1%	8.9%	11.8%	8.3%	28.4%	12.1%	57.5%	7.3%	7.2%	9.7%
<b>Genesee County HD</b>	3,303	11,381	14,684	44.4%	38.1%	6.6%	10.6%	25.7%	15.6%	54.6%	10.6%	8.1%	13.9%
<b>Grand Traverse County HD</b>	626	2,126	2,752	85.7%	0.7%	6.2%	6.2%	45.4%	12.5%	50.4%	7.1%	6.9%	*
<b>Health Delivery, Inc.</b>	533	2,367	2,900	11.4%	53.9%	30.2%	4.0%	52.4%	27.8%	41.6%	11.8%	8.6%	13.8%
<b>Huron</b>	196	859	1,055	90.4%	0.3%	6.0%	3.0%	44.6%	17.6%	48.0%	5.9%	6.1%	*
<b>Ingham County HD</b>	2,012	7,378	9,390	38.6%	25.0%	18.8%	11.9%	31.5%	13.7%	54.0%	8.0%	7.9%	10.6%
<b>Intercare Comm. Health Network</b>	3,460	13,763	17,223	60.1%	3.5%	30.2%	4.9%	45.8%	20.1%	48.0%	7.0%	7.4%	10.8%
<b>Ionia County HD</b>	467	1,773	2,240	85.4%	0.3%	9.9%	4.2%	43.9%	14.5%	48.6%	5.4%	5.1%	*
<b>Jackson County HD</b>	1,250	4,926	6,176	65.2%	12.8%	8.3%	13.2%	42.2%	15.2%	52.9%	6.4%	6.1%	6.5%
<b>Kalamazoo County HD</b>	889	3,036	3,925	59.7%	16.9%	10.7%	11.2%	41.3%	15.5%	55.3%	8.0%	5.8%	13.7%
<b>Kalamazoo Family Health Center</b>	934	3,795	4,729	32.0%	42.2%	13.4%	11.3%	50.5%	21.0%	48.9%	7.3%	7.6%	9.0%
<b>Kent</b>	4,858	19,692	24,550	35.3%	21.4%	31.1%	8.8%	40.7%	21.4%	47.7%	8.8%	8.3%	11.7%
<b>Keweenaw Bay WIC Program</b>	54	266	320	4.1%	*	3.8%	9.1%	51.9%	17.1%	58.5%	2.2%	0.0%	0.0%
<b>Lapeer County HD</b>	486	1,932	2,418	85.5%	0.5%	7.4%	6.3%	42.6%	11.5%	56.4%	6.4%	5.1%	*
<b>Livingston County HD</b>	526	2,029	2,555	89.3%	0.5%	5.1%	4.0%	28.2%	14.1%	55.6%	6.5%	6.3%	*
<b>LMAS</b>	204	912	1,116	69.7%	0.3%	1.6%	24.0%	59.5%	16.3%	53.0%	4.6%	4.8%	*
<b>Macomb County HD</b>	3,334	10,944	14,278	57.0%	25.6%	3.5%	8.6%	30.1%	15.5%	52.3%	9.6%	7.6%	13.8%
<b>Marquette County HD</b>	333	1,262	1,595	83.0%	0.4%	3.2%	12.9%	43.8%	15.3%	47.0%	6.5%	6.1%	*
<b>Mid-Michigan Comm.</b>	456	1,929	2,385	89.7%	1.1%	3.4%	4.7%	46.7%	18.4%	49.3%	6.1%	6.2%	*
<b>Mid-Michigan DHD</b>	989	3,896	4,885	84.6%	0.5%	10.8%	3.8%	43.9%	16.8%	53.1%	6.0%	6.1%	*
<b>Monroe County HD</b>	853	3,268	4,121	81.0%	4.4%	7.7%	6.7%	46.1%	17.3%	52.2%	6.6%	6.3%	*
<b>Muskegon County HD</b>	1,723	6,820	8,543	52.9%	24.9%	11.6%	10.1%	49.9%	18.5%	52.1%	10.4%	8.0%	14.1%
<b>Northwest MI Comm Health Agency</b>	702	2,903	3,605	87.1%	0.4%	3.2%	7.5%	47.0%	19.6%	48.7%	7.0%	7.4%	*
<b>Oakland</b>	4,191	15,081	19,272	47.7%	31.2%	12.8%	6.1%	25.4%	15.7%	52.9%	9.3%	7.5%	12.7%
<b>Saginaw County Depart PH</b>	1,181	4,578	5,759	46.6%	27.8%	17.4%	7.9%	47.6%	19.2%	51.6%	7.9%	7.7%	9.2%
<b>Sanilac County HD</b>	261	951	1,212	89.1%	0.4%	7.6%	2.7%	47.6%	16.9%	46.2%	11.7%	12.6%	*
<b>Shiawassee County HD</b>	514	1,966	2,480	86.9%	0.4%	6.5%	5.9%	50.1%	13.0%	52.1%	6.6%	7.0%	*
<b>St Clair County HD</b>	1,005	3,636	4,641	75.0%	5.1%	7.6%	12.0%	47.6%	15.8%	53.6%	6.9%	6.7%	*
<b>Tuscola County HD</b>	369	1,528	1,897	87.3%	0.6%	7.2%	4.8%	46.8%	14.8%	53.2%	5.0%	5.0%	*
<b>Washtenaw County HD</b>	1,478	5,577	7,055	34.9%	36.8%	11.6%	12.1%	32.3%	14.4%	51.4%	9.4%	8.4%	11.9%
<b>Wayne</b>	6,024	20,952	26,976	58.5%	26.7%	5.2%	5.9%	28.4%	15.9%	51.8%	8.0%	7.2%	9.5%
<b>Western Upper Penin DHD</b>	349	1,494	1,843	88.2%	0.4%	2.7%	6.7%	45.6%	15.8%	51.4%	5.0%	5.5%	*

<sup>a</sup> PNSS & PedNSS combined data (Distribution of American Indian/Alaska Native & Asian/Pacific Islander available in Local Agency Briefs). <sup>b</sup> PNSS Data \*Data insufficient for analysis

Table A-2 (continued) Selected indicators by Local WIC Agency, Michigan PNSS & PedNSS 2013

	Breastfeeding <sup>c</sup>		Overweight <sup>d,e</sup>				Obese <sup>d,e</sup>				Anemia < 5yrs <sup>d</sup>
	Initiation <sup>b</sup>	6 months duration <sup>d</sup>	Total	White	Black	Hispanic	Total	White	Black	Hispanic	
Michigan	63.1%	17.7%	16.9%	17.3%	14.6%	19.2%	13.5%	13.2%	11.1%	18.3%	17.5%
Barry-Eaton DHD	78.4%	22.1%	18.8%	18.4%	*	17.9%	13.5%	13.0%	*	20.9%	5.3%
Bay County HD	58.2%	14.1%	17.7%	17.4%	*	17.4%	15.4%	14.1%	*	18.5%	7.5%
Benzie-Leelanau DHD	81.4%	31.9%	17.6%	17.2%	*	15.9%	13.8%	10.2%	*	20.6%	10.1%
Berrien County HD	57.5%	14.1%	17.6%	17.0%	16.4%	19.3%	11.8%	11.8%	11.9%	14.8%	12.7%
Branch-Hillsdale-St. Joe DHD	79.2%	22.0%	18.8%	18.7%	*	21.6%	14.4%	14.4%	*	14.5%	6.2%
Calhoun	67.1%	13.6%	17.4%	17.8%	15.5%	20.4%	15.4%	15.6%	15.0%	19.0%	16.7%
Central MI District HD	76.8%	19.9%	18.0%	17.9%	*	15.9%	15.0%	14.3%	*	23.9%	9.3%
Chippewa County HD	69.9%	24.1%	15.3%	14.8%	*	*	14.3%	10.7%	*	*	13.8%
Community Action Agency	70.6%	18.8%	18.2%	17.2%	*	20.2%	17.5%	16.6%	*	19.7%	10.1%
Delta-Menominee	70.4%	15.1%	17.9%	16.9%	*	*	13.8%	13.4%	*	*	2.7%
Detroit City	45.9%	11.2%	15.6%	16.4%	14.2%	20.8%	12.7%	13.6%	10.8%	19.8%	25.4%
Detroit Urban League	41.9%	7.7%	15.0%	17.4%	13.6%	19.3%	12.7%	14.0%	10.5%	19.1%	33.7%
Dickinson-Iron DHD	76.9%	20.1%	18.3%	17.2%	*	*	12.6%	11.6%	*	*	6.1%
District Health Department #10	77.2%	22.0%	19.2%	18.6%	*	22.6%	14.8%	13.2%	*	20.7%	14.8%
District Health Department #2	72.6%	18.8%	20.1%	19.6%	*	*	14.9%	14.4%	*	*	14.7%
District Health Department #4	61.1%	16.1%	16.7%	16.1%	*	*	19.1%	18.7%	*	*	11.4%
Downriver Community Serv	64.7%	23.8%	19.1%	18.6%	19.5%	19.8%	15.9%	14.5%	13.3%	27.2%	13.1%
Genesee County HD	56.5%	13.7%	16.4%	16.8%	15.7%	16.0%	13.1%	14.2%	10.9%	16.7%	19.3%
Grand Traverse County HD	85.6%	28.4%	19.0%	17.8%	*	24.1%	11.3%	11.7%	*	9.3%	15.1%
Health Delivery, Inc.	57.9%	7.1%	20.3%	16.2%	19.2%	24.4%	14.6%	14.1%	10.7%	22.1%	11.1%
Huron	72.8%	16.1%	17.1%	17.2%	*	*	17.1%	17.5%	*	*	7.2%
Ingham County HD	76.7%	22.6%	15.6%	17.8%	10.9%	17.3%	13.2%	11.2%	14.0%	16.9%	11.9%
Intercare Comm. Health Network	76.7%	23.6%	16.9%	16.7%	12.0%	18.3%	13.6%	11.1%	7.5%	18.2%	26.4%
Ionia County HD	72.7%	21.0%	16.4%	16.4%	*	14.1%	13.9%	13.7%	*	20.5%	7.9%
Jackson County HD	66.6%	16.5%	18.5%	18.3%	18.4%	20.2%	14.3%	14.2%	10.6%	19.7%	24.7%
Kalamazoo County HD	71.7%	25.4%	18.7%	19.0%	20.1%	19.2%	12.7%	11.1%	6.5%	19.2%	29.1%
Kalamazoo Family Health Center	65.6%	20.6%	15.8%	15.8%	15.2%	17.0%	14.0%	12.3%	13.9%	19.1%	29.2%
Kent	70.1%	20.2%	16.7%	15.9%	14.1%	19.5%	13.3%	10.4%	11.4%	17.7%	11.5%
Keweenaw Bay WIC Program	74.0%	16.7%	26.9%	0.0%	*	*	29.6%	50.0%	*	*	28.1%
Lapeer County HD	70.6%	19.8%	19.3%	19.9%	*	11.3%	14.2%	13.4%	*	27.4%	14.4%
Livingston County HD	76.6%	18.8%	16.7%	16.9%	*	*	15.5%	15.6%	*	*	6.8%
LMAS	71.3%	18.5%	16.2%	16.6%	*	*	9.7%	10.1%	*	*	9.5%
Macomb County HD	55.9%	13.6%	15.9%	17.1%	13.6%	14.3%	13.8%	14.4%	10.8%	17.7%	22.0%
Marquette County HD	77.5%	25.9%	18.8%	19.2%	*	*	13.0%	10.9%	*	*	6.7%
Mid-Michigan Comm.	79.8%	23.8%	17.9%	17.8%	*	*	13.1%	12.7%	*	*	9.5%
Mid-Michigan DHD	79.1%	24.6%	18.5%	18.8%	*	19.7%	15.0%	14.2%	*	20.7%	4.9%
Monroe County HD	66.0%	18.3%	16.8%	16.5%	14.8%	18.1%	13.5%	13.0%	9.3%	16.4%	7.5%
Muskegon County HD	59.5%	14.2%	16.6%	16.8%	15.3%	19.9%	12.1%	11.5%	11.0%	16.9%	17.7%
Northwest MI Comm Health Agency	79.0%	23.3%	18.1%	17.5%	*	*	13.3%	12.2%	*	*	10.7%
Oakland	58.0%	18.5%	15.3%	15.7%	13.9%	17.5%	11.4%	11.5%	8.1%	16.5%	16.5%
Saginaw County Depart PH	68.7%	15.0%	14.8%	15.9%	12.8%	16.6%	14.9%	16.0%	14.7%	15.1%	15.5%
Sanilac County HD	68.7%	15.5%	21.2%	21.6%	*	*	13.8%	13.1%	*	*	5.9%
Shiawassee County HD	76.3%	25.7%	18.5%	17.8%	*	26.0%	15.6%	15.4%	*	20.0%	11.2%
St Clair County HD	59.5%	13.3%	17.7%	16.3%	23.9%	21.0%	14.5%	13.7%	12.7%	12.9%	8.8%
Tuscola County HD	67.1%	16.5%	18.4%	17.6%	*	*	12.6%	12.6%	*	*	7.4%
Washtenaw County HD	79.5%	30.9%	17.5%	18.5%	16.2%	20.5%	13.7%	14.1%	11.8%	19.5%	21.1%
Wayne	56.8%	17.4%	16.4%	16.3%	15.9%	18.7%	13.7%	13.5%	11.4%	18.2%	17.0%
Western Upper Penin DHD	79.7%	31.3%	18.9%	19.2%	*	*	9.8%	9.5%	*	*	8.0%

<sup>b</sup> PNSS Data. <sup>c</sup> Analysis limited to children < 2 years of age. <sup>d</sup> PedNSS data. <sup>e</sup> Analysis limited to children older than 24 months and up to 60 months. \*Data insufficient for analysis

**Table A-3. Selected indicators by Local WIC Agency, Michigan PNSS & PedNSS 2014**

	PNSS N	PedNSS N	Total N <sup>a</sup>	Race/Ethnicity <sup>a</sup>				1st Trimester WIC Enrollment <sup>b</sup>	Weight Gain <sup>b</sup>		Low Birthweight <sup>b</sup>		
				White	Black	Hispanics	Multiracial		<Ideal	>Ideal	Total	White	Black
<b>Michigan</b>	65,861	249,940	315,801	50.8%	27.2%	12.7%	7.1%	35.7%	17.2%	52.3%	9.1%	7.4%	13.1%
<b>Barry-Eaton DHD</b>	717	2,807	3,524	86.4%	2.3%	6.3%	4.7%	37.4%	15.1%	53.6%	6.3%	5.7%	*
<b>Bay County HD</b>	644	2,607	3,251	73.0%	3.1%	13.5%	10.1%	48.9%	17.6%	53.3%	7.6%	8.1%	*
<b>Benzie-Leelanau DHD</b>	162	692	854	71.3%	0.4%	18.6%	7.7%	45.9%	21.7%	47.3%	4.2%	4.2%	*
<b>Berrien County HD</b>	1,156	4,263	5,419	45.9%	38.3%	7.5%	7.2%	33.5%	15.0%	56.0%	9.0%	6.7%	13.4%
<b>Branch-Hillsdale-St. Joe DHD</b>	1,364	5,252	6,616	77.2%	2.1%	14.7%	5.9%	44.7%	15.9%	52.9%	6.5%	6.3%	*
<b>Calhoun</b>	1,192	4,631	5,823	52.9%	19.8%	9.2%	12.4%	38.7%	15.2%	50.6%	9.2%	8.4%	13.5%
<b>Central MI District HD</b>	1,309	4,949	6,258	88.3%	1.3%	4.1%	5.4%	48.8%	17.6%	53.7%	7.6%	7.4%	*
<b>Chippewa County HD</b>	303	1,166	1,469	49.8%	0.7%	3.1%	29.0%	57.8%	17.3%	51.3%	3.1%	2.5%	*
<b>Community Action Agency</b>	617	2,214	2,831	65.3%	1.8%	25.4%	7.4%	31.1%	19.3%	45.9%	7.5%	7.4%	*
<b>Delta-Menominee</b>	425	1,480	1,905	86.6%	0.1%	3.6%	9.3%	49.5%	11.7%	57.7%	6.5%	6.3%	*
<b>Detroit City</b>	8,057	29,954	38,011	8.0%	74.2%	13.9%	2.0%	28.4%	18.7%	52.7%	12.2%	7.9%	13.5%
<b>Detroit Urban League</b>	3,248	13,057	16,305	15.3%	70.5%	10.0%	2.9%	26.4%	18.4%	51.3%	11.2%	6.8%	12.9%
<b>Dickinson-Iron DHD</b>	256	1,049	1,305	90.4%	0.3%	1.8%	7.1%	45.8%	17.7%	54.2%	4.8%	4.6%	*
<b>District Health Department #10</b>	2,050	8,213	10,263	79.7%	1.3%	13.2%	5.5%	47.7%	15.4%	55.3%	6.5%	5.9%	*
<b>District Health Department #2</b>	447	1,761	2,208	91.0%	0.1%	3.5%	5.2%	47.5%	17.0%	55.3%	5.6%	6.0%	*
<b>District Health Department #4</b>	432	1,717	2,149	89.2%	0.3%	2.2%	7.8%	41.9%	14.2%	52.8%	7.5%	7.3%	*
<b>Downriver Community Serv</b>	826	3,005	3,831	69.3%	8.6%	12.2%	7.9%	27.2%	14.8%	52.7%	7.9%	7.2%	12.7%
<b>Genesee County HD</b>	3,234	11,445	14,679	43.9%	37.5%	6.7%	11.6%	26.9%	16.2%	53.0%	11.7%	10.8%	13.8%
<b>Grand Traverse County HD</b>	567	2,001	2,568	86.4%	0.9%	5.1%	6.5%	49.5%	15.7%	54.0%	7.6%	6.7%	20.0%
<b>Health Delivery, Inc.</b>	540	2,301	2,841	11.9%	52.4%	29.9%	5.0%	47.5%	27.1%	41.0%	11.0%	10.5%	12.9%
<b>Huron</b>	170	779	949	89.9%	0.4%	6.5%	3.0%	48.2%	13.9%	54.0%	5.8%	4.8%	*
<b>Ingham County HD</b>	2,084	7,419	9,503	38.4%	24.4%	18.8%	12.3%	32.3%	14.9%	55.3%	8.3%	7.5%	12.6%
<b>Intercare Comm. Health Network</b>	3,279	13,410	16,689	60.1%	3.6%	30.1%	5.0%	42.9%	18.4%	47.7%	6.3%	6.9%	4.5%
<b>Ionia County HD</b>	458	1,739	2,197	84.8%	0.3%	10.4%	4.5%	38.8%	18.8%	51.0%	6.3%	6.4%	*
<b>Jackson County HD</b>	1,248	4,907	6,155	64.4%	13.6%	8.0%	13.6%	41.5%	16.2%	51.1%	7.4%	7.1%	10.2%
<b>Kalamazoo County HD</b>	855	2,991	3,846	58.2%	17.8%	10.9%	11.7%	38.9%	14.9%	54.8%	9.6%	8.1%	12.8%
<b>Kalamazoo Family Health Center</b>	929	3,736	4,665	33.5%	40.7%	13.6%	11.2%	47.7%	18.6%	52.9%	9.8%	6.9%	14.1%
<b>Kent</b>	4,778	18,987	23,765	34.7%	21.9%	30.6%	8.9%	35.8%	22.1%	47.9%	9.4%	8.7%	14.5%
<b>Keweenaw Bay WIC Program</b>	53	269	322	4.0%	*	4.7%	9.0%	53.8%	34.1%	46.3%	2.3%	16.7%	*
<b>Lapeer County HD</b>	513	1,953	2,466	86.7%	0.5%	7.3%	5.3%	44.0%	15.3%	49.9%	5.6%	4.7%	*
<b>Livingston County HD</b>	535	1,901	2,436	89.3%	0.6%	4.7%	4.2%	29.6%	12.8%	54.8%	6.2%	6.3%	*
<b>LMAS</b>	180	870	1,050	71.4%	0.5%	0.9%	22.0%	59.1%	19.0%	50.3%	10.1%	8.8%	*
<b>Macomb County HD</b>	3,249	11,089	14,338	58.1%	24.8%	3.1%	8.5%	31.0%	16.2%	53.9%	8.6%	7.8%	10.9%
<b>Marquette County HD</b>	357	1,223	1,580	82.4%	0.2%	3.4%	13.2%	45.8%	17.9%	50.0%	5.3%	4.5%	*
<b>Mid-Michigan Comm.</b>	416	1,863	2,279	91.0%	1.0%	3.2%	4.0%	44.1%	22.9%	48.3%	11.7%	11.5%	*
<b>Mid-Michigan DHD</b>	882	3,824	4,706	83.3%	0.3%	12.3%	3.8%	37.2%	14.9%	56.4%	6.5%	6.6%	*
<b>Monroe County HD</b>	793	3,133	3,926	80.3%	4.6%	7.5%	7.3%	39.6%	16.1%	52.5%	6.2%	6.0%	11.8%
<b>Muskegon County HD</b>	1,673	6,724	8,397	53.0%	24.1%	11.7%	10.8%	49.8%	19.0%	50.8%	10.5%	9.1%	15.1%
<b>Northwest MI Comm Health Agency</b>	708	2,950	3,658	87.7%	0.7%	2.9%	5.4%	49.1%	18.8%	52.2%	6.2%	6.0%	*
<b>Oakland</b>	4,097	14,994	19,091	47.1%	31.3%	12.7%	6.5%	25.2%	17.2%	53.7%	9.9%	7.6%	13.5%
<b>Saginaw County Depart PH</b>	1,153	4,368	5,521	46.4%	25.8%	19.3%	8.2%	45.6%	16.0%	49.1%	9.3%	8.9%	12.0%
<b>Sanilac County HD</b>	249	918	1,167	89.4%	0.3%	7.5%	2.6%	46.2%	20.4%	45.5%	8.1%	8.3%	
<b>Shiawassee County HD</b>	490	1,947	2,437	86.7%	0.2%	6.7%	6.4%	47.3%	17.9%	52.6%	7.5%	7.7%	
<b>St Clair County HD</b>	981	3,584	4,565	74.2%	5.0%	8.6%	12.0%	48.6%	14.1%	56.5%	6.5%	6.0%	*
<b>Tuscola County HD</b>	382	1,547	1,929	87.5%	0.5%	7.5%	4.4%	44.4%	16.1%	54.0%	8.6%	9.1%	*
<b>Washtenaw County HD</b>	1,472	5,591	7,063	33.7%	37.0%	11.9%	12.5%	35.3%	16.4%	51.2%	9.6%	7.3%	12.9%
<b>Wayne</b>	6,000	21,232	27,232	58.3%	26.6%	5.5%	5.9%	27.3%	15.9%	53.0%	9.1%	7.4%	11.6%
<b>Western Upper Penin DHD</b>	331	1,428	1,759	88.3%	0.4%	2.4%	6.7%	44.0%	15.3%	48.5%	4.9%	5.1%	*

<sup>a</sup> PNSS & PedNSS combined data (Distribution of American Indian/Alaska Native & Asian/Pacific Islander available in Local Agency Briefs). <sup>b</sup> PNSS Data \*Data insufficient for analysis



**Table A-3 (continued) Selected indicators by Local WIC Agency, Michigan PNSS & PedNSS 2014**

	Breastfeeding <sup>c</sup>		Overweight <sup>d,e</sup>				Obese <sup>d,e</sup>				Anemia < 5yrs <sup>d</sup>
	Initiation <sup>b</sup>	6 months duration <sup>d</sup>	Total	White	Black	Hispanic	Total	White	Black	Hispanic	
<b>Michigan</b>	63.6%	18.5%	16.7%	17.0%	14.6%	19.1%	13.6%	13.4%	10.7%	18.4%	17.0%
<b>Barry-Eaton DHD</b>	80.2%	22.3%	18.9%	17.6%	*	23.9%	12.8%	13.1%	*	15.5%	8.5%
<b>Bay County HD</b>	63.3%	15.6%	17.6%	16.7%	*	16.7%	15.0%	14.3%	*	17.9%	8.6%
<b>Benzie-Leelanau DHD</b>	86.0%	30.6%	14.8%	16.8%	*	12.9%	14.8%	13.7%	*	17.7%	7.9%
<b>Berrien County HD</b>	61.8%	16.7%	15.7%	17.0%	14.2%	13.8%	12.1%	14.6%	10.1%	14.6%	11.3%
<b>Branch-Hillsdale-St. Joe DHD</b>	79.8%	25.3%	18.0%	18.1%	*	18.5%	15.3%	14.8%	*	17.1%	5.2%
<b>Calhoun</b>	67.3%	13.4%	18.7%	18.8%	16.3%	21.9%	15.7%	15.5%	14.4%	18.4%	16.3%
<b>Central MI District HD</b>	74.9%	21.2%	18.0%	18.5%	*	14.0%	15.1%	14.2%	*	20.4%	8.6%
<b>Chippewa County HD</b>	63.8%	29.4%	17.3%	14.8%	*	*	12.5%	11.2%	*	*	13.3%
<b>Community Action Agency</b>	75.0%	17.5%	16.9%	15.3%	*	20.5%	18.1%	16.9%	*	20.5%	11.7%
<b>Delta-Menominee</b>	74.6%	19.2%	16.2%	16.2%	*	*	14.9%	14.7%	*	*	2.8%
<b>Detroit City</b>	46.1%	12.3%	15.1%	15.0%	14.1%	19.5%	12.3%	12.1%	10.6%	19.0%	23.8%
<b>Detroit Urban League</b>	43.9%	10.0%	14.3%	14.1%	13.1%	21.3%	12.8%	15.7%	11.2%	18.6%	33.2%
<b>Dickinson-Iron DHD</b>	69.4%	29.8%	17.3%	17.3%	*	*	13.5%	12.8%	*	*	6.5%
<b>District Health Department #10</b>	77.0%	23.1%	19.6%	18.3%	*	25.3%	16.1%	14.9%	*	22.5%	13.4%
<b>District Health Department #2</b>	68.2%	17.9%	18.6%	17.8%	*	*	14.4%	14.5%	*	*	14.4%
<b>District Health Department #4</b>	63.7%	21.1%	18.1%	18.9%	*	*	16.4%	16.1%	*	*	15.6%
<b>Downriver Community Serv</b>	67.1%	23.4%	18.7%	17.8%	13.6%	21.2%	15.3%	14.3%	17.5%	20.5%	14.1%
<b>Genesee County HD</b>	56.1%	14.1%	16.3%	16.2%	15.7%	16.2%	12.8%	13.9%	10.8%	16.8%	20.8%
<b>Grand Traverse County HD</b>	85.7%	31.7%	16.9%	15.8%	*	*	13.5%	13.5%	*	*	16.3%
<b>Health Delivery, Inc.</b>	59.7%	10.9%	19.0%	17.0%	15.4%	25.9%	15.1%	8.5%	13.6%	20.4%	6.9%
<b>Huron</b>	72.0%	23.6%	15.4%	16.1%	*	*	20.5%	20.8%	*	*	5.6%
<b>Ingham County HD</b>	77.7%	25.7%	16.5%	17.7%	14.4%	19.0%	12.5%	10.1%	12.0%	17.4%	11.5%
<b>Intercare Comm. Health Network</b>	76.4%	25.2%	17.7%	17.8%	17.2%	18.0%	14.5%	11.8%	7.2%	20.4%	24.4%
<b>Ionia County HD</b>	79.8%	18.6%	17.0%	17.2%	*	16.7%	14.6%	13.1%	*	22.2%	8.1%
<b>Jackson County HD</b>	70.7%	16.5%	21.2%	21.3%	18.8%	21.1%	14.7%	14.9%	10.8%	20.1%	18.0%
<b>Kalamazoo County HD</b>	72.2%	23.5%	16.7%	16.3%	15.7%	22.2%	13.7%	14.0%	9.6%	16.0%	26.2%
<b>Kalamazoo Family Health Center</b>	63.9%	18.8%	17.0%	16.2%	16.5%	18.9%	13.2%	13.2%	12.1%	16.0%	26.2%
<b>Kent</b>	71.8%	20.3%	16.4%	16.2%	14.6%	18.3%	13.5%	10.9%	11.0%	18.0%	11.0%
<b>Keweenaw Bay WIC Program</b>	62.8%	22.0%	23.4%	0.0%	*	*	29.0%	40.0%	*	*	23.0%
<b>Lapeer County HD</b>	71.0%	23.1%	20.1%	20.1%	*	19.6%	13.6%	12.3%	*	30.4%	9.9%
<b>Livingston County HD</b>	79.9%	22.6%	17.8%	18.1%	*	*	11.8%	11.3%	*	*	6.0%
<b>LMAS</b>	72.8%	21.7%	19.5%	18.6%	*	*	9.9%	9.1%	*	*	11.9%
<b>Macomb County HD</b>	57.2%	14.8%	16.0%	15.9%	15.3%	20.4%	13.7%	14.3%	10.9%	20.4%	19.8%
<b>Marquette County HD</b>	80.7%	27.1%	19.6%	17.4%	*	*	12.2%	12.2%	*	*	7.9%
<b>Mid-Michigan Comm.</b>	78.7%	27.5%	17.7%	17.0%	*	*	15.2%	14.9%	*	*	9.3%
<b>Mid-Michigan DHD</b>	82.0%	26.1%	19.0%	19.7%	*	16.3%	14.0%	13.4%	*	17.3%	4.0%
<b>Monroe County HD</b>	62.5%	13.8%	16.0%	15.5%	17.5%	15.6%	13.6%	13.3%	7.9%	19.8%	7.3%
<b>Muskegon County HD</b>	62.8%	15.5%	15.8%	16.1%	14.6%	17.1%	12.9%	13.0%	10.3%	16.8%	16.6%
<b>Northwest MI Comm Health Agency</b>	77.4%	29.1%	18.9%	18.8%	*	*	14.3%	12.9%	*	*	7.4%
<b>Oakland</b>	60.6%	19.3%	15.5%	16.1%	13.6%	17.6%	12.0%	11.7%	9.5%	17.4%	15.4%
<b>Saginaw County Depart PH</b>	67.0%	13.3%	17.2%	18.7%	15.5%	17.4%	14.5%	15.4%	12.1%	16.8%	18.3%
<b>Sanilac County HD</b>	61.6%	16.8%	21.9%	20.5%	*	*	16.6%	16.6%	*	*	7.7%
<b>Shiawassee County HD</b>	72.1%	22.0%	18.6%	18.0%	*	20.4%	12.0%	12.0%	*	14.8%	13.2%
<b>St Clair County HD</b>	60.8%	12.9%	16.4%	16.3%	12.0%	18.9%	16.2%	14.9%	20.0%	18.9%	8.1%
<b>Tuscola County HD</b>	73.2%	19.1%	17.2%	16.5%	*	14.8%	13.5%	13.8%	*	13.0%	4.8%
<b>Washtenaw County HD</b>	80.7%	29.9%	17.6%	18.2%	17.3%	17.1%	15.9%	16.7%	13.6%	22.9%	16.4%
<b>Wayne</b>	53.2%	17.3%	15.2%	14.8%	14.9%	20.9%	12.0%	12.9%	9.1%	11.5%	22.8%
<b>Western Upper Penin DHD</b>	76.3%	30.1%	14.9%	15.3%	*	*	10.1%	8.2%	*	*	10.6%

<sup>b</sup> PNSS Data. <sup>c</sup> Analysis limited to children < 2 years of age. <sup>d</sup> PedNSS data. <sup>e</sup> Analysis limited to children older than 24 months and up to 60 months. \*Data insufficient for analysis







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