PRAMS
Perspectives

A Pregnancy Risk Assessment Monitoring System Report - January 2013

Gestational Weight Gain in Utah: Populations and Interventions

Background:

In 2009, the Institute of Medicine (IOM) updated its recommendations for pregnancy weight gain, the first revision in two decades. The revised guidelines followed national trends of increased maternal age, higher rates of multiple gestation, and more women entering into pregnancy with elevated body mass indices (BMI).[1] The IOM amendment incorporated findings from research that emphasized the life-stage framework, considering maternal outcomes such as postpartum weight retention, duration of breastfeeding, cardiovascular health, and other chronic diseases.[2] Additionally, the new gestational weight gain (GWG) guidelines adopt standard World Health Organization (WHO) BMI categories, and for the first time apply a range of appropriate weight gain for obese women. The IOM also issued provisional guidelines for women with twin pregnancies. Table 1 shows the IOM recommended GWG guidelines for women pregnant with a single fetus by maternal prepregnancy BMI.

What is PRAMS?

Data in this newsletter were obtained from the Utah Pregnancy Risk Assessment Monitoring System (PRAMS). PRAMS is an ongoing, population-based, risk factor surveillance system designed to identify and monitor selected maternal experiences that occur before, during, and after pregnancy and early infancy experiences. Each month, a sample of approximately 200 women two to four months postpartum is selected. The sample is stratified based on maternal education and birth weight so that inferences and comparisons about these groups can be made. The results are weighted for sample design and non-response.

Women are asked questions about prenatal care, breastfeeding, smoking and alcohol use, physical abuse, and early infant care. PRAMS is intended to help answer questions that birth certificate data alone cannot answer. Data will be used to provide important information that can guide policy and other efforts to improve care and outcomes for pregnant women and infants in Utah.

The PRAMS data reported here represent all live births to Utah residents during 2009-2010. A total of 4,220 mothers were selected to participate in the project and 3,234 mothers responded, for a response rate of 77%. Survey results are weighted for non-response so that analyses can be generalized to the entire population of Utah women delivering live births.

The physiological and metabolic changes that occur to the mother during pregnancy are critical for the growth and development of the placenta and fetus.[1] However, the placenta, fetus, and amniotic fluid make up only about 35% of the weight gained during pregnancy.[6] The additional weight gain can be attributed to protein, fat, water, and minerals that are deposited in the extracellular fluid, adipose tissue, uterus, and breasts.[6] Gaillard et al. found that GWG has some influence on gestational hypertension, preeclampsia, gestational diabetes, cesarean section (C-section) delivery, and having babies that are large for gestational age. Although these findings were not as strong an association as prepregnancy obesity, their clinical implications may still be significant.[7]

Women who gain weight excessively during pregnancy are more likely to have difficulty losing weight after delivery. This long-term weight retention may increase the risk of being overweight or obese when entering into subsequent pregnancies, significantly increasing the risk of pregnancy-related morbidities.

Excessive GWG increases women's risk for having a baby that is large for gestational age, which also increases her risk of C-section deliveries and birth injuries.[8] Although less of a problem in Utah, research has shown that inadequate pregnancy weight gain can also be problematic. Low weight gain is associated with low birth weight babies and fetal growth restriction.

This report examines characteristics of Utah women who experienced excessive and inadequate GWG, and examines the prevalence of weight gain counseling and the relationship to GWG guideline adherence.

Methodology:

This report uses Utah PRAMS data from 2009-2010 to examine GWG in Utah. GWG was calculated using maternal prepregnancy weight and reported weight at the time of delivery, as well as the gestational age of the baby, as reported by vital records. The calculations of GWG follow the IOM methodology. Women were classified as having inadequate weight gain if they gained less than the IOM recommendation for their prepregnancy BMI and as excessive weight gain if they gained more. The data exclude multiple gestations, birth certificates with missing maternal prepregnancy BMI, weight at the time of delivery, and gestational age of the baby. Using SAS version 9.3, data were analyzed using Chi-square tests to identify significant contributors to inadequate and excessive weight gain and to detect differences between groups. This analysis represents 98,438 women who gave birth to a single baby in the state of Utah during 2009-2010.

Table 1. New Recommendations for Total and Rate of Weight Gain During Pregnancy, by Prepregnancy BMI +

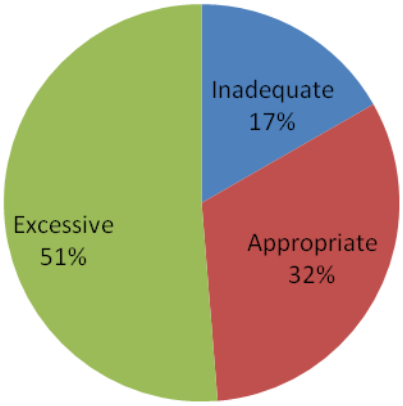
Prepregnancy BMI Category	BMI (kg/m²)	Total Weight Gain (lbs)	Rates of Weight Gain* 2nd and 3rd Trimesters (lbs/week)
Underweight	<18.5	28–40	1 (1–1.3)
Normal weight	18.5-24.9	25–35	1 (0.8–1)
Overweight	25.0-29.9	15–25	0.6 (0.5–0.7)
Obese (includes all classes)	≥30.0	11–20	0.5 (0.4–0.6)

+ To calculate BMI go to www.nhlbisupport.com/bmi/
* Calculations assume a 0.5–2 kg (1.1–4.4 lbs) weight gain in the first trimester. [3 4 5] Table adapted from IOM. [1]

Results:

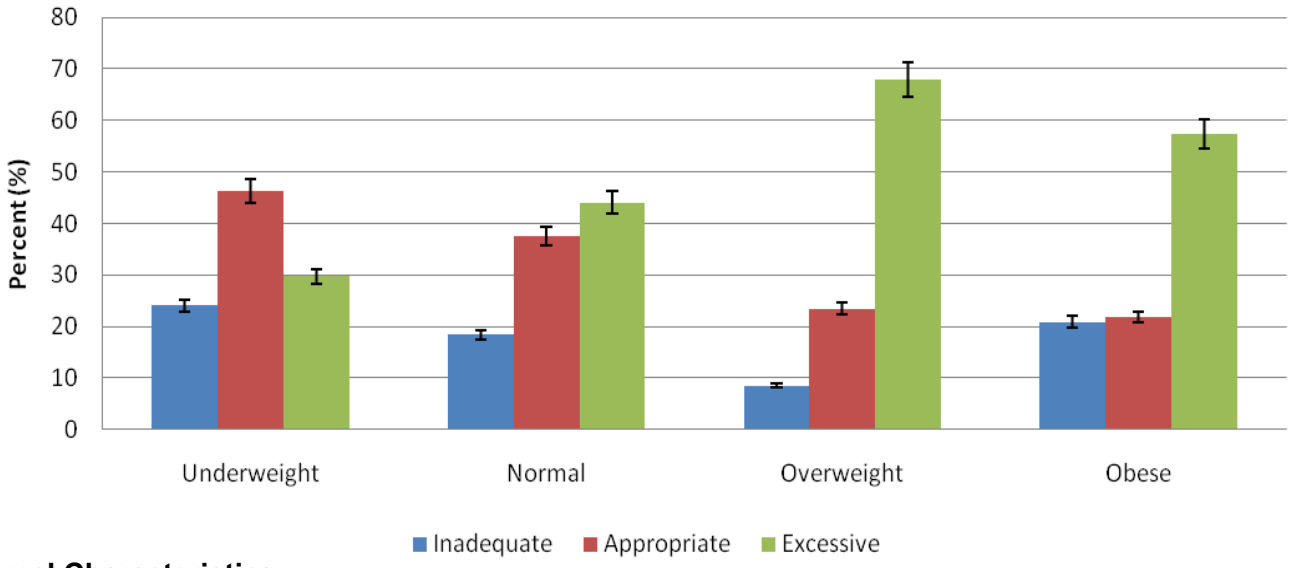
More than half of Utah women did not gain the appropriate amount of weight during their pregnancy; 16.7% of women gained an inadequate amount of weight and 51.3% of women had excessive weight gain (Figure 1). In addition to the fact that an obese prepregnancy BMI is an independent predictor of many maternal morbidities and adverse fetal outcomes, it is also one of the strongest predictors of unhealthy GWG. Women who are not at a healthy weight prior to pregnancy are more likely to gain outside of the recommended range during their pregnancy. More than 1 in 3 women in Utah are overweight or obese prior to pregnancy. Nearly one-fourth (24%) of women in Utah were overweight and 17% were obese prior to pregnancy; 54% of women were within the normal BMI range, and only about 5% of women were underweight prior to pregnancy. Women who were overweight or obese prior to pregnancy were significantly more likely to gain excessive weight during their pregnancy ($p<0.0001$).

Figure 1. Gestational Weight Gain, Utah PRAMS, 2009-2010



Among women who were overweight prior to pregnancy, 68% gained excessive weight during their pregnancy. Among women who were considered obese, 57% gained excessive weight (Figure 2). The proportion of women who gained appropriately was similar for women with underweight or normal BMIs prior to pregnancy, but decreased substantially for overweight and obese women. The proportion of inadequate weight gain was highest among women who were underweight prior to pregnancy. Interestingly, 20% of women who were obese were categorized as having inadequate weight gain. This finding may need to be investigated further, as some studies have shown the benefits of obese women maintaining or even losing weight during pregnancy. For example, Beyerlein et al. found that gestational weight loss in overweight and obese women was protective against preeclampsia and emergency C-section. However, the same study found that weight loss increased the likelihood of preterm delivery and small for gestational age (SGA) infants.[9]

Figure 2. Gestational Weight Gain by Prepregnancy BMI, Utah PRAMS, 2009-2010



Maternal Characteristics:

Women with inadequate or excessive weight gain had some statistically significant differences when compared to women whose weight gain was within the IOM recommended guidelines. These differences are indicated in Table 2 with a P-value <0.05, which was considered significant for the purposes of this analysis. A separate analysis of mothers with inadequate weight gain and those with excessive was conducted in relation to the appropriate weight gain reference group.

Women with <u>inadequate</u> GWG were significantly more likely to:

- Have a lower education level
- Report no insurance for prenatal care
- Report no prenatal care during the first trimester
- Report inadequate prenatal care according to the Kotelchuck Index
- Be underweight or obese prior to pregnancy

Additionally, women with <u>excessive</u> GWG were significantly more likely to:

- Be unmarried
- Have had no previous live births
- Be overweight or obese prior to pregnancy

Table 2. Gestational Weight Gain by Selected Maternal Characteristics, Utah PRAMS, 2009-2010

	Inadequate			Excessive			Appropriate	
Characteristics	**%**	95% Confidence Interval	P-Value	**%**	95% Confidence Interval	P-Value	**%**	95% Confidence Interval
Total	16.7	(15.3-18.2)		51.3	(49.3-53.3)		32.0	(30.1-33.9)
Maternal Age			NS			NS		
≤ 17	9.9*	(3.8-16.0)		60.6	(50.1-71.0)		29.5	(19.7-39.3)
18 - 19	17.9	(11.5-24.2)		48.1	(39.4-56.7)		34.0	(25.9-42.2)
20 - 24	15.6	(12.8-18.5)		50.7	(46.6-54.7)		33.7	(29.8-37.5)
25 - 29	15.5	(13.1-18.0)		51.6	(48.1-55.1)		32.9	(29.6-36.1)
30 - 34	17.6	(14.5-20.8)		52.7	(48.5-56.9)		29.7	(25.8-33.5)
35 - 39	23.8	(17.6-30.0)		44.9	(37.6-52.1)		31.3	(24.5-38.2)
40 +	17.7*	(5.2-30.1)		62.8	(47.1-78.5)		19.6*	(7.1-32.0)
Education Level			**<0.05**			NS		
Less than High School	21.9	(18.6-25.2)		49.6	(45.6-53.7)		28.5	(24.8-32.1)
Completed High School	17.4	(14.1-20.7)		52.5	(48.1-56.9)		30.1	(26.0-34.1)
Some College	14.7	(12.3-17.2)		53.5	(50.0-57.0)		31.8	(28.5-35.1)
College Graduate	16.1	(13.2-19.1)		48.6	(44.5-52.6)		35.3	(31.5-39.2)
Marital Status			NS			**<0.05**		
Married	16.6	(15.0-18.3)		50.6	(48.3-52.8)		32.8	(30.7-34.9)
Unmarried	17.4	(14.0-20.8)		54.8	(50.3-59.4)		27.7	(23.5-31.9)
Race			NS			NS		
White	16.4	(14.8-18.0)		51.5	(49.3-53.7)		32.1	(30.0-34.2)
Other than White	18.7	(14.7-22.7)		48.3	(43.0-53.7)		33.0	(27.9-38.0)
Ethnicity			NS			NS		
Non-Hispanic	16.4	(14.8-18.1)		51.2	(48.9-53.5)		32.4	(30.2-34.5)
Hispanic	17.8	(14.6-21.0)		50.5	(45.9-55.1)		31.7	(27.4-36.0)
Federal Poverty Level (FPL)			NS			NS		
≤100% of FPL	16.3	(13.5-19.0)		50.9	(46.8-54.9)		32.9	(29.0-36.7)
101-133% of FPL	18.3	(13.3-23.3)		51.7	(45.0-58.3)		30.0	(23.9-36.2)
134-185% of FPL	19.4	(14.7-24.1)		54.4	(48.5-60.4)		26.2	(21.0-31.4)
185+% of FPL	16.5	(14.4-18.5)		50.3	(47.5-53.2)		33.2	(30.6-35.9)
Prenatal Care Payer			**<0.05**			NS		
No Insurance	25.1	(19.3-30.8)		45.6	(38.8-52.3)		29.4	(23.2-35.6)
Medicaid	16.9	(14.1-19.7)		52.7	(48.9-56.5)		30.4	(26.8-34.0)
Private Insurance	15.8	(13.8-17.7)		51.2	(48.5-53.9)		33.0	(30.5-35.5)
Self Pay/Other	15.9	(8.6-23.2)		49.4	(38.7-60.1)		34.7	(24.4-44.9)
Urban/Rural			NS			NS		
Urban	16.2	(14.5-19.9)		52.0	(49.7-54.3)		31.8	(29.6-33.9)
Rural	18.3	(15.2-21.3)		49.1	(45.0-53.2)		32.6	(28.7-36.5)
Previous Live Birth			NS			**<0.05**		
No	14.9	(12.4-17.4)		56.3	(52.9-59.8)		28.8	(25.6-31.9)
Yes	17.7	(15.9-19.6)		48.5	(46.0-51.1)		33.7	(31.3-36.1)
Prepregnancy Body Mass Index			**<0.05**			**<0.05**		
Underweight	24.1	(16.4-31.8)		29.7	(21.6-37.9)		46.2	(37.2-55.2)
Normal	18.4	(16.3-20.5)		44.1	(41.3-46.8)		37.6	(34.9-40.2)
Overweight	8.5	(6.3-10.7)		68.0	(64.2-71.8)		23.5	(20.0-27.0)
Obese	20.9	(17.0-24.9)		57.3	(52.5-62.2)		21.8	(17.7-25.8)
1st Trimester Prenatal Care			**<0.05**			NS		
No	19.5	(15.6-23.4)		50.5	(45.6-55.4)		30.0	(25.6-34.5)
Yes	16.1	(14.5-17.7)		51.5	(49.3-53.8)		32.4	(30.2-34.5)
Kotelchuck Index-Prenatal care			**<0.05**			NS		
Inadequate	22.8	(18.5-27.1)		45.2	(40.1-50.4)		31.9	(27.0-36.8)
Adequate	15.6	(14.0-17.1)		52.3	(50.0-54.0)		32.2	(30.1-34.3)

NS=Not Significant

*Use caution in interpreting; the estimate has a relative standard error greater than 30% and does not meet UDOH standards for reliability.

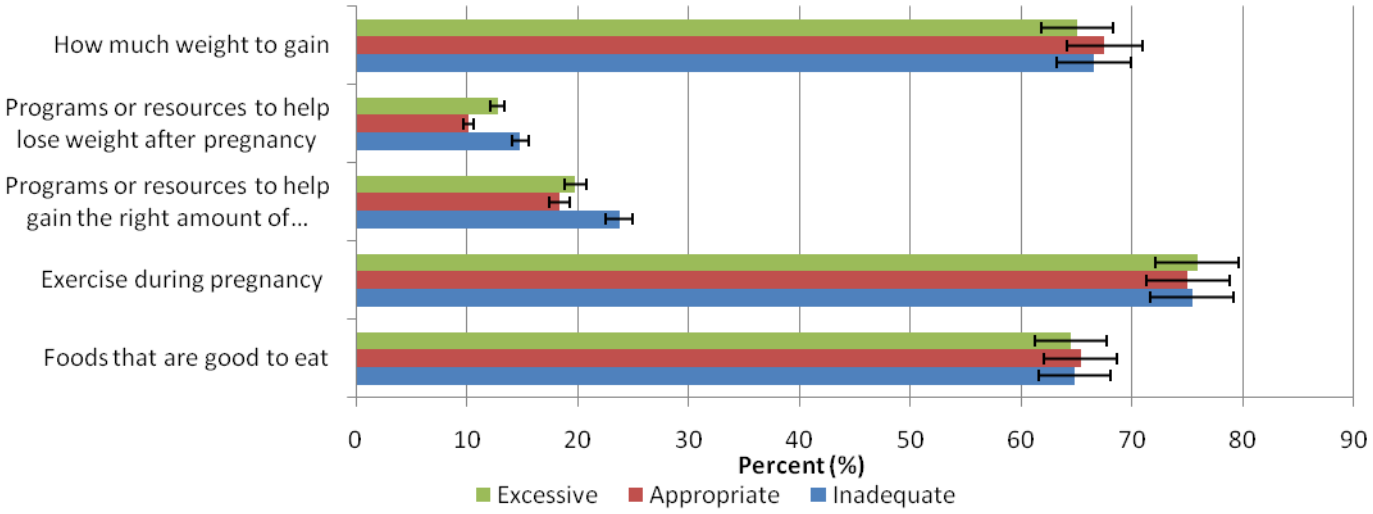
Prenatal Care Interventions:

As demonstrated in Table 2, the timing of prenatal care is significantly associated with inadequate weight gain. Prenatal care and the scope of care received may inform mothers' beliefs about healthy pregnancy behaviors. This counseling may have the potential to substantially influence the amount of weight women gain during pregnancy. To assess the scope of prenatal care that Utah mothers received, the PRAMS survey asked about specific topics discussed during prenatal care visits. These subjects included how much weight to gain, information on diet and physical activity, and relevant resources available to mothers.

Of all women who received prenatal care, only 65.1% responded yes to the question "*During any of your prenatal care visits,* did a doctor, nurse, or other health care worker talk with you about how much weight you should gain during your pregnancy?" The proportion of women who had discussions about GWG with a provider differs significantly among prepregnancy BMI groups; only 62% of obese and overweight women reported that their providers discussed appropriate GWG during pregnancy compared to 73.5% of underweight women reporting a weight gain discussion. Furthermore, 10% of women who reported that their provider had "told them how much weight to gain during pregnancy" did not remember the amount that they were told at the time of the survey.

Overall, 20.5% of women discussed programs available to help them with appropriate weight gain during their pregnancy and 12.5% reported discussing programs to help them lose weight after pregnancy. Women with a normal BMI prior to pregnancy were significantly less likely to report learning about these programs and resources. Only 75% of women who received prenatal care (PNC) reported providers discussing exercise and 65% of women reported discussing foods that were healthful during pregnancy. Figure 3 shows areas of prenatal care counseling by gestational weight gain.

Figure 3. Prenatal Care Discussions by GWG Category, Utah PRAMS, 2009-2010



Although not significantly different, fewer of the women who gained excessive or inadequate weight were told how much weight to gain. Women who gained inadequate amounts of weight were significantly more likely to report their provider informing them about resources to help gain the right amount of weight and resources to help lose weight after their pregnancy. These discussions did not increase the proportion of appropriate GWG, as there were no significant differences in GWG in women who received counseling on diet, exercise, resources for weight gain, for weight loss, and those who did not.

PREGNANCY OUTCOMES:

Table 3 examines pregnancy outcomes by GWG. Women with inadequate or excessive weight gain had some statistically significant differences in outcomes compared to women who gained within the IOM recommended guidelines.

Women with inadequate gain had significantly higher rates of infant mortality, postpartum depression diagnosis, gestational diabetes, and SGA babies. Women with excessive weight gain had significantly higher rates of pregnancy induced hypertension, postpartum depression diagnosis, and breastfeeding discontinuation. Labor induction was borderline significant (p-value=0.055) for women with excessive GWG, and women with excessive GWG had significantly fewer SGA babies. No significant differences were noted in rates of preterm delivery, cesarean sections, or infant NICU admission .

Table 3. Selected Outcomes by Gestational Weight Gain, Utah PRAMS, 2009-2010

	Inadequate			Excessive			Appropriate	
	%	95% CI	P-Value	%	95% CI	P-Value	%	95% CI
Small for Gestational Age	15.7	(12.5-18.8)	**<0.01**	7.4	(6.1-8.8)	**<0.05**	10.5	(8.4-12.6)
Labor Induction	45.0	(40.1-49.9)	NS	49.7	(46.8-52.6)	NS	45.1	(41.5-48.7)
Infant Death	0.9*	(0.3-1.6)	**<0.001**	0.4	(0.2-0.6)	NS	0.3*	(0.1-0.4)
Never Breastfed	10.0	(7.2-12.8)	NS	7.5	(6.0-9.0)	NS	7.2	(5.4-9.1)
Stopped Breastfeeding	30.7	(26.1-35.4)	NS	33.7	(31.0-36.5)	**<0.05**	28.1	(24.8-31.5)
Postpartum Depression Diagnosis	10.7	(7.8-13.6)	**<0.05**	10.5	(8.7-12.2)	**<0.05**	7.4	(5.6-9.2)
Gestational Diabetes	9.9	(7.0-12.8)	**<0.001**	4.6	(3.5-5.8)	NS	5.4	(3.8-7.0)
High Blood Pressure	6.8	4.5-9.2)	NS	13.3	(11.4-15.2)	**<.**0001	6.7	(5.0-8.5)
NS=Not Significant								

^The estimate has been suppressed because the relative standard error is greater than 50% or the observed number of events is very small and not appropriate for publication

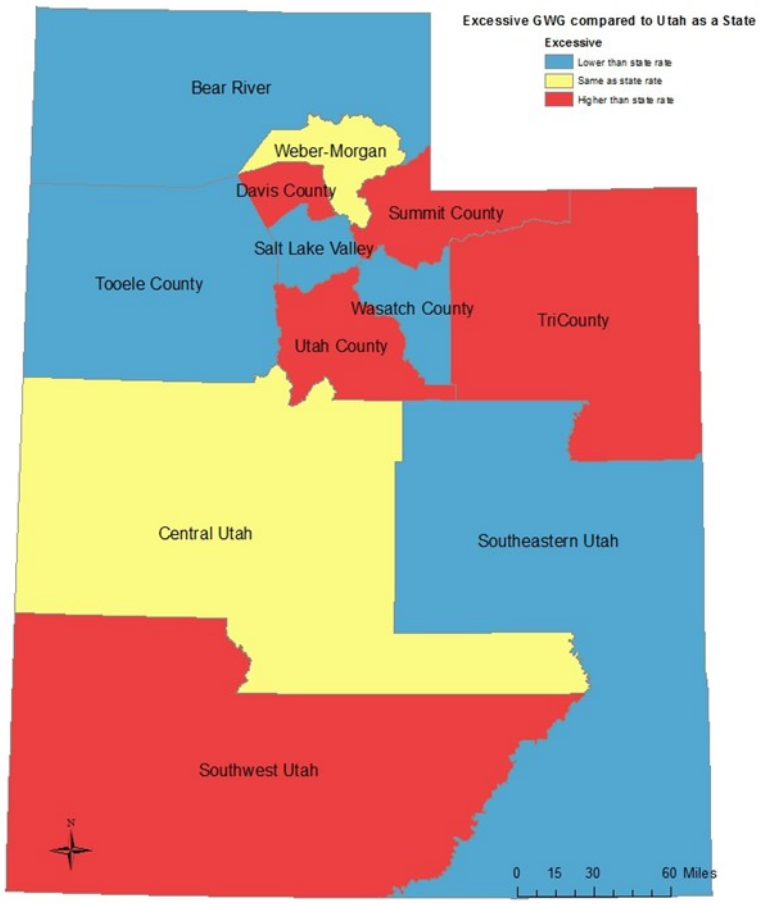
*Use caution in interpreting; the estimate has a relative standard error greater than 30% and does not meet UDOH standards for reliability.

Authors:
Jessica Sanders, MSPH, PRAMS Data Manager
Laurie Baksh, MPH, Manager, Maternal and Infant Health Program
Lynsey Gammon, MPH, PRAMS Operations Manager

GWG by Geographical Region:

Additional analysis was performed to show variation in GWG by local health district. ArcGIS 10.1 was used to compare areas of the state to the state overall rate of excessive weight gain. The overall state rate was 51.3% (95% CI 49.3-53.3). Bear River, Tooele County, Salt Lake Valley, Wasatch County, and Southeastern Utah health districts had significantly lower rates of excessive GWG than the overall state rate. Davis County, Summit County, TriCounty and Southwest Utah health districts had significantly higher rates of excessive GWG. Central Utah and Weber Morgan districts were not significantly different from the overall state rate. Looking at these Local Health Districts can inform public health professionals on areas that require additional education on GWG.

Figure 4. Map of Excessive GWG by Local Health District, Utah PRAMS 2009-2010



Conclusion and Recommendation:

In Utah, excessive gestational weight gain is of concern. More than half of all Utah mothers who delivered between 2009 and 2010 gained more than the recommended amount of weight during their pregnancy. Utah mothers with excessive weight gain had significantly higher rates of gestational hypertension, postpartum depression, and were more likely to discontinue breastfeeding than women who gained within the appropriate range.

Quality prenatal care includes early and frequent appointments with a health care provider to discuss healthy behaviors, proper diet, and a variety of medical conditions that may arise or be exacerbated during pregnancy. However, this report shows that not all Utah mothers are receiving this information. Many mothers are missing out on important conversations regarding issues such as GWG and available resources that may be helpful for appropriate weight gain.

GWG may not be as strong an influence on pregnancy complications and outcomes as prepregnancy BMI, but pregnancy does serve as an opportune time for prenatal care providers to talk about weight. Together, patients and physicians can discuss interventions to prevent weight retention.

Providers should discuss healthy pregnancy weight gain with all women, regardless of prepregnancy BMI. Providers may unknowingly assume a woman's risk or lack of risk based on physical appearance. It should be standard practice to discuss appropriate pregnancy weight gain, proper diet and nutrition, importance of exercise, and resources available for proper weight gain, and assistance with postpartum weight loss. The findings from this report may indicate the need to increase provider awareness on the importance of addressing weight gain with all patients, and giving them additional tools to discuss GWG with overweight and obese women so that they feel more prepared to address this sensitive health topic.

It is important to note that among women who are underweight prior to pregnancy, the chances of their gaining appropriate weight improves when they are properly counseled. This effect does not carry over to obese women, indicating that obese women may need additional education and support. GWG guidelines vary for individual women depending on prepregnancy BMI; therefore, it may be just as important for providers to tailor the message specifically to the individual. The majority of women in Utah gain excessive weight during pregnancy. There are no significant differences between maternal characteristics, which convey the fact that all Utah women are at risk for excessive weight gain and the issues needs to be addressed with all women. Following pregnancy weight gain guidelines can improve both maternal and infant health outcomes and may be a useful tool to reduce both postpartum and childhood obesity. Pregnancy can be an important opportunity to promote the adoption of healthy behaviors.

Resources and Additional Services

A pregnant woman needs between 200 and 300 additional calories per day. Personal eating plans geared specifically for pregnant women can be found at http://www.choosemyplate.gov/pregnancy-breastfeeding.html. Women who are in need of more comprehensive nutrition advice can be referred to a registered dietitian for personal counseling.

The Utah Department of Health has developed a series of pregnancy weight gain charts that are individualized for prepregnancy BMI, as based on Institute of Medicine guidelines. These charts can be downloaded at: http://www.babyyourbaby.org/pregnancy/during-pregnancy/weight-gain.php. The Department has also developed posters outlining the IOM recommendations that can be placed in provider offices. To obtain your free copies of these materials, call the Maternal and Infant Health Program at 801-538-9970. All materials are available in both English and Spanish.

References

1. Rasmussen KM, Yaktine AL. Weight Gain During Pregnancy: Reexamining the Guidelines. In: Rasmussen KM, Yaktine AL, editors. Weight Gain During Pregnancy: Reexamining the Guidelines. Washington (DC) 2009.
2. Rasmussen KM, Catalano PM, Yaktine AL. New guidelines for weight gain during pregnancy: what obstetricians/ gynecologists should know. Current Opinion in Obstetrics & Gynecology. 2009; 21:521-6.
3. Siega-Riz AM, Adair LS, Hobel CJ. Institute of Medicine maternal weight gain recommendations and pregnancy outcome in a predominantly Hispanic population. Obstetrics and Gynecology. 1994; 84:565-73.
4. Abrams B, Selvin S. Maternal weight gain pattern and birth weight. Obstetrics and Gynecology. 1995; 86:163-9.
5. Carmichael S, Abrams B, Selvin S. The pattern of maternal weight gain in women with good pregnancy outcomes. American Journal of Public Health. 1997; 87:1984-8.
6. Pitkin RM. Nutritional support in obstetrics and gynecology. Clinical Obstetrics and Gynecology. 1976; 19:489-513.
7. Gaillard R, Durmus B, Hofman A, Mackenbach J, Steegers E, Jaddoe V. OS021. Risk factors and outcomes of maternal obesity and excessive weight gain during pregnancy. Pregnancy Hypertension: An International Journal of Women's Cardiovascular Health. 2012; 2:186.
8. Academies TN. Weight Gain During Pregnancy: How Much is Too Much? The Sounds of Science Podcast 2009.
9. Beyerlein A, Schiessl B, Lack N, von Kries R. Associations of gestational weight loss with birth-related outcome: a retrospective cohort study. BJOG : An International Journal of Obstetrics and Gynaecology. 2011; 118:55-61.
10. Wolff S, Legarth J, Vangsgaard K, Toubro S, Astrup A. A randomized trial of the effects of dietary counseling on gestational weight gain and glucose metabolism in obese pregnant women. International Journal of Obesity. 2008; 32:495-501.