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Weight Gain During Pregnancy: Colorado Pregnancy Risk Assessment Monitoring System (PRAMS), 1997-2000

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Introduction

A large body of evidence suggests that maternal weight gain during pregnancy is an important determinant of fetal growth¹. Inadequate prenatal weight gain is a significant risk factor for intrauterine growth retardation and low birth weight in infants^{2,3,4}. Inadequate maternal weight gain during the third trimester of pregnancy is associated with increased risk of spontaneous preterm delivery⁵. In Colorado, an analysis of birth certificate data found that among singleton births, inadequate weight gain during pregnancy is the largest contributor to low birth weight⁶. This is important because Colorado has one of the highest low birth weight rates in the nation (8.6 percent in Colorado, 2001 versus 7.7 percent in US, 2001). Maternal weight gain above the Institute of Medicine (IOM) guidelines is associated with excessive postpartum weight retention⁷. Weight retention is of concern, given the trend toward increasing obesity among US women and the associated risks for cardiovascular disease, diabetes, and certain types of cancer. Therefore, interventions aimed at achieving adequate weight gain during pregnancy will have an impact on preventing both poor birth outcomes and improving the future health of the mother.

In 1990, the Food and Nutrition Board of the National Institute of Medicine (IOM) issued a report with guidelines for nutrition and weight gain during pregnancy¹. These guidelines are the standard for weight gain during pregnancy in the United States. The IOM guidelines for weight gain during pregnancy incorporate pre-pregnancy body mass index (BMI) in setting the recommended weight gain ranges. BMI is based on height and weight ((kg)/height (m)²). As shown in Table 1, pregnant women are advised to gain the appropriate amount of weight, based on their pre-pregnancy BMI. In the mid-1990s the Maternal and Child Health Bureau

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Table 1. Institute of Medicine guidelines for total weight gain during pregnancy, based on pre-pregnancy Body Mass Index (BMI)

Pre-Pregnancy BMI	Recommended Total Weight Gain (pounds) for Singleton Pregnancies
Less than 19.8	28-40
19.8-26.0	25-35
26.1-29.0	15-25
More than 29.0	15

(MCHB) reviewed research related to maternal weight gain that had been published since the 1990 IOM report, and made recommendations to promote the use of the 1990 IOM guidelines for both the rate of weight gain and total weight gain, based on a woman’s pre-pregnancy BMI⁷.

Based on the vast amount of research demonstrating a strong relationship between maternal weight gain and the risks of low birth weight or postpartum weight retention, a Healthy People 2010 objective is being developed to measure the proportion of women who achieved their recommended weight gain during pregnancy. By identifying the characteristics of women in Colorado with weight gain outside the IOM-recommended ranges (inadequate, excessive) the state is able to develop more effective strategies aimed at educating health care providers, policy makers, women of childbearing age, and pregnant women regarding recommended weight gain during pregnancy.

This report identifies the characteristics of women with prenatal weight gain outside the IOM-recommended standards. Data were collected through the Pregnancy Risk Assessment Monitoring System (PRAMS), a survey of new mothers.

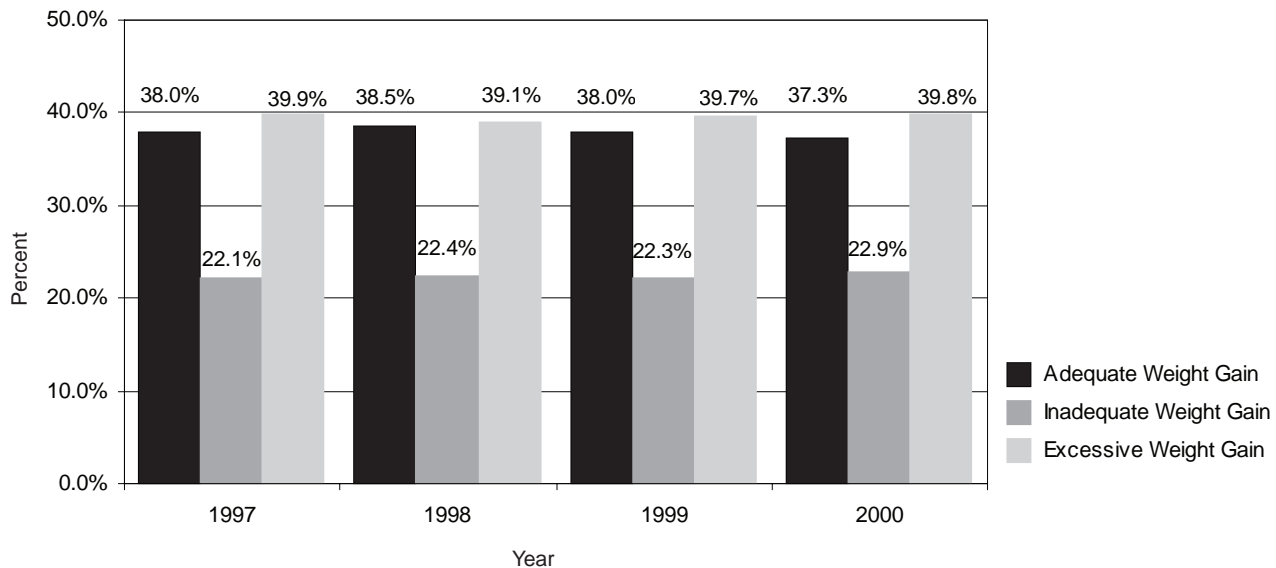
Methodology

The Pregnancy Risk Assessment Monitoring System (PRAMS) is an ongoing, population-based surveillance system designed to supplement vital records and to gener-

ate state-specific perinatal health data. Each month, a stratified random sample comprised of approximately 5 percent of Colorado women who recently had a baby is selected from eligible birth certificates to comprise the PRAMS sample. The sample is stratified by region of residence (Denver Metro, Other Metro, Rural) and birth weight (low, adequate) to ensure a large enough sample in the rural and low birth weight categories. Selected women are asked to complete the PRAMS questionnaire, which addresses a variety of health and psychosocial issues such as prenatal care, maternal use of alcohol and cigarettes, breastfeeding, stress, and infant health. The data presented in this report represent live births to Colorado women between 1997 and 2000. From 1997 to 2000, a total of 11,288 women were selected to participate in PRAMS and 8,250 (73 percent) of those women completed surveys. Survey data from respondents are weighted to represent all live births from 1997 to 2000 to Colorado residents 15 years and older.

To determine adequacy of weight gain during pregnancy, each respondent’s pre-pregnancy BMI and amount of weight gained during pregnancy were obtained. On the PRAMS survey, women are asked, “Just before you got pregnant, how much did you weigh?” and “How tall are you without shoes?” From these two responses, each woman’s pre-pregnancy BMI was established. The amount of weight each respondent gained during pregnancy was collected from birth certificate data. For this analysis, only singleton, full-term (37-42 weeks) infants were included. As a result, the 6,531 eligible respondents were categorized as follows: Adequate weight gain (within the range recommended by the IOM), inadequate weight gain (below the recommended range), and excessive weight gain (above the recommended range). All missing (blank or “don’t know”) observations were excluded. It should be noted that 10.6 percent of all respondents had missing information in calculating adequacy of weight gain. As shown in Figure 1, the three adequacy-of weight-gain categories fluctuated little across the four years. All subsequent data are combined to obtain the most accurate prevalence point estimates.

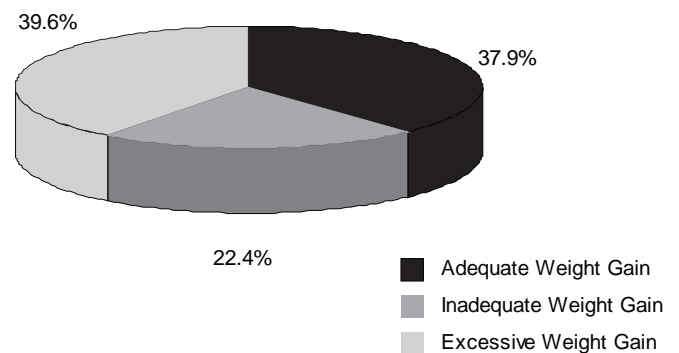
Figure 1. Adequacy of weight gain during pregnancy by year: Colorado PRAMS, 1997-2000



Prevalence of Inadequate and Excessive Weight Gain

Between 1997 and 2000, 37.9 percent of Colorado women gained the appropriate amount of weight during pregnancy (Figure 2). The majority of Colorado women (62.0 percent) gained weight outside of the IOM guidelines: 22.4 percent gained an inadequate amount and 39.6 percent gained an excessive amount of weight during pregnancy.

Figure 2. Adequacy of weight gain during pregnancy: Colorado PRAMS, 1997-2000



Inadequate Weight Gain

Various maternal characteristics were analyzed against the three adequacy-of-weight-gain categories (Table 2). In Colorado, residents of rural areas of the state (25.5 percent) had statistically higher rates of inadequate weight gain than the populace of “other metro” regions (19.9 percent). However, this difference was not seen when comparing rural and Denver metro regions (25.5 and 23.0 percent, respectively). Hispanic women (26.9 percent) were more likely to gain an inadequate amount of weight than non-Hispanic White women (20.8 percent). Women who had a previous

Table 2. Adequacy of weight gain categories by selected maternal characteristics: Colorado PRAMS, 1997-2000 (n=6,351)

	Adequate Weight Gain		Inadequate Weight Gain		Excessive Weight Gain	
	Percent	95% CI ¹	Percent	95% CI ¹	Percent	95% CI ¹
Colorado	37.9	(36.3, 39.5)	22.4	(21.0, 23.8)	39.6	(38.0, 41.2)
Region of residence²						
Denver Metro	38.3	(35.9, 40.7)	23.0	(20.9, 25.1)	38.7	(36.3, 41.2)
Other Metro	38.3	(35.9, 40.7)	19.9	(17.9, 21.9)	41.8	(39.4, 44.2)
Rural	35.5	(33.4, 37.6)	25.5	(23.5, 27.5)	39.0	(36.8, 41.2)
Age						
15-19 years	33.8	(29.0, 38.6)	25.0	(20.6, 29.4)	41.2	(36.2, 46.2)
20-24 years	36.6	(33.2, 40.0)	22.7	(19.7, 25.7)	40.6	(37.2, 44.0)
25-34 years	38.8	(36.6, 41.0)	21.4	(19.5, 23.3)	39.9	(37.7, 42.1)
35+ years	40.3	(36.2, 44.4)	23.7	(20.1, 27.3)	35.9	(31.8, 40.0)
Marital status						
Married	39.1	(37.3, 40.9)	22.2	(20.6, 23.8)	38.7	(36.9, 40.5)
Other	34.2	(30.8, 37.6)	23.3	(20.3, 26.3)	42.5	(39.0, 46.0)
Education						
<12 years	36.6	(32.1, 41.1)	26.8	(22.6, 31.0)	36.6	(32.1, 41.1)
12 years	33.4	(30.5, 36.3)	22.7	(20.1, 25.3)	43.8	(40.8, 46.8)
>12 years	40.4	(38.3, 42.5)	21.0	(19.3, 22.7)	38.6	(36.5, 40.7)
Race/Ethnicity						
White/Non-Hispanic	38.4	(36.6, 40.2)	20.8	(19.3, 22.3)	40.8	(39.0, 42.6)
Hispanic	36.7	(32.9, 40.5)	26.9	(23.4, 30.4)	36.4	(32.6, 40.2)
Black	28.2	(20.0, 36.4)	27.7	(19.0, 36.4)	44.1	(34.9, 53.3)
Other	47.4	(37.9, 56.9)	23.1	(15.1, 31.1)	29.5	(21.1, 37.9)
Previous live birth³						
None	37.7	(35.3, 40.1)	19.0	(17.1, 20.9)	43.3	(40.9, 45.7)
One or more	38.1	(36.0, 40.2)	25.1	(23.2, 27.0)	36.8	(34.7, 38.9)
Poverty level						
Above 185%	40.5	(38.3, 42.7)	20.1	(18.3, 21.9)	39.4	(37.2, 41.6)
Below 185%	33.6	(30.9, 36.3)	24.7	(22.3, 27.2)	41.7	(38.9, 44.5)
Unknown	38.8	(34.4, 43.2)	25.2	(21.2, 29.2)	35.9	(31.5, 40.3)
Prenatal care paid for by Medicaid						
No	39.4	(37.6, 41.2)	20.9	(19.4, 22.4)	39.6	(37.7, 41.5)
Yes	33.6	(30.5, 36.7)	26.7	(23.7, 29.7)	39.7	(36.5, 42.9)
Received WIC⁴ services during pregnancy						
No	39.8	(37.9, 41.7)	21.6	(20.0, 23.2)	38.7	(36.8, 40.6)
Yes	33.4	(30.5, 36.3)	24.6	(21.9, 27.3)	41.9	(38.9, 44.9)

¹ Confidence Interval

² Denver Metro region includes Adams, Arapahoe, Boulder, Denver, Douglas, and Jefferson counties.

Other Metro region includes El Paso, Larimer, Mesa, Pueblo, and Weld counties.

The Rural region includes the remaining counties of the state.

³ As reported on birth certificate

⁴ The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)

live birth were statistically more likely to gain an insufficient amount of weight when compared to women who gave birth to their first child (25.1 and 19.0 percent, respectively). Inadequate weight gain is statistically more prevalent among women who report their average household income as below 185 percent of the federal poverty level (24.7 percent) than women who report their average household income above that level (20.1 percent). Women who had their prenatal care paid for by Medicaid were significantly more likely to have insufficient weight gain

than women who had their prenatal care paid for by other means (26.7 and 20.9 percent, respectively). The prevalence of inadequate weight gain was not significantly different among age groups, by marital status, by years of education, or by participation in WIC.

As shown in Table 3, women who did not gain enough weight had significantly higher rates of inadequate prenatal care utilization than women who gained the appropriate amount of weight (14.1 and 9.4 percent, respectively).

Table 3. Behavioral characteristics of women who gained an adequate, inadequate, and excessive amount of weight during pregnancy: Colorado PRAMS, 1997-2000 (n = 6,351)

	Adequate Weight Gain		Inadequate Weight Gain		Excessive Weight Gain	
	Percent	95% CI ¹	Percent	95% CI ¹	Percent	95% CI ¹
Drank alcohol during pregnancy	9.1	(7.6, 10.6)	9.1	(7.0, 11.2)	9.8	(8.2, 11.4)
Smoked during pregnancy	11.2	(9.5, 12.9)	14.1	(11.7, 16.5)	12.9	(11.1, 14.7)
Start prenatal care 1st Trimester	79.0	(76.8, 81.2)	79.9	(77.0, 82.8)	79.5	(77.3, 81.7)
Inadequate prenatal care²	9.4	(7.7, 11.1)	14.1	(11.4, 16.7)	7.8	(6.5, 9.2)
Unintended pregnancy³	36.3	(33.7, 38.9)	40.3	(36.8, 43.8)	41.7	(39.1, 44.3)
Did not get PNC as early as wanted	18.2	(16.1, 20.3)	19.5	(16.7, 22.3)	20.4	(18.3, 22.5)

¹ Confidence Interval

² Adequacy of prenatal care measured by the Kotelchuck Index

³ Pregnancy characterized as unwanted or mistimed

Population Attributable Risk for Inadequate Weight Gain

Almost twice as many women who gained an inadequate amount of weight (5.3 percent) delivered a low birth weight infant compared to women who gained an adequate amount of weight (3.2 percent). As previously mentioned, inadequate weight gain plays a significant role in low-weight births. Population attributable risk for inadequate weight gain was calculated to determine its contribution to the occurrence of low-weight births. If inadequate weight gain could be eliminated among pregnant women, Colorado's singleton low birth weight rate could be reduced by as much as 19.3 percent.

Excessive Weight Gain

As shown in Table 2, the rate of excessive weight gain was not significantly different among women according to their region of residence, age, marital status, or poverty level. Women with 12 years of education (43.8 percent) had significantly higher rates of excessive weight gain than women who had more than 12 years of education (38.6 percent). The rate of excessive weight gain was significantly higher among women who had no previous live births when compared to women who had one or more previous live

births (43.3 and 36.8 percent, respectively). Among women who characterized their pregnancy as unintended the prevalence of excessive weight gain was significantly higher (41.7 percent) compared to women who gained an appropriate amount of weight during pregnancy (36.3 percent) (Table 3).

Statistics Primer

What is population attributable risk?

Population attributable risk (PAR) is a statistical measure used to estimate the proportion of cases of a disease or negative health outcome that can be attributed to a particular risk factor. PAR combines the prevalence of a risk factor in a population with the severity of the risk factor to yield a percentage of the total disease rate that is "attributed" to the risk factor. Therefore, if the PAR of a particular risk factor is about 20 percent, then 20 percent of the disease or negative health outcome can be linked to that risk factor. For example, if inadequate weight gain were eliminated, the rate of low-weight births in Colorado could be reduced by as much as 20 percent.

Summary

In Colorado, the majority of women (62.0 percent) gain an amount of weight during pregnancy that is outside the IOM recommendations. More than one in five women gain an inadequate amount of weight during pregnancy, and nearly 40 percent gain an excessive amount of weight during their pregnancy. This is a significant health problem in Colorado in that inadequate weight gain during pregnancy is associated with low birth weight and excessive weight gain during pregnancy is associated with postpartum weight retention.

Women in Colorado who are at risk of gaining an insufficient amount of weight during pregnancy are more likely to be Hispanic, women who have already had a child, in a lower income bracket, and/or Medicaid recipients. Receiving less than adequate prenatal care also place many women at risk of inadequate weight gain. Women in Colorado who are at risk of excessive weight gain are first time mothers and are those who characterize their pregnancy as unintended. In addition, inadequate weight gain significantly contributes to the occurrence of low-weight births. If inadequate weight gain could be eliminated, Colorado's low weight birth rate could be reduced by almost twenty percent.



Additional Information

What is being done in Colorado about weight gain during pregnancy?

The Colorado Department of Public Health and Environment has initiated a committee comprised of various health professionals throughout Colorado. The goal of this group is to increase knowledge and awareness among providers and the general public about appropriate weight gain during pregnancy. Focus groups with physicians and pregnant women in Colorado were conducted to determine beliefs and attitudes around weight gain during pregnancy. This information is being used to develop a social marketing campaign aimed at providers and consumers. Initially, the committee will focus on inadequate weight gain, and future work will entail the broader issue of appropriate weight gain; both inadequate and excessive weight gain. A toolkit and packet of information is being developed for providers that will enable them to educate clients more effectively. Additionally, public service announcements are being developed around this important issue. For more information, please contact Stephanie Beaudette at 303-692-2487.

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