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The impact of setting a pregnancy weight gain goal on total weight gain

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Abstract

Background: Expert groups recommend that women set a pregnancy weight gain goal with their care provider to optimise weight gain.

Objective: Our aim was to describe the concordance between first-trimester personal and provider pregnancy weight gain goals with the Institute of Medicine (IOM) recommendations and to determine the association between these goals and total weight gain.

Methods: We used data from 9353 women in the Nulliparous Pregnancy Outcomes Study: monitoring mothers-to-be. In the first trimester, women reported their personal pregnancy weight gain goal and their provider weight gain goal, and we categorised personal and provider weight gain goals and total weight gain according to IOM recommendations. We used log-binomial or linear regression models to relate goals to total weight gain, adjusting for confounders including race/ethnicity, maternal age, education, smoking, marital status and planned pregnancy.

Results: Approximately 37% of women reported no weight gain goals, while 24% had personal and provider goals, 31% had only a personal goal, and 8% had only a provider goal. Personal and

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

provider goals were outside the recommended ranges in 12%-23% of normal-weight women, 31%-41% of overweight women and 47%-63% of women with obesity. Women with both personal and provider pregnancy weight gain goals were 6%-14% more likely than their counterparts to have a goal within IOM-recommended ranges. Having any goal or a goal within the IOM-recommended ranges was unrelated to pregnancy weight gain. Excessive weight gain occurred in approximately half of normal-weight or obese women and three-quarters of overweight women, regardless of goal setting group.

Conclusions: These findings do not support the effectiveness of early-pregnancy personal or provider gestational weight gain goal setting alone in optimising weight gain. Multifaceted interventions that address a number of mediators of goal setting success may assist women in achieving weight gain consistent with their goals.

Keywords

body mass index; gestational weight gain; goal setting; obesity; pregnancy

1 | BACKGROUND

In the United States, only 1 in 3 pregnant women gains within the 2009 Institute of Medicine (IOM) weight gain recommendations.^{1,2} Nearly half of women gain too much weight,¹ which increases their risk of postpartum weight retention and later-life obesity,³ as well as obesity in their child.⁴ Approximately 20% of women gain too little weight,¹ which is associated with preterm birth, foetal growth restriction and infant death.^{2,5} The IOM^{2,6} and the American College of Obstetricians and Gynecologists⁷ recommend that, along with life style counselling and monitoring of weight gain, pregnant women set a weight gain goal with their provider to promote healthy weight gain. Popular websites echo these statements.⁸⁻¹⁰

Personal weight gain goals¹¹ and provider¹¹⁻¹⁵ weight gain goals during pregnancy have been associated with weight gain within the IOM-recommended ranges in all but two studies.^{16,17} However, there are important limitations with many of these studies. Reporting bias is a major concern, as women self-reported their weight gain goals after knowing their weight gain.^{11-14,16} Generalisability to modern pregnant populations is also questionable because a majority of studies were conducted before dissemination of the 2009 IOM guidelines.^{11-13,16,18-20} Further, samples were often recruited 10-25 years ago,^{11,15,18,19} before the dramatic increase in the public's awareness of the obesity epidemic.²¹ Only one small study¹⁸ inquired about weight gain goals set in the first trimester, when goal setting is likely to be most effective. Furthermore, although some papers reported on both personal and provider goals,^{11-14,16,17} no prior work has determined their joint impact on gestational weight gain. Given these limitations, it is currently unclear whether goal setting is an important part of pregnancy weight gain management.

The objectives of this study were twofold: to describe the alignment of first-trimester personal and provider pregnancy weight gain goals with the IOM recommendations and to determine the association between these goals and total weight gain and weight gain within the IOM-recommended range.

2 | METHODS

Data were derived from the Nulliparous Pregnancy Outcomes Study: monitoring mothers-to-be (nuMoM2b), a large prospective U.S. pregnancy cohort study.²² Women with singleton pregnancies who were 6 to 13 completed weeks of gestation and had no previous pregnancy that lasted ≥ 20 weeks' gestation were recruited at 8 US medical centres (Case Western Reserve University, Columbia University, Indiana University, University of Pittsburgh, Northwestern University, University of California at Irvine, University of Pennsylvania, and the University of Utah) from October 2010 to September 2013. At enrolment (6-13 completed weeks' gestation), trained and credentialed study personnel queried women about their weight gain goals, prepregnancy weight, medical history, sociodemographic characteristics and prepregnancy behaviours. Women completed two additional study visits. After delivery, pregnancy events, total gestational weight gain, delivery diagnoses and complications, and birth outcomes were ascertained from medical records. All study sites used a common protocol and manual of operations.

A total of 10 038 women enrolled in the study. We excluded 4.8% of women who had a missing gestational age or who delivered at <20 weeks gestation. Of the 9559 women available, we removed 206 (2%) who had missing data on confounders in the final model. The final analytic cohort included 9353 women.

At enrolment, women were asked, "Do you have a goal for your weight during this pregnancy? If yes, what is your goal?" Throughout the manuscript, we refer to this as the personal goal. Women were also asked, "Have you talked with your care provider about weight goals for this pregnancy? If yes, what weight goals did your care provider recommend to you?" We refer to this as provider goal, though we acknowledge that this advice was self-reported by the patient and not confirmed by the provider. We categorised women into 1 of 4 possible weight gain goal groupings: (a) personal goal and provider goal, (b) personal goal only, (c) provider goal only and (4) no reported goals.

At enrolment and the first study visit, maternal height was measured using a stadiometer or measuring tape, and prepregnancy weight was self-reported at a mean of 12 (standard deviation 1.2) weeks gestation. BMI (pregnancy weight (kg)/height (m)²) was categorised as underweight (<18.5 kg/m²), normal weight (18.5-24.9 kg/m²) or affected by overweight (25-29.9 kg/m²) or obesity (≥ 30 kg/m²).²³ In sensitivity analyses, we stratified obesity into grade 1 (30-34.9 kg/m²), or grades 2 and 3 (≥ 35 kg/m²).

Total gestational weight gain was calculated by subtracting prepregnancy weight from the last measured weight (abstracted from the medical record at a mean [SD] of 0.49 [1.2] weeks before delivery). We categorised personal and provider weight gain goals and actual weight gain according to whether they fell below, within or above the IOM-recommended weight gain ranges (underweight: 28-40 lb, normal weight: 25-35 lb, overweight: 15-25 lb, obese: 11-20 lb).² These ranges assume a term pregnancy, and classifying actual gestational weight gain relative to the IOM guidelines will be biased among women who deliver preterm. We standardised total gestational weight gain for gestational age at delivery using prepregnancy BMI category-specific z-score charts for singleton pregnancies.²⁴ Converting

women's total weight gain to gestational age-standardised z-scores produces a measure that is independent of gestational duration.²⁴⁻²⁶ Z-scores were calculated by comparing a woman's weight gain to the gestational age-specific mean and standard deviation of weight gain in the population using the formula: $z\text{-score} = (\text{observed weight} - \text{gestational age-specific population mean weight}) / \text{gestational age-specific population standard deviation}$.²⁴ We determined the BMI- and gestational age-specific z-scores that correspond to the upper and lower bounds of the IOM guidelines: underweight: -0.59 to 0.54 SD, normal weight: -0.96 to -0.09 SD, overweight: -1.31 to -0.62 SD, obese: -1.0 to 0.23 SD. We then classified total weight gain as below, within and above the IOM guidelines using these z-score cut-offs.

Race/ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic or other), highest level of education (high school or less, some college, college graduate or graduate degree), marital status and any smoking before pregnancy were self-reported at the first visit along with whether this pregnancy was planned, and whether they talked to a health care provider before conception about a healthy weight (yes or no) or using vitamins (yes or no). Presence of prepregnancy diabetes and prepregnancy hypertension was determined by medical record abstraction.

2.1 | Ethics approval

Each site's local institutional review board approved the study and all women gave written informed consent.

2.2 | Statistical analysis

We used multivariable log-binomial regression models to determine associations between goal setting group and prevalence of goals outside the IOM weight gain guidelines and the prevalence of total weight gain outside the IOM guidelines. We used multivariable linear regression to estimate the relation between goal setting group and absolute total gestational weight gain and the difference in actual weight gain and goal weight gain. Models were weighted using inverse probability of censoring weights and used robust standard errors. A priori, we fit models stratified by prepregnancy BMI category. We excluded underweight women from the stratified results because there were too few once divided into goal setting groups ($n = 343$). Among women with both a personal and provider weight gain goal, we used the personal goal when relating goal to actual weight gain. We used theory-based causal diagrams²⁸ to identify confounders that we included in all models: maternal race/ethnicity, age, education, smoking status, marital status, year of birth, height, planned pregnancy and whether she discussed healthy weight or vitamins with a provider before pregnancy. We used the “margins” command in Stata to calculate adjusted means, risk differences and prevalences and their corresponding 95% confidence intervals (CI). Risk differences were multiplied by 100 to estimate the number of women per 100 whose goals (or actual weight gain) were outside the IOM guidelines.

2.3 | Missing data

Some women were missing data on weight gain goals ($n = 1069$, 11%) and total weight gain ($n = 344$, 4%). We accounted for potential selection bias using inverse probability of

censoring weights.²⁸ We used logistic regression to relate determinants of missingness to an indicator of having missing goal data (or missing weight data). The models' predicted probabilities were used to calculate inverse weights for missing goals and missing actual weight gain.

3 | RESULTS

In the first trimester, 24% of women reported personal and provider pregnancy weight gain goals, 31% reported only a personal goal, 8% reported only a provider goal, and 37% reported no goals (Table 1). Prepregnancy BMI did not differ meaningfully among goal setting groups. Women who reported having no goal or only a personal weight gain goal tended to be non-white, young, unmarried and smokers. About half of women who reported having no goal or only a personal goal described their pregnancies as planned and less than half reported talking to a health care provider before conception about using vitamins. The mean gestational age at the first visit in each goal setting group was 12 weeks.

3.1 | Weight gain goals

In the full cohort, the mean weight gain goal was 24 lb (95% confidence interval [CI] 23, 24). Mean weight gain goals were similar comparing normal-weight and overweight women, and goals were lowest in women with obesity (Table 2). Goals were not meaningfully different if they were set by the patient or provider.

When goals were categorised according to IOM guidelines, normal-weight women were most likely to have a goal within the recommended range (Table 3). Only 2%-4% of normal-weight women had goals above the IOM-recommended range, compared with 24%-34% of overweight women and 22%-36% of women with obesity. Approximately one-quarter of women with obesity had goals below the guidelines.

Across all BMI groups, women who reported having both personal and provider goals were most likely to have a goal within the recommended range compared with women with only one of these goals (Table 3). For instance, Table S1 shows that among overweight women, the adjusted prevalence of having a goal within the guidelines was 6% lower in women with only a personal goal compared with women reporting a personal and provider goal. Importantly, for women with overweight and obesity, the joint effect of having patient and provider goals did not meaningfully decrease the proportion of goals above the guidelines.

3.2 | Gestational weight gain relative to weight gain goals

The mean total pregnancy weight gain in the cohort was 34 lb (95% CI 34, 35), and 13%, 29% and 60% of women gained below, within or above IOM-recommended ranges, respectively. Excessive weight gain occurred in approximately half of normal-weight women and women with obesity, as well as three-quarters of overweight women. However, in each BMI group, goal setting was not related to weight gain within guidelines (Figure 1, Table S2). Furthermore, the proportion of women with weight gain within IOM guidelines was not meaningfully different according to whether the goal itself was within or outside the recommended range (Table 4). Regardless of goal setting group, only 11%-16% of overweight women gained within IOM-recommended ranges.

3.3 | Difference between weight gain goal and actual gestational weight gain

On average, women in the cohort who reported having any goal gained 11.5 lb (95% CI 11.5, 11.6) more than their goal. Normal-weight women tended to have smaller differences between goal and actual weight gain than the other BMI groups (Table 5). Nevertheless, how close women came to meeting their goal was unrelated to goal setting group, even after adjusting for confounders.

Table S1-S5 present previous results stratified by obesity severity. These estimates were imprecise due to small samples.

3.4 | Agreement between personal and provider goals

Approximately 92% of women who reported having both personal and provider weight gain goals reported goals that agreed within 5 lb. Compared with women whose personal and provider goals agreed within 5 lb, those whose goals disagreed were more likely to have obesity (36% vs 22%) and lower mean personal weight gain goals (16 (95% CI: 14, 18) lb vs 24 (95% CI: 24, 25) lb); nearly half had a personal goal below the IOM guidelines (49% vs 13%), and 35% aimed to gain \leq 10 lb. Despite these low weight gain goals, 52% of women who had goals that disagreed gained in excess of the IOM guidelines (vs 58%).

3.5 | Comment

3.5.1 | Principal findings—In this contemporary US cohort, women who reported having both a personal and a provider pregnancy weight gain goal in the first trimester were more likely than woman with just one of these goals to have a goal within IOM-recommended ranges. However, personal and provider goals were commonly outside recommended ranges, especially among women with overweight or obesity. Importantly, having a personal and/or provider goal or having a goal within the IOM-recommended ranges was unrelated to actual pregnancy weight gain. Women with any goal gained 11 lb over their goal, and even women whose personal goals were below IOM guidelines still experienced excessive weight gain.

3.5.2 | Strengths of the study—The cohort used in this study was geographically and racially diverse. The ability to evaluate both personal and provider goals in the first trimester, when goal setting may be most effective, was an important strength. Our objective measurement of weight at the last antenatal visit avoids the potential measurement error in self-reported data.

3.5.3 | Limitations of the data—The nuMoM2b cohort only included nulliparous women in, so the findings in this study should be carefully generalised to other populations. Additionally, we did not confirm patients' report of provider goals or inquire whether goals were set or modified at the next early-pregnancy visit. This may lead to exposure misclassification. We lacked data on additional patient-provider communication about nutrition, physical activity or weight monitoring throughout gestation. Such data are critical for evaluating the impact of clinical encounters on weight gain. The method for accounting for possible selection bias assumes that data are missing at random. We believe that our adjustment for variables in weighted models makes our assumption reasonable.

Prepregnancy weight self-reported in the first trimester may be misreported, but previous work has suggested a negligible impact on results.²⁹⁻³²

3.6 | Interpretation

We are unaware of studies that reported on the joint effect of personal and provider weight gain goals. We found that among women with both personal and provider goals, the vast majority agreed within 5 lb. Research evaluating personal and provider goals separately, however, has shown that pregnancy weight gain goals are often inconsistent with the 2009^{14,15,33,34} or 1990^{11-13,16,18-20} IOM guidelines. Goals outside recommended ranges are particularly prevalent in women with overweight or obesity.^{12,14,18,34} Our findings are also consistent with studies showing that one- to two-thirds of pregnant women report having no personal^{19,20} or provider^{11-16,18-20,33,34} weight gain goal. While our results suggest that a first-trimester clinical encounter included a conversation about pregnancy weight gain, we did not collect data on patient-provider communication or patients' and providers' knowledge of weight gain recommendations. Our data support research indicating that there are many barriers to setting healthy weight gain goals, including patients' and providers' lack of awareness of or agreement with pregnancy weight gain guidelines.^{15,20,35-37}

Our observation that weight gain goals were not related to total pregnancy weight gain is in contrast to previous observational research. In the only study to report personal pregnancy weight gain goals relative to weight gain, researchers asked 1661 women who delivered in 1993 to report their weight gain goal and their total weight gain.¹¹ They found that, compared with women whose personal goals were within the 1990 IOM-recommended ranges, women reporting personal goals outside the 1990 IOM guidelines were 5 to 6 times as likely to report having gained below or above the recommended ranges.

There are 6 studies that evaluated provider weight gain goals relative to weight gain in samples of 150 or more.^{11-14,16,17} Five of these found that having any provider pregnancy weight gain goal or having a provider goal within the IOM guidelines was associated with weight gain within the recommended ranges.^{11-14,17} One had sample size large enough to present results stratified by BMI.¹⁴ In a cohort of 7125 U.S. women, researchers found that provider weight gain advice greater than the 2009 IOM guidelines was modestly associated with excessive weight gain in all BMI groups. They also reported modest relations between provider goals less than the recommendations and inadequate weight gain in normal-weight women. Women with overweight or obesity who reported receiving no advice were more likely to gain outside the guidelines.

A threat to the validity of prior findings is the misclassification of weight gain goals in a manner that is differential by total weight gain. In all but one¹⁷ of the aforementioned studies,^{11-14,16} women self-reported their weight gain goals in the third trimester or postpartum period, when they knew their total weight gain or an approximation of it. Women's knowledge of their actual weight gain likely influences their reported goals. For instance, women who gained 40 lb in pregnancy may recall a goal that is systematically higher than women with lower weight gain because they feel embarrassed to have gained in excess of their goal or they do not remember their actual goal (or if they had a goal). Our prospective ascertainment of women's goals in the first trimester avoids this reporting bias.

4 | CONCLUSIONS

Goal setting is frequently recommended by public health organisations and professional societies to encourage behaviour change. The lack of association between goal setting and gestational weight gain in our cohort, however, mirrors work by others demonstrating that goal setting alone has minimal effects on a broad range of health behaviours.^{38,39} The theoretical framework of goal setting emphasises a number of potential modifiers of goal setting success. Goals are more achievable if people are committed to the goal, the task is straightforward, feedback is provided throughout the process of obtaining the goal, and there are limited constraints to achieving the goal.^{39,40} Thus, goal setting for gestational weight gain needs to be part of a layered intervention that addresses multiple moderators of goal setting success. Goal setting has been used as part of a layered intervention to reduce excessive weight gain with success.⁴¹⁻⁴³ Trials of gestational weight gain intervention have yielded mixed results, illustrating constraints that interfere with behaviour change and the need for ongoing work in this area.⁴⁴

Pregnancy is a unique time to modify behaviour because women are motivated by the health of their baby and have frequent interactions with the health care system.⁴⁵ However, our results do not support the effectiveness of early-pregnancy personal or provider gestational weight gain goal setting alone in optimising weight gain. Multidimensional interventions that address a number of mediators of goal setting success may assist women in achieving weight gain consistent with their goals. Future research should explore strategies that specifically provide ongoing support to women as well as target the constraints to behaviour change unique to the woman. As with obesity prevention,⁴⁶ a multifaceted approach involving interventions at the individual, social, policy and environmental levels is likely needed to improve pregnancy weight gain.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Synopsis

Study Question

Is setting a pregnancy weight gain goal in the first trimester related to gaining weight within the recommended ranges?

What's already known

Expert groups recommend that women set a pregnancy weight gain goal with their provider to promote healthy weight gain. However, the studies informing this guideline have serious limitations.

What this study adds

Personal or provider pregnancy weight gain goals were often outside the recommended ranges, especially for women with overweight and obesity. Goal setting was not related to total gestational weight gain. Women with any goal gained 11 lb over their goal, and women whose goals were below the recommendations experienced excessive weight gain.

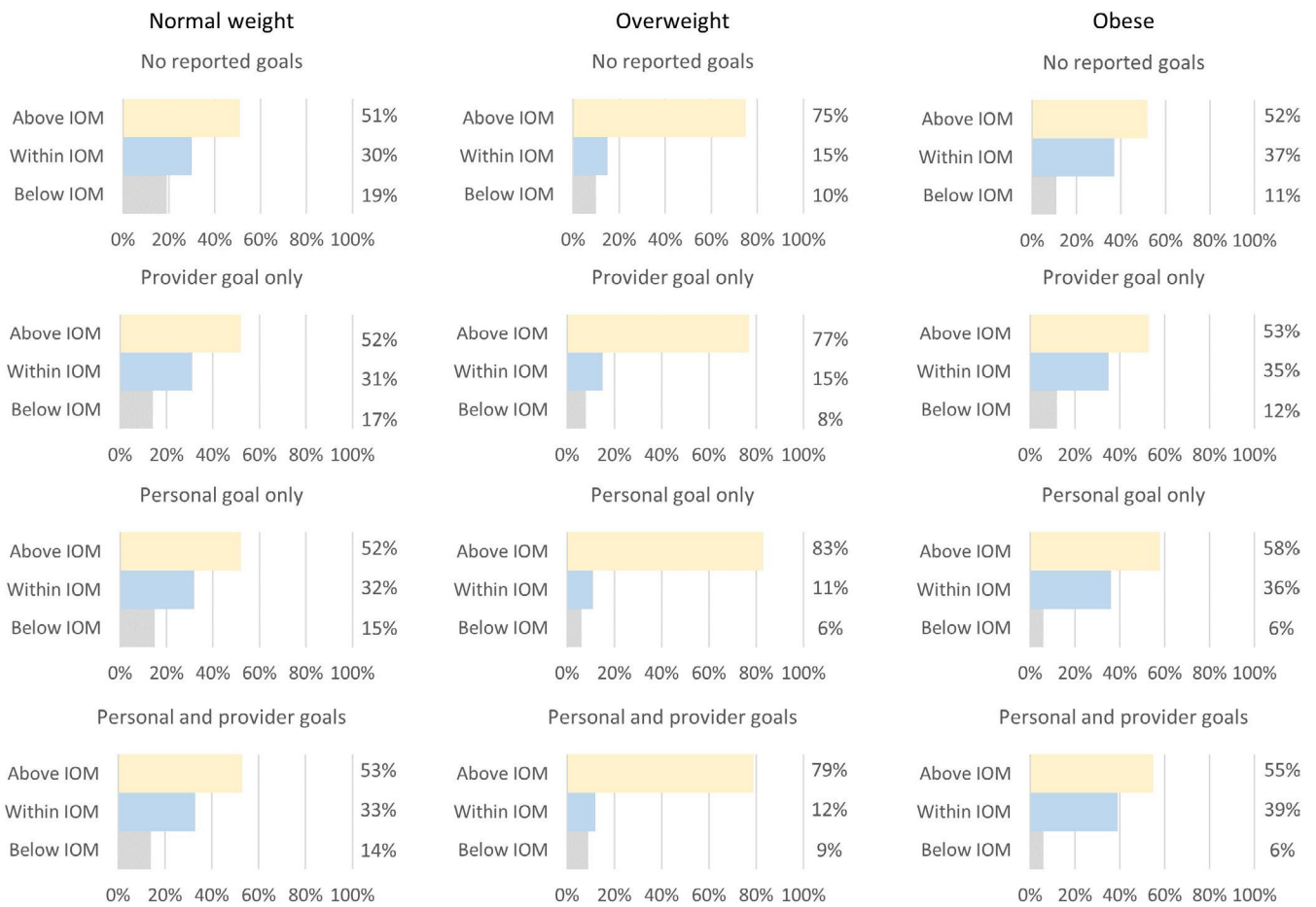


FIGURE 1. Total gestational weight gain relative to the Institute of Medicine (IOM) guidelines by weight gain goal setting group and prepregnancy body mass index

Characteristics of women according to weight gain goal setting group, Nulliparous Pregnancy Outcomes Study: monitoring mothers-to-be (nuMoM2b), weighted n = 9353

TABLE 1

	Personal weight gain goal and patient-reported provider ^d goal (n = 2234)		Personal weight gain goal only (n = 2912)		Patient-reported provider weight gain goal ^e only (n = 739)		No reported weight gain goals (n = 3467)	
	%	n	%	n	%	n	%	n
Prepregnancy BMI								
Underweight		4		3		5		4
Normal weight		52		55		54		53
Overweight		22		24		19		22
Class 1 obesity		11		11		10		11
Class 2 or 3 obesity		11		7		12		9
Maternal race/ethnicity								
Non-Hispanic white		68		63		60		56
Non-Hispanic Black		10		11		19		17
Hispanic		13		16		16		18
Other		8		10		10		9
Maternal age								
24 or younger		23		29		42		47
25 to 34		65		60		52		46
35 or older		11		11		7		7
Married								
Yes		70		68		51		49
No		30		32		49		51
Maternal education								
High school or equivalent		4		5		10		13
Some college		7		9		14		16
College graduate		17		18		22		21
Graduate degree		72		68		54		50
Smoked in the last month								
Yes		14		16		20		21

	Personal weight gain goal and patient-reported provider ^d goal (n = 2,234)	Personal weight gain goal only (n = 2,912)	Patient-reported provider weight gain goal ^c only (n = 739)	No reported weight gain goals (n = 3,467)
	%	%	%	%
No	86	84	80	79
Prepregnancy diabetes or hypertension				
Yes	5	3	4	4
No	95	97	96	96
Pregnancy planned				
Yes	68	65	51	51
No	32	35	49	49
Before pregnancy, talked to a care provider about using vitamins				
Yes	58	51	44	37
No	42	49	56	63
Before pregnancy, talked to a care provider about a healthy weight				
Yes	45	37	36	27
No	55	63	64	73

Abbreviation: BMI, body mass index.

^aPatient-reported provider goal was not confirmed by the provider.

Mean personal weight gain goals and patient-reported provider weight gain goals according to prepregnancy body mass index and goal setting group, Nulliparous Pregnancy Outcomes Study: monitoring mothers-to-be (nuMoM2b)

TABLE 2

	Weighted n	IOM-recommended weight gain range, lb	Personal weight gain goal, lb		Patient-reported provider ^a weight gain goal, lb	
			Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
Normal weight						
Personal and provider weight gain goal	1153	25-35	27 (27, 28)	27 (26, 27)	27 (26, 27)	27 (26, 27)
Personal weight gain goal only	1601		27 (26, 27)	–	–	–
Provider weight gain goal only	399		–	25 (25, 26)	25 (25, 26)	25 (25, 26)
Overweight						
Personal and provider weight gain goal	484	15-25	25 (24, 25)	23 (22, 24)	23 (22, 24)	23 (22, 24)
Personal weight gain goal only	705		25 (23, 26)	–	–	–
Provider weight gain goal only	141		–	22 (21, 23)	22 (21, 23)	22 (21, 23)
Obesity						
Personal and provider weight gain goal	509	11-20	16 (15, 17)	17 (16, 17)	17 (16, 17)	17 (16, 17)
Personal weight gain goal only	525		17 (16, 18)	–	–	–
Provider weight gain goal only	161		–	18 (16, 20)	18 (16, 20)	18 (16, 20)

Abbreviation: CI, confidence interval.

^aPatient-reported provider goal was not confirmed by the provider.

TABLE 3

Personal weight gain goals and patient-reported provider weight gain goals relative to the 2009 Institute of Medicine gestational weight gain recommendations, by prepregnancy body mass index and goal setting group, Nulliparous Pregnancy Outcomes Study: monitoring mothers-to-be (nuMoM2b)

	Weighted n	Personal weight gain goal			Provider ^a weight gain goal		
		Below IOM	Within IOM	Above IOM	Below IOM	Within IOM	Above IOM
Normal weight							
Personal and provider weight gain goal, %	1153	14	84	2	10	88	2
Personal weight gain goal only, %	1601	21	77	4	–	–	–
Provider weight gain goal only, %	399	–	–	–	16	81	3
Overweight							
Personal and provider weight gain goal, %	484	7	69	24	3	69	28
Personal weight gain goal only, %	705	12	63	25	–	–	–
Provider weight gain goal only, %	141	–	–	–	7	59	34
Obesity							
Personal and provider weight gain goal, %	509	25	53	22	21	53	26
Personal weight gain goal only, %	525	25	46	29	–	–	–
Provider weight gain goal only, %	161	–	–	–	24	37	38

Note: IOM, the 2009 Institute of Medicine prepregnancy body mass index-specific gestational weight gain guidelines.²

^aPatient-reported provider goal was not confirmed by the provider.

Association between pregnancy weight gain goal and the prevalence of total weight gain within the IOM-recommended ranges by prepregnancy body mass index category, Nulliparous Pregnancy Outcomes Study: monitoring mothers-to-be (nuMoM2b)

TABLE 4

Goal setting group	Goal ^d relative to IOM guidelines	<i>b</i> <i>n</i>	Adjusted ^c prevalence of weight gain within the IOM guidelines (95% CI)
Normal weight			
Personal and provider weight gain goal	Within	839	32 (28, 35)
	Outside	156	37 (29, 44)
Personal weight gain goal only	Within	1063	31 (29, 34)
	Outside	313	31 (26, 37)
Provider ^d weight gain only	Within	277	29 (23, 34)
	Outside	65	45 (33, 58)
No goal	–	1846	31 (29, 33)
Overweight			
Personal and provider weight gain goal	Within	289	12 (7.7, 15)
	Outside	128	14 (8.0, 20)
Personal weight gain goal only	Within	380	11 (7.7, 14)
	Outside	223	12 (8.0, 16)
Provider ^d weight gain goal only	Within	74	15 (6.8, 23)
	Outside	50	16 (5.7, 25)
No goal	–	769	14 (12, 17)
Obese			
Personal and provider weight gain goal	Within	229	39 (33, 45)
	Outside	205	35 (29, 42)
Personal weight gain goal only	Within	209	41 (35, 47)
	Outside	242	31 (25, 37)
Provider ^d weight gain goal only	Within	51	50 (36, 64)
	Outside	86	27 (18, 36)
No goal	–	719	39 (35, 43)

Abbreviations: CI, confidence interval; IOM, the 2009 Institute of Medicine pregnancy body mass index-specific gestational weight gain guidelines.²

^a Goal gestational weight gain for women with both personal and provider goals refers to the personal weight gain goal.

^b Weighted n.

^c Adjusted for race/ethnicity, age, education, marital status and planned pregnancy.

^d Patient-reported provider goal was not confirmed by the provider.

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Difference between total gestational weight gain and goal weight gain according to goal pre-pregnancy body mass index category and setting group, Nulliparous Pregnancy Outcomes Study: monitoring mothers-to-be (nuMoM2b)

TABLE 5

	Difference between total gestational weight gain and goal gestational weight gain ^d	Weighted n	Adjusted ^b mean (95% CI), lb
Normal weight			
Personal and provider weight gain goal	1153	8.9 (8.2, 9.6)	
Personal weight gain goal only	1601	10 (9.3, 10.7)	
Provide ^c weight gain goal only	399	7.8 (6.3, 9.2)	
Overweight			
Personal and provider weight gain goal	484	12 (10, 14)	
Personal weight gain goal only	705	15 (13, 16)	
Provide ^c weight gain goal only	141	12 (8.0, 15)	
Obese			
Personal and provider weight gain goal	509	15 (13, 17)	
Personal weight gain goal only	525	15 (13, 17)	
Provide ^c weight gain goal only	161	10 (5.9, 14)	

Abbreviation: CI, confidence interval.

^a Goal gestational weight gain for women with both personal and provider goals refers to the personal weight gain goal.

^b Adjusted for race/ethnicity, age, education, marital status and planned pregnancy.

^c Patient-reported provider goal was not confirmed by the provider.