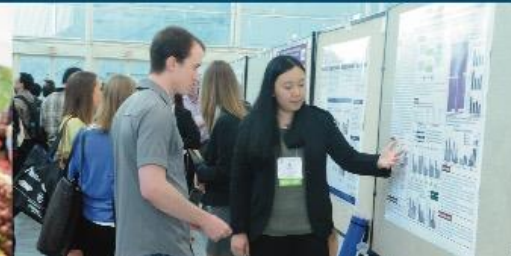


# Diabetes diagnosis consistently *increases* the relative odds of meeting pregnancy weight gain recommendations in San Francisco

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# Faculty Disclosure

**No conflicts to disclose.**

# Background

- In San Francisco, excess pregnancy weight gain is prevalent and associated with increased risk of poor birth outcomes
  - 41.6% of births in 2007-2016
  - Gestational hypertension, OR (95%CI): 2.1 (1.9-2.3)
  - Cesarean, OR (95%CI): 1.5 (1.4-1.5)
  - Macrosomia, OR (95%CI): 2.6 (2.5-2.7)
- Locally, women who are overweight or obese before pregnancy have higher risk of excess pregnancy weight gain
  - 58% of women who were overweight or obese
  - 35% of women who were normal weight

# Excess Pregnancy Weight Gain 2013

## ALL SAN FRANCISCO HOSPITALS

### Number and proportion of women who gained excess weight during pregnancy by pre-pregnancy weight status and risk factors before or during pregnancy

	Normal weight before pregnancy					Overweight or obese before pregnancy				
	All	White	Asian	Latino	Black	All	White	Asian	Latino	Black
Total number of live, singleton, term births	4,216	1,967	1,437	532	121	1,743	520	309	628	171
	N, Row %	N, Row %	N, Row %	N, Row %	N, Row %	N, Row %	N, Row %	N, Row %	N, Row %	N, Row %
Total number of women who gained excess weight	1346, 33%	704, 36%	437, 30%	154, 29%	51, 42%	944, 58%	348, 67%	171, 55%	321, 51%	104, 61%
Risk factors before or during pregnancy										
Maternal age 19-34 y	902, 35%	402, 38%	296, 33%	116, 28%	44, 42%	622, 58%	176, 66%	113, 62%	253, 52%	80, 59%
Maternal age 35+ y	508, 31%	302, 34%	141, 26%	38, 31%	-	341, 58%	172, 68%	58, 45%	68, 48%	24, 69%
First time mother	908, 36%	463, 37%	270, 33%	105,	28, 50%	491, 66%	201, 69%	75, 61%	139, 66%	40, 69%
2 or more children	502, 29%	241, 34%	167, 28%	49, 20%	23, 35%	525, 52%	147, 64%	96, 52%	172, 41%	64, 57%
Mother born outside US	625, 32%	174, 37%	338, 31%	88, 25%	-	419, 51%	80, 63%	102, 50%	204, 47%	11, 61%
US born mother	908, 33%	530, 35%	99, 29%	66, 36%	43, 43%	597, 64%	268, 68%	69, 66%	117, 61%	93, 60%
No WIC during pregnancy	1150, 34%	675, 36%	305, 30%	82, 34%	19, 41%	586, 62%	313, 68%	124, 57%	88, 58%	30, 60%
WIC participant	273, 32%	29, 45%	132, 32%	72, 25%	32, 43%	430, 54%	35, 60%	47, 52%	236, 50%	74, 61%
7 or more prenatal care visits	1375, 34%	691, 36%	433, 31%	146, 29%	44, 40%	957, 58%	330, 67%	166, 55%	318, 53%	87, 63%
<7 prenatal care visits	32, 28%	12, 29%	-	-	-	58, 57%	-	-	-	23, 55%
Quit smoking during pregnancy	-	-	-	-	-	11, 79%	-	-	-	-
Smoked before and during pregnancy	-	-	-	-	-	14, 67%	-	-	-	-
No smoking before or during pregnancy	1394, 33%	699, 35%	432, 30%	153, 29%	47, 43%	991, 58%	348, 67%	171, 55%	321, 51%	96, 61%
No gestational diabetes	1357, 34%	692, 36%	405, 32%	149, 29%	49, 43%	936, 60%	348, 67%	171, 55%	321, 51%	100, 62%
Gestational diabetes	53, 21%	62, 43%	12, 24%	-	-	62, 43%	-	-	-	-
No gestational hypertension	1,378%	690, 36%	429, 30%	146, 29%	49, 42%	948, 58%	348, 67%	171, 55%	321, 51%	97, 60%
Gestational hypertension	32, 40%	14, 40%	-	-	-	68, 71%	-	-	-	-

991, 58%

936, 60%

62, 43%

948, 58%

(1) Reporting period is January 1 through December 31. Analysis based on one record per live, singleton, term birth delivered in San Francisco. Data are

# Background

- Gestational diabetes is *positively* associated with overweight or obesity before pregnancy and/or excess weight gain during pregnancy

(Hedderson et al, 2010; Robitaille et al, 2015; Boriboonhirunsarn 2017; Ornaghi et al, 2018)

# Background

- In some controlled trials, dietary intervention to control gestational diabetes limits weight gain during pregnancy

Landon et al, N Engl J Med 2009; 361(14):1339-1348; Perichart-Perera et al. Int J Endocrinol 2012: 296017.

- In San Francisco, women who are overweight or obese before pregnancy are eligible for intervention services, *if they are diagnosed with diabetes mellitus (DM)*

# Question

For women who are overweight or obese before pregnancy, is diagnosis of diabetes mellitus (DM) consistently associated with greater likelihood of meeting pregnancy weight gain recommendations?

# Specific Aims

- Determine if, on an annual basis, DM diagnosis significantly modified the relationship between pre-pregnancy weight status and relative odds of pregnancy weight gain within the guidelines
- Estimate, over the past decade, the decrease in risk of excess pregnancy weight gain associated with DM diagnosis for women who were overweight or obese before pregnancy



# Data

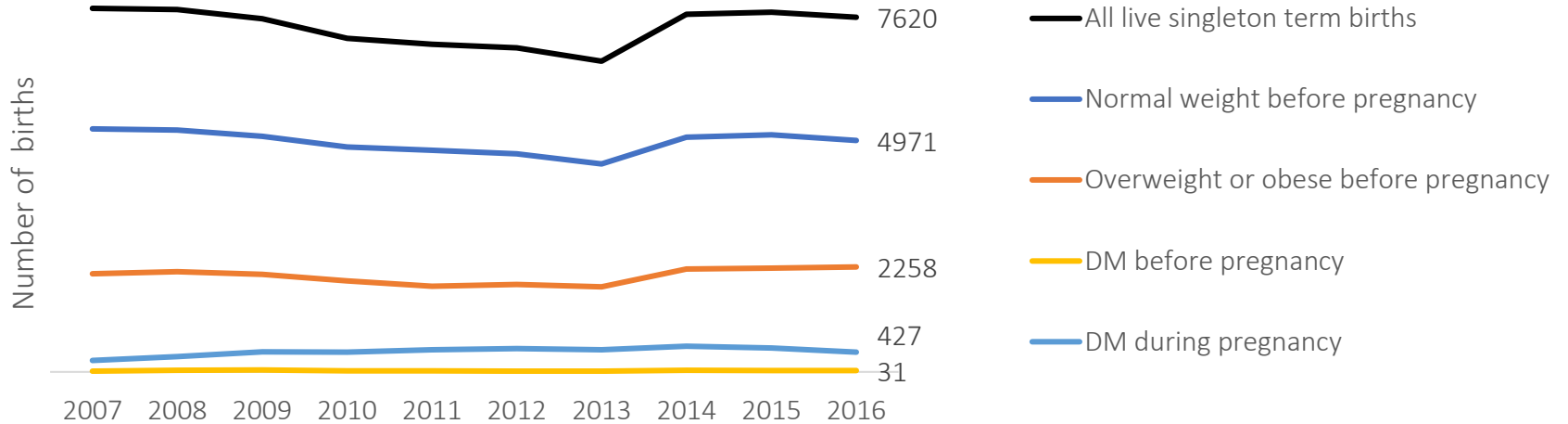
- CDPH Birth Statistical Master File, 2007-2016
- All live, singleton, term births in San Francisco (n=74,041)
  - San Francisco residents
  - Complete data for weight, height, pregnancy complications, covariates
- DM diagnosis
  - Pregnancy complication code 09: Pre-pregnancy DM (diagnosis prior to this pregnancy)
  - Pregnancy complication code 31: Gestational DM (diagnosis this pregnancy)
- Recommended pregnancy weight gain
  - Institute of Medicine (IOM) Guidelines, 2009
  - Gestational weight gain of 28-40, 25-35, 15-25 or 11-20 pounds for women who were underweight, normal weight, overweight or obese before pregnancy, respectively.

# Analysis

- Cross-sectional, Retrospective
- Multivariable logistic regression models to estimate the relative odds of meeting the IOM recommendations or relative odds of excess pregnancy weight gain
  - Control for age, parity, race-ethnicity, health insurance, timing of prenatal care, education, smoking
  - Stratify by DM diagnosis
  - Test for interaction between pre-pregnancy weight\*DM diagnosis
  - Robust standard errors by delivery hospital

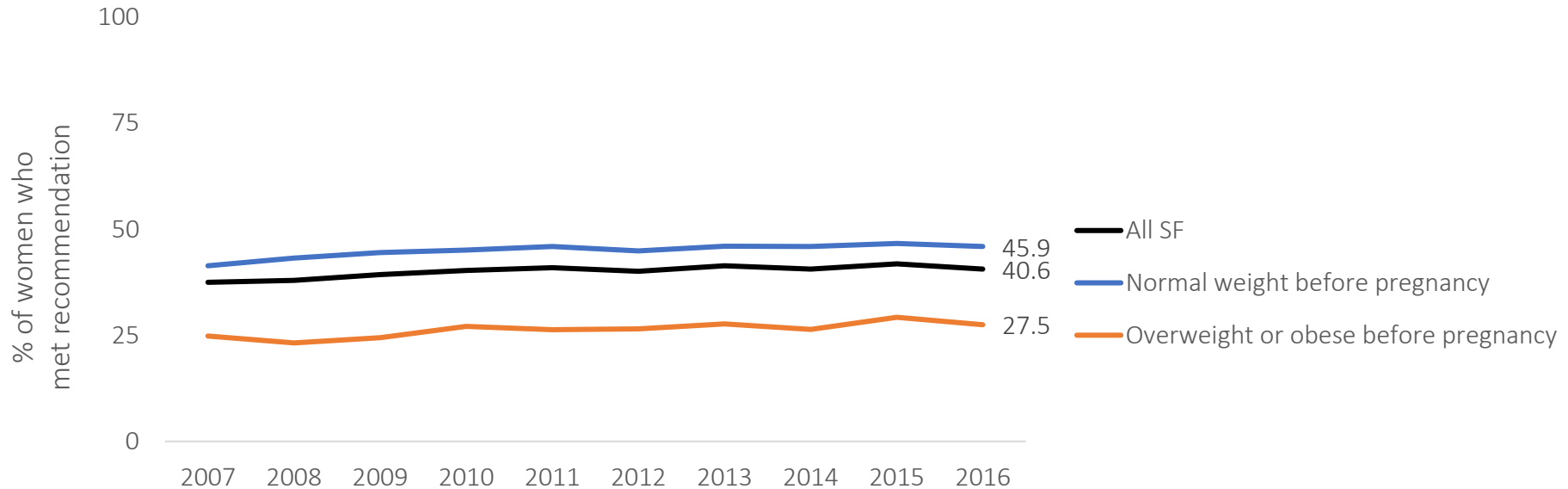
# Results

Each year, about 2000 women were overweight or obese before pregnancy and about 500 women had a DM diagnosis during pregnancy



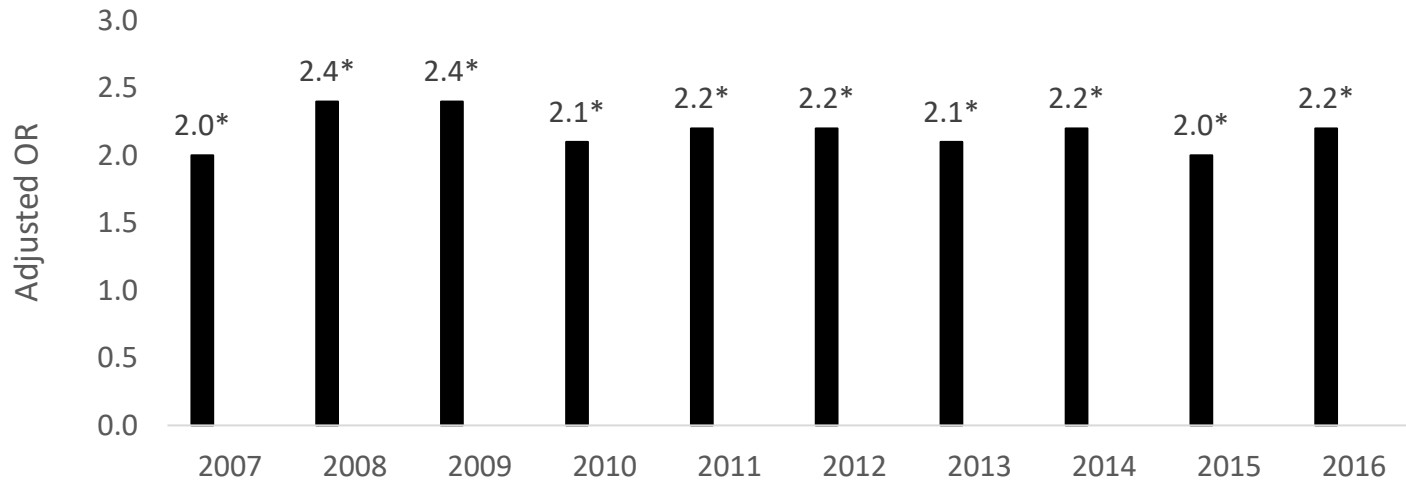
# Results

Each year, women who were normal weight before pregnancy were more likely than women who were overweight or obese before pregnancy to gain the recommended amount of weight during pregnancy



# Results

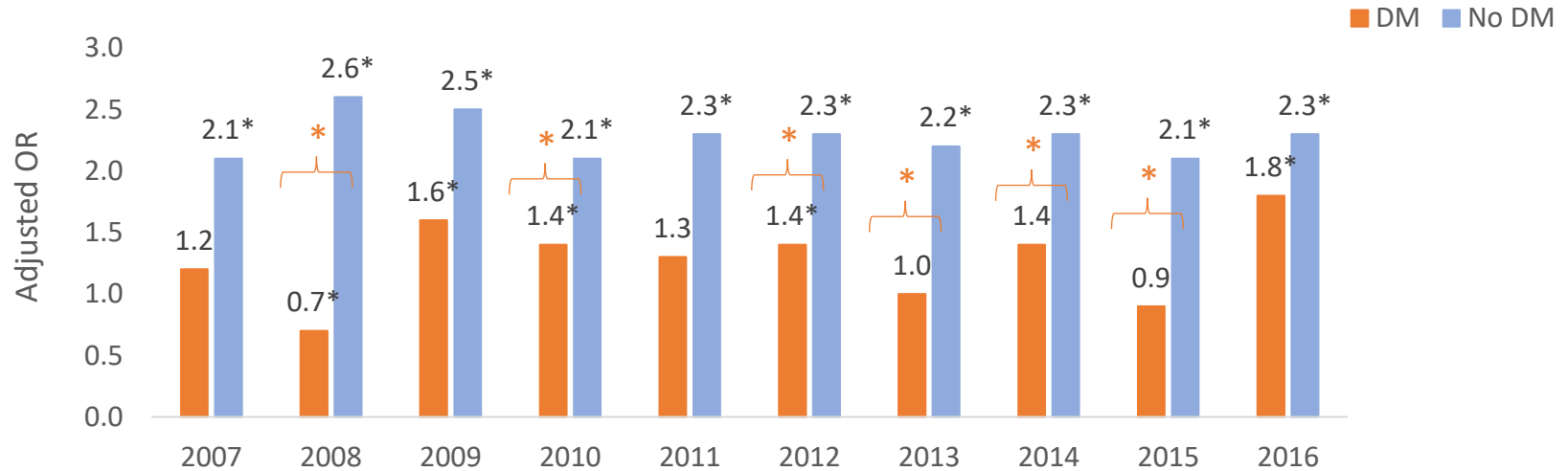
Each year, women who were normal weight before pregnancy were about 2 times more likely to meet IOM recommendations than women who were overweight or obese before pregnancy



\*The odds ratio is statistically significant ( $p < 0.05$ ) controlling for maternal age, race-ethnicity, parity, health insurance, first trimester prenatal care, education, smoking

# Results

In 2007-2016, the magnitude of effect of pre-pregnancy weight status on the relative odds of meeting pregnancy weight gain recommendations was *smaller* for women with a DM diagnosis

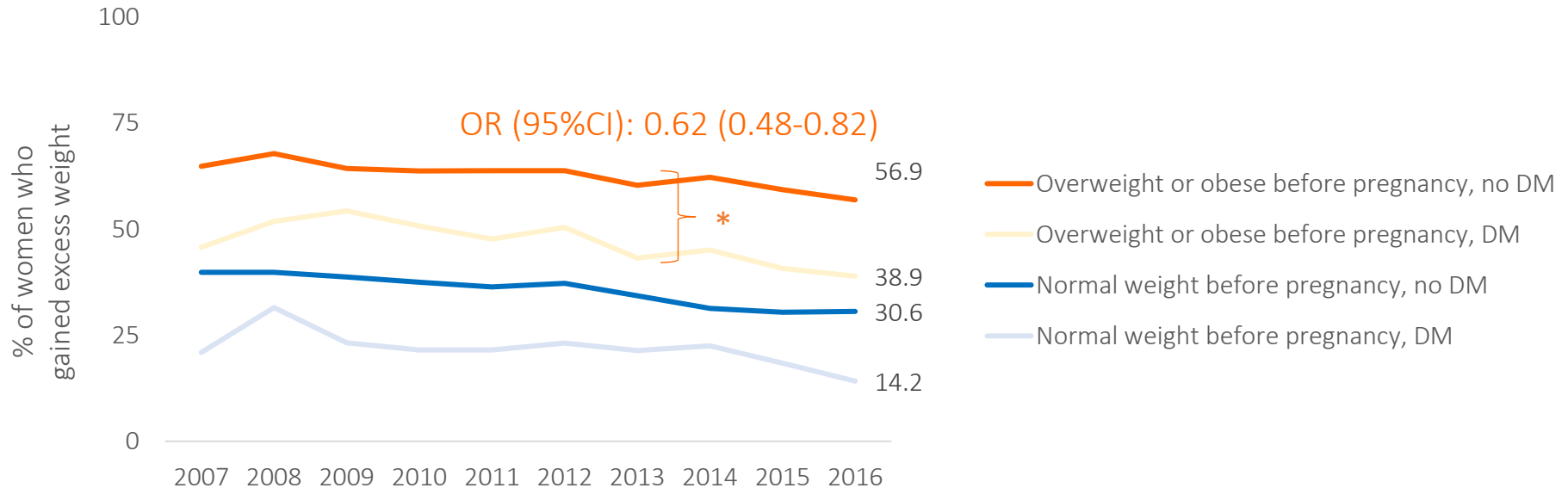


\*The odds ratio is statistically significant ( $p < 0.05$ ) controlling for maternal age, race-ethnicity, parity, health insurance, first trimester prenatal care, education, smoking

\*The interaction term is statistically significant ( $p < 0.05$ )

# Results

Over the past decade, DM diagnosis was associated with a 38% reduction in the relative odds of excess pregnancy weight gain for women who were overweight or obese before pregnancy



# Limitations

- Cross-sectional observational analysis
- Not all women at risk
  - Excluded preterm births, multiparous, twins, people with missing data
- Measurement issues
  - Weight status, weight change
    - Uncertain data quality, measurement timing, self-report
  - DM diagnosis
    - Chart review or self-report
- Confounding
  - Prenatal care frequency, quality?
- Mechanisms unknown



# Conclusions

- In San Francisco:
  - Diabetes diagnosis significantly modified the effect of pre-pregnancy weight status on the relative odds of gaining the recommended amount of weight during pregnancy in multiple years
  - Over the past decade, DM diagnosis was associated with a 38% reduction in relative odds of excess pregnancy weight gain for women who were overweight or obese before pregnancy
  - Further work is needed to understand the causal mechanisms underlying this association and potential for extending the beneficial effect to women who are not diagnosed with diabetes