

# Pregnancy-related weight in Nova Scotia, 2003-2013

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# Pregnancy-related weight (mom)

**pre-pregnancy  
BMI**

**gestational  
weight gain**

**postpartum  
weight retention**



# Pre-pregnancy body mass index

$$\text{BMI} = \frac{\text{weight (kg)}}{\text{height}^2 (\text{m}^2)}$$

Body Mass Index (BMI) Chart for Adults

Obese (>30)   
  Overweight (25-30)   
  Normal (18.5-25)   
  Underweight (<18.5)

HEIGHT in feet/inches and centimeters

WEIGHT	4'8"	4'9"	4'10"	4'11"	5'0"	5'1"	5'2"	5'3"	5'4"	5'5"	5'6"	5'7"	5'8"	5'9"	5'10"	5'11"	6'0"
lbs (kg)	142cm	147	150	152	155	157	160	163	165	168	170	173	175	178	180	183	
260 (117.9)	58	56	54	53	51	49	48	46	45	43	42	41	40	38	37	36	35
255 (115.7)	57	55	53	51	50	48	47	45	44	42	41	40	39	38	37	36	35
250 (113.4)	56	54	52	50	49	47	46	44	43	42	40	39	38	37	36	35	34
245 (111.1)	55	53	51	49	48	46	45	43	42	41	40	38	37	36	35	34	33
240 (108.9)	54	52	50	48	47	45	44	43	41	40	39	38	36	35	34	33	33
235 (106.6)	53	51	49	47	46	44	43	42	40	39	38	37	36	35	34	33	32
230 (104.3)	52	50	48	46	45	43	42	41	39	38	37	36	35	34	33	32	31
225 (102.1)	50	49	47	45	44	43	41	40	39	37	36	35	34	33	32	31	31
220 (99.8)	49	48	46	44	43	42	40	39	38	37	36	34	33	32	32	31	30
215 (97.5)	48	47	45	43	42	41	39	38	37	36	35	34	33	32	31	30	29
210 (95.3)	47	45	44	42	41	40	38	37	36	35	34	33	32	31	30	29	28
205 (93.0)	46	44	43	41	40	39	37	36	35	34	33	32	31	30	29	29	28
200 (90.7)	45	43	42	40	39	38	37	35	34	33	32	31	30	30	29	28	27
195 (88.5)	44	42	41	39	38	37	36	35	33	32	31	31	30	29	28	27	26
190 (86.2)	43	41	40	38	37	36	35	34	33	32	31	30	29	28	27	26	26
185 (83.9)	41	40	39	37	36	35	34	33	32	31	30	29	28	27	27	26	25
180 (81.6)	40	39	38	36	35	34	33	32	31	30	29	28	27	27	26	25	24
175 (79.4)	39	38	37	35	34	33	32	31	30	29	28	27	27	26	25	24	24
170 (77.1)	38	37	36	34	33	32	31	30	29	28	27	27	26	25	24	24	23
165 (74.8)	37	36	34	33	32	31	30	29	28	27	27	26	25	24	24	23	22
160 (72.6)	36	35	33	32	31	30	29	28	27	27	26	25	24	24	23	22	22
155 (70.3)	35	34	32	31	30	29	28	27	27	26	25	24	24	23	22	22	21
150 (68.0)	34	32	31	30	29	28	27	27	26	25	24	23	23	22	22	21	20
145 (65.8)	33	31	30	29	28	27	27	26	25	24	23	23	22	21	21	20	19
140 (63.5)	31	30	29	28	27	26	26	25	24	23	23	22	21	21	20	20	19
135 (61.2)	30	29	28	27	26	26	25	24	23	22	22	21	21	20	19	19	18
130 (59.0)	29	28	27	26	25	25	24	23	22	22	21	21	20	19	19	18	18
125 (56.7)	28	27	26	25	24	24	23	22	21	21	20	20	19	18	18	17	17
120 (54.4)	27	26	25	24	23	23	22	21	21	20	20	19	18	18	17	17	16
115 (52.1)	26	25	24	23	22	22	21	21	20	19	19	18	18	17	17	16	16

Nova Scotia Prenatal Form

  
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The Pregnancy Weight Gain Calculator will help you determine the recommended weight gain that will promote a healthy pregnancy.

**What are the benefits of gaining a healthy amount of weight during pregnancy?**

Gaining a healthy amount of weight during pregnancy can:

- help your baby have a healthy start;
- reduce your risk of complications in pregnancy and at delivery; and
- improve your long-term health.

Recommended weight gain is based on a woman's [Body Mass Index](#) before pregnancy (her pre-pregnancy **BMI**).



**Calculate your pre-pregnancy BMI**

Enter your weight **before** your pregnancy:  kg

or

lb

.....

Enter your height:  cm

Or

ft  in

[Calculate](#)

[www.hc-sc.gc.ca/fn-an/nutrition/prenatal/bmi/index-eng.php](http://www.hc-sc.gc.ca/fn-an/nutrition/prenatal/bmi/index-eng.php)

# Pre-pregnancy body mass index

Category	BMI, kg/m <sup>2</sup>
<b>underweight</b>	<b>&lt;18.5</b>
<b>normal weight</b>	<b>18.5 to 24.9</b>
<b>overweight</b>	<b>25 to 29.9</b>
<b>obese</b>	<b>30+</b>
I	30 to 34.9
II	35 to 39.9
III	40+

# Pre-pregnancy BMI

## Importance for maternal and child health

- **gestational diabetes**
- **pre-eclampsia**
- **Caesarean delivery**
- **congenital anomalies**
- **fetal macrosomia**
- **preterm birth**
- **perinatal death**
- **child obesity**

# Pre-pregnancy BMI in Nova Scotia 2003-2013

Category	%
<b>underweight</b>	<b>3.9</b>
<b>normal weight</b>	<b>48.5</b>
<b>overweight</b>	<b>24.6</b>
<b>obese</b>	<b>23.0</b>
I	12.6
II	6.3
III	4.1

63,355 deliveries to women  $\geq$  20 years of age

# Pre-pregnancy BMI compared to other areas

BMI	NS 2003-13	[NFLD <sup>1</sup> ] 2001-7	PEI <sup>2</sup> 2008	BC <sup>3</sup> 2007/8	CAN-MES <sup>4</sup> 2006-7	CHMS <sup>5</sup> 2007-9	US <sup>5</sup> 2004
<b>underweight</b>	<b>3.9</b>	<b>3.0</b>	<b>4.4</b>	<b>5.7</b>	<b>6.1</b>	<b>5.0</b>	<b>5.2</b>
<b>normal weight</b>	<b>48.5</b>	<b>46.3</b>	<b>50.4</b>	<b>61.1</b>	<b>59.4</b>	<b>52.4</b>	<b>53.1</b>
<b>overweight</b>	<b>24.6</b>	<b>26.4</b>	<b>24.1</b>	<b>21.0</b>	<b>21.0</b>	<b>22.9</b>	<b>23.0</b>
<b>obese</b>	<b>23.0</b>	<b>20.0</b>	<b>21.1</b>	<b>12.2</b>	<b>13.5</b>	<b>19.7</b>	<b>18.7</b>

<sup>1</sup> Crane JM et al, JOGC, 2009

<sup>2</sup> PEI Reproductive Care Program, Perinatal Database Report, 2008

<sup>3</sup> BC Perinatal Health Program, Perinatal Health Report, 2008

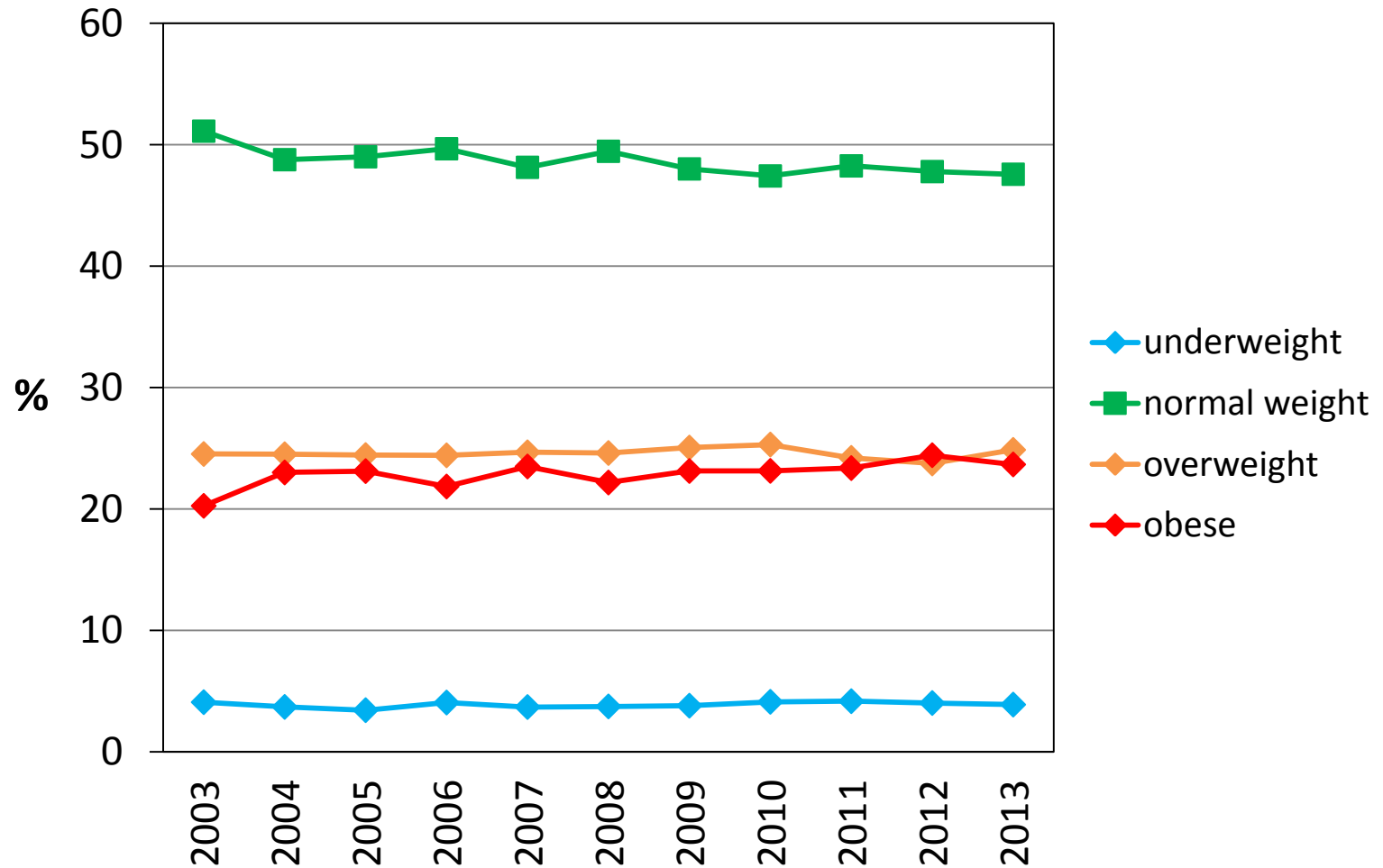
<sup>4</sup> Kowal C et al, Matern Child Health J, 2011

<sup>5</sup> Women aged 18-39 y, Canadian Health Measures Survey, Statistics Canada

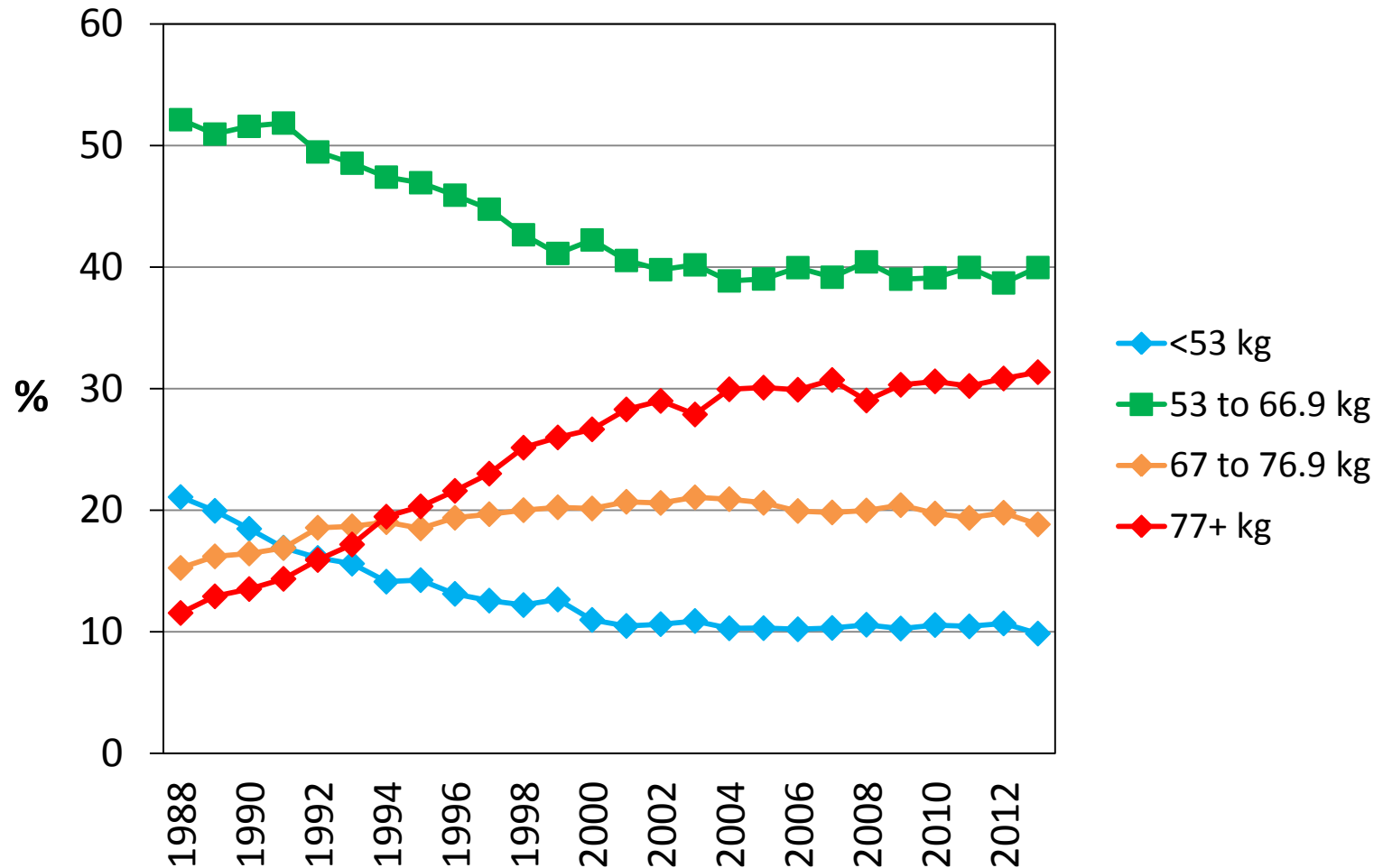
<sup>6</sup> Chu SY et al, Matern Child Health J, 2009



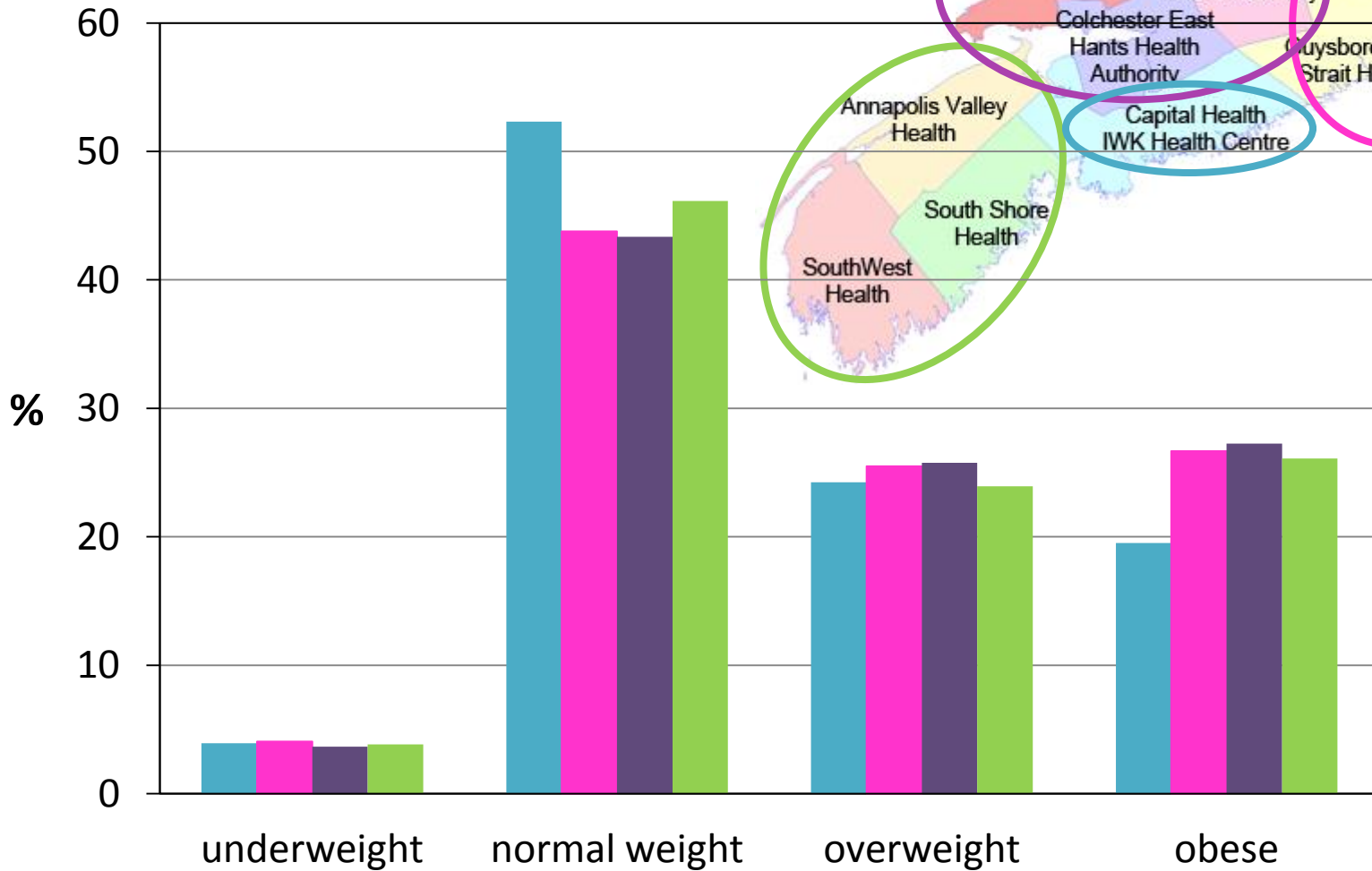
# Pre-pregnancy BMI in NS, 2003-2013



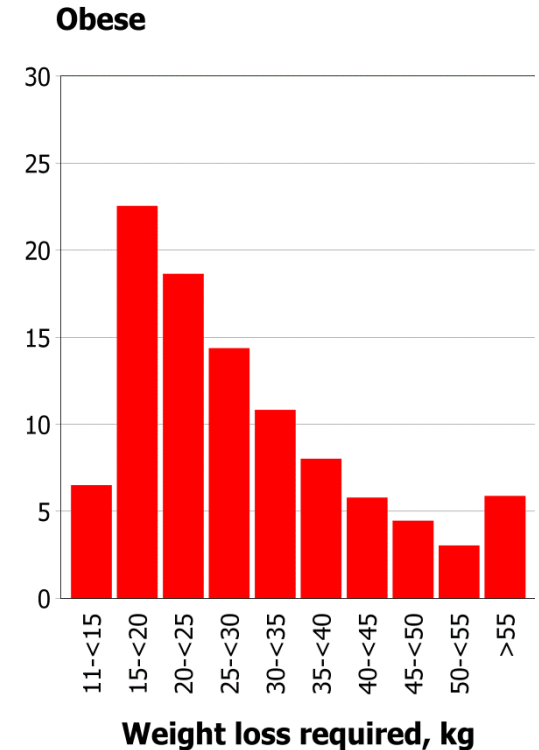
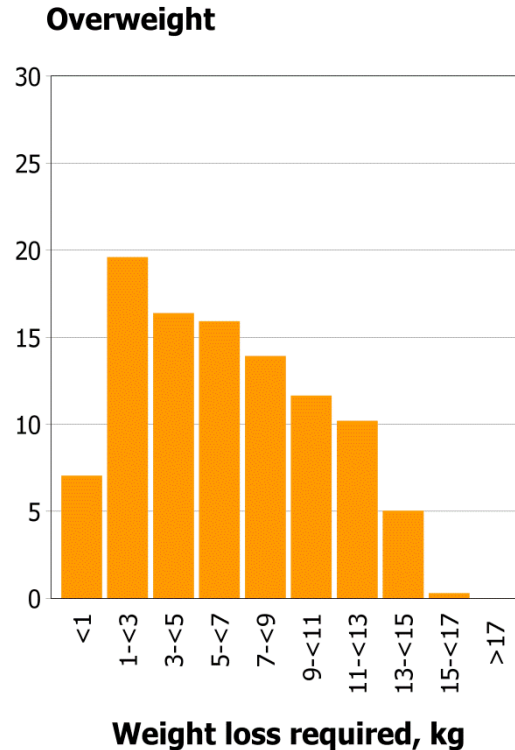
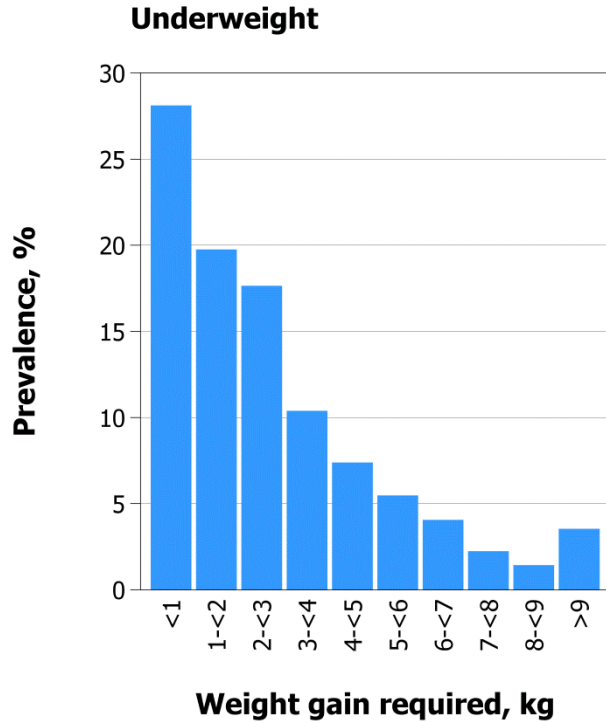
# Pre-pregnancy weight in NS, 1988-2013



# Pre-pregnancy BMI in NS 2003-2013



# Weight change required to achieve a normal pre-pregnancy weight, NS 2003-2013



median 2.0  
(IQR) (0.9 to 3.8)

5.9  
(2.9 to 9.3)

25.8  
(18.8 to 36.3)

# Pre-pregnancy BMI

- **SOGC guidelines:**
  - women should be encouraged to enter pregnancy with a BMI < 30 kg/m<sup>2</sup>, and ideally < 25 kg/m<sup>2</sup>
  - periodic health examinations ... offer ideal opportunities to raise the issue of weight loss before conception
- **management of obesity in pregnancy**
  - health care utilization
  - staff training, specialized equipment

# Gestational weight gain

**GWG = delivery weight – pre-pregnancy weight**

<b>Category</b>	<b>Recommended IOM, Health Canada</b>
<b>underweight</b>	<b>12.5 to 18</b>
<b>normal weight</b>	<b>11.5 to 16</b>
<b>overweight</b>	<b>7 to 11.5</b>
<b>obese</b>	<b>5 to 9</b>

Health Canada. Prenatal Nutrition Guidelines for Health Professionals: Gestational Weight Gain. Ottawa: 2010. Cat. No.: H164-109/3-2009E-PDF.

[www.hc-sc.gc.ca/fn-an/nutrition/prenatal/ewba-mbsa-eng.php](http://www.hc-sc.gc.ca/fn-an/nutrition/prenatal/ewba-mbsa-eng.php)

# Gestational weight gain

**Table 3. Pregnancy weight gain based on BMI**

	BMI range	Suggested weight gain (kg)
Underweight	< 18.5	12.5 to 18
Normal weight	18.5 to 24.9	11.5 to 16
Overweight	25.0 to 29.9	7 to 11.5
Obese Class I	30.0 to 34.9	7
Obese Class II	35.0 to 39.9	7
Obese Class III	≥ 40.0	7

# Inappropriate gestational weight gain (GWG) puts women and their children at risk

## **Inadequate GWG**

- ↑ preterm birth, low birth weight, infant mortality
- ↑ offspring obesity

## **Excessive GWG**

- ↑ gestational diabetes mellitus, pre-eclampsia
- ↑ high birthweight/macrosomia, C-section
- ↑ postpartum weight retention, maternal obesity
- ↑ offspring obesity



# Gestational weight gain in Nova Scotia, 2003-13

Category	Recommended	BELOW	IN	ABOVE
underweight	12.5 to 18	22.0	39.5	38.5
normal weight	11.5 to 16	17.9	32.6	49.6
overweight	7 to 11.5	8.4	18.7	72.8
obese	5 to 9	18.3	19.0	62.7
all women		15.8	26.3	57.9

# GWG compared to other areas

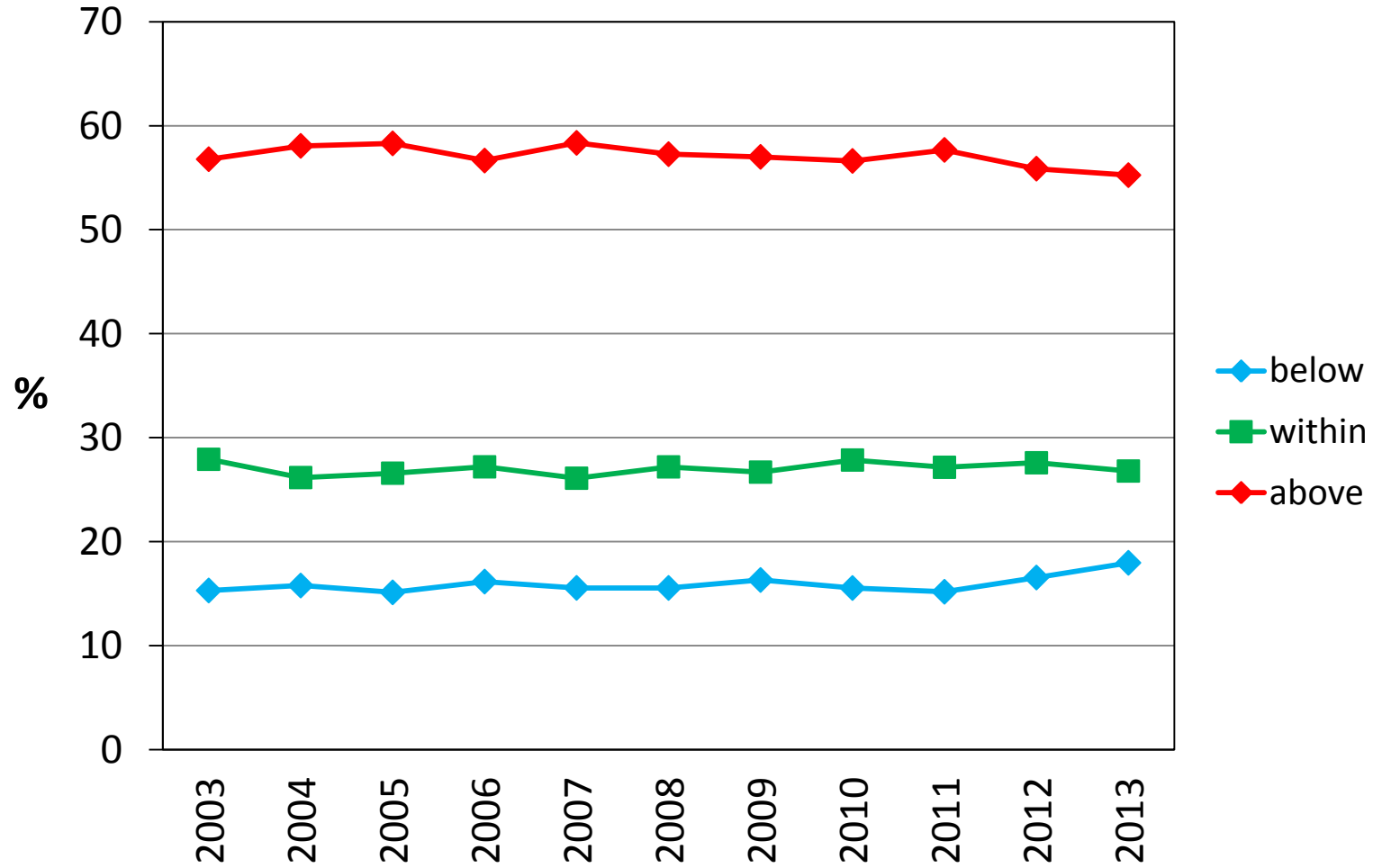
<b>GWG</b>	<b>NS 2003-13</b>	<b>[NFLD]<sup>1</sup> 2001-7</b>	<b>CAN-MES<sup>2</sup> 2006-7</b>	<b>Florida<sup>3</sup> 2004-7</b>
<b>BELOW</b>	<b>15.8</b>	<b>17.1</b>	<b>18.7</b>	<b>20.2</b>
<b>WITHIN</b>	<b>26.3</b>	<b>30.6</b>	<b>32.6</b>	<b>28.6</b>
<b>ABOVE</b>	<b>57.9</b>	<b>52.3</b>	<b>48.7</b>	<b>51.2</b>

<sup>1</sup> Crane JM et al, JOGC, 2009

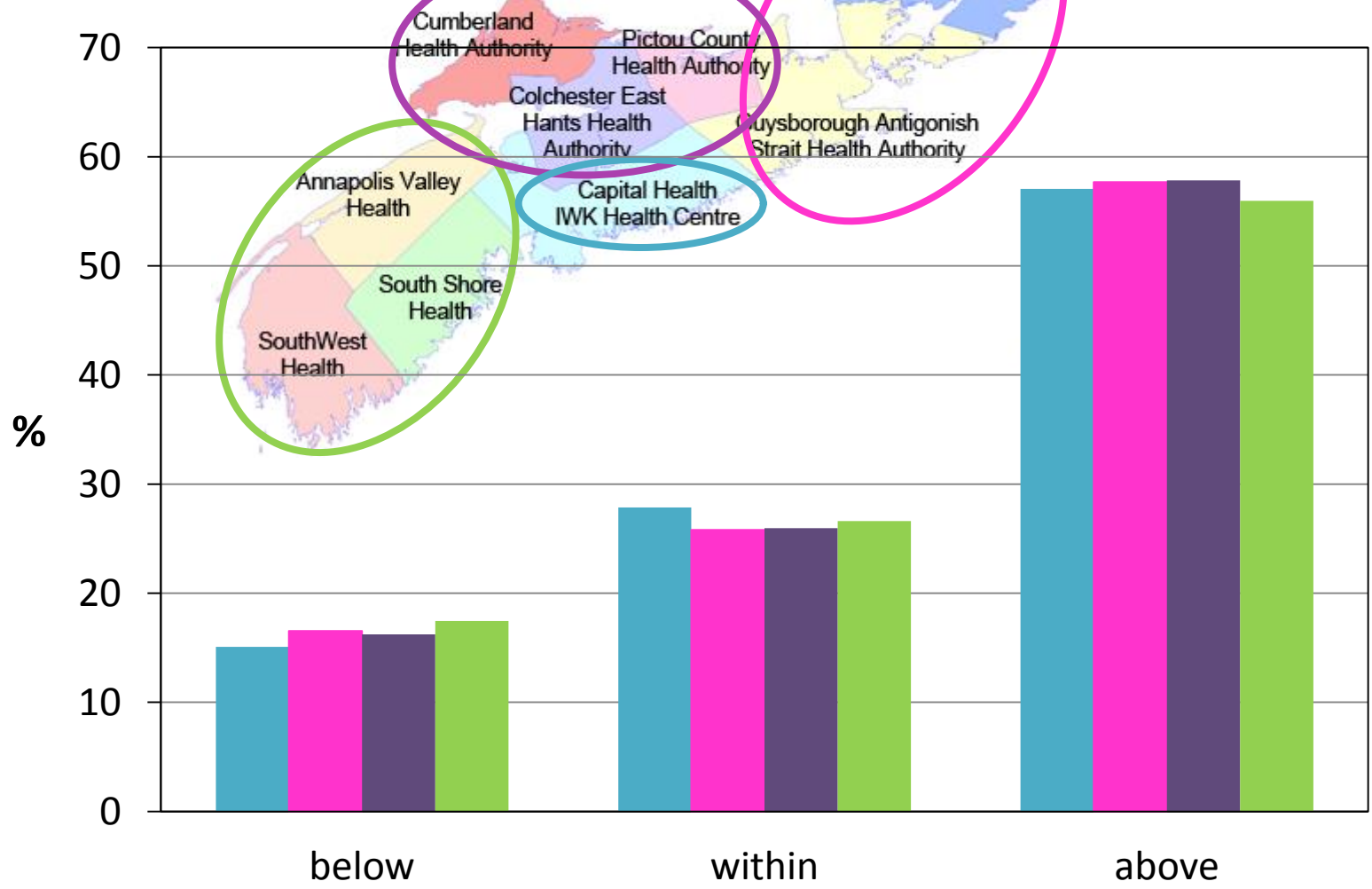
<sup>2</sup> Kowal C et al, Matern Child Health J, 2011

<sup>5</sup> Park S et al., Matern Child Health J, 2010

# GWG in NS, 2003-2013

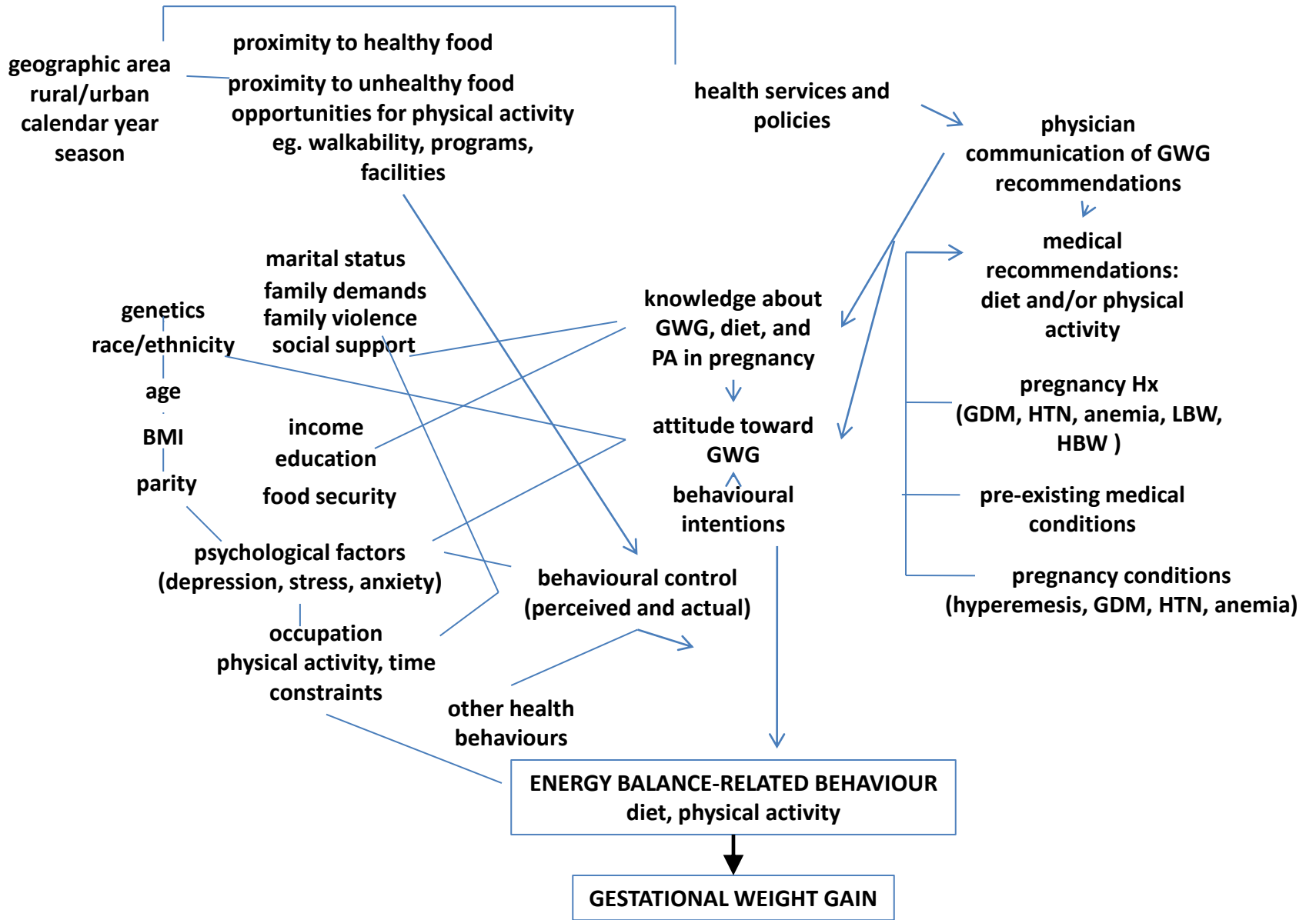


# GWG in NS 2003-2013



## Identification of correlates of inappropriate GWG may help to:

- identify populations in need of intervention
- suggest potential causal mechanisms and points of intervention
- increase care provider awareness that women at risk may have other health needs



# Correlates of GWG Nova Scotia, 2003-13

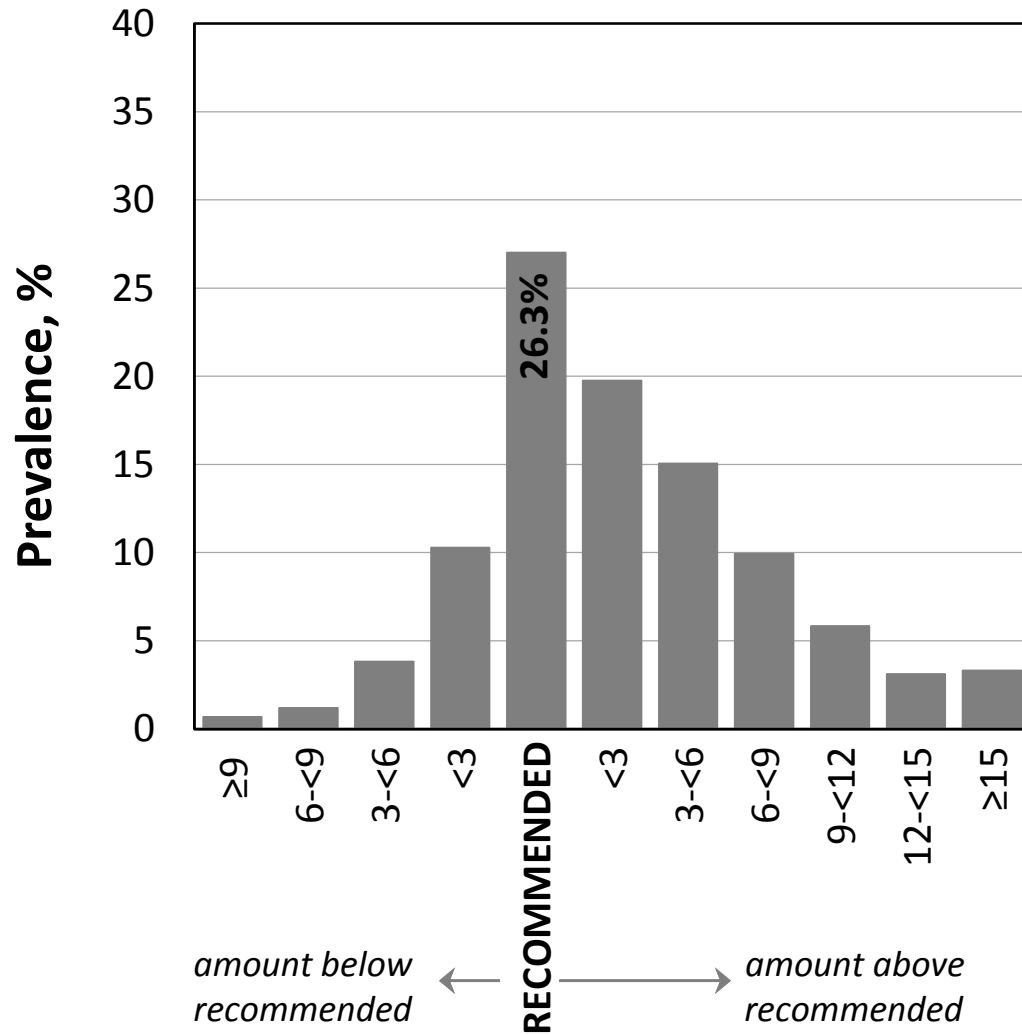
- pre-pregnancy BMI
- age, parity
- relationship status
- smoking
- depression
- pre-existing diabetes
- season
- sex of fetus

# Correlates of GWG Nova Scotia, 2003-13

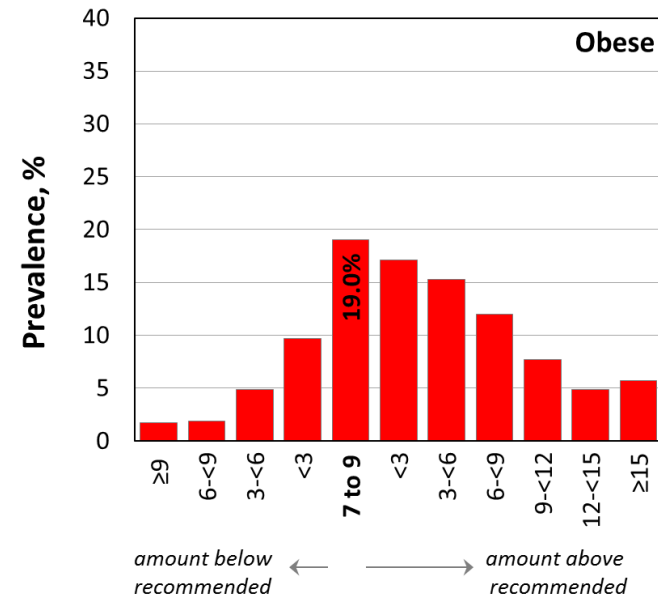
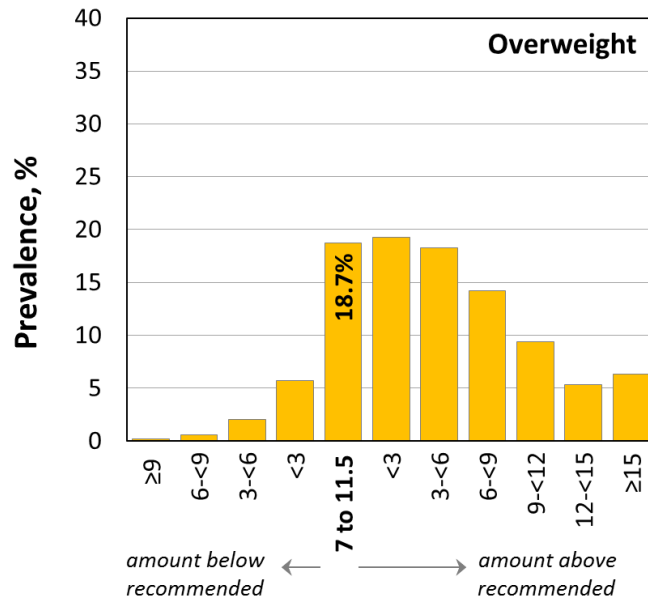
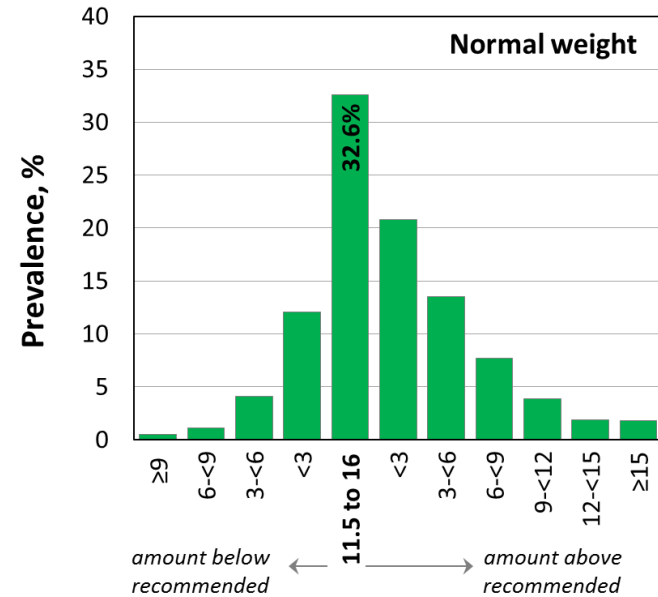
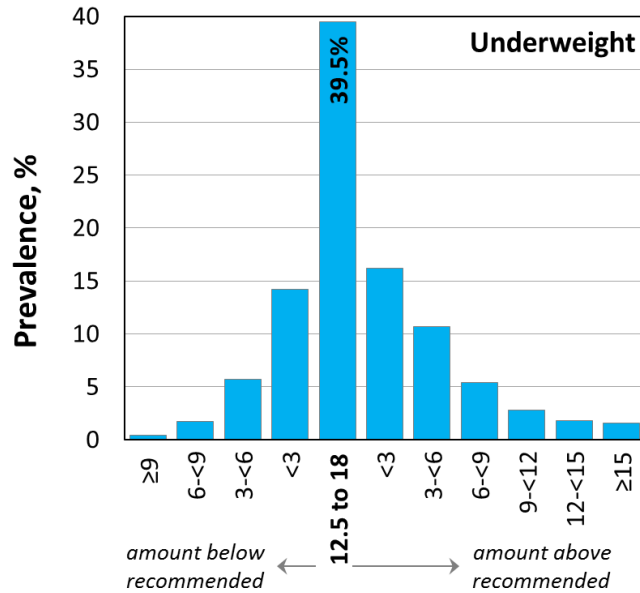
- **previous pregnancy**
  - gestational weight gain
  - interpregnancy interval
  - interpregnancy weight change



# GWG in NS, 2003-2013

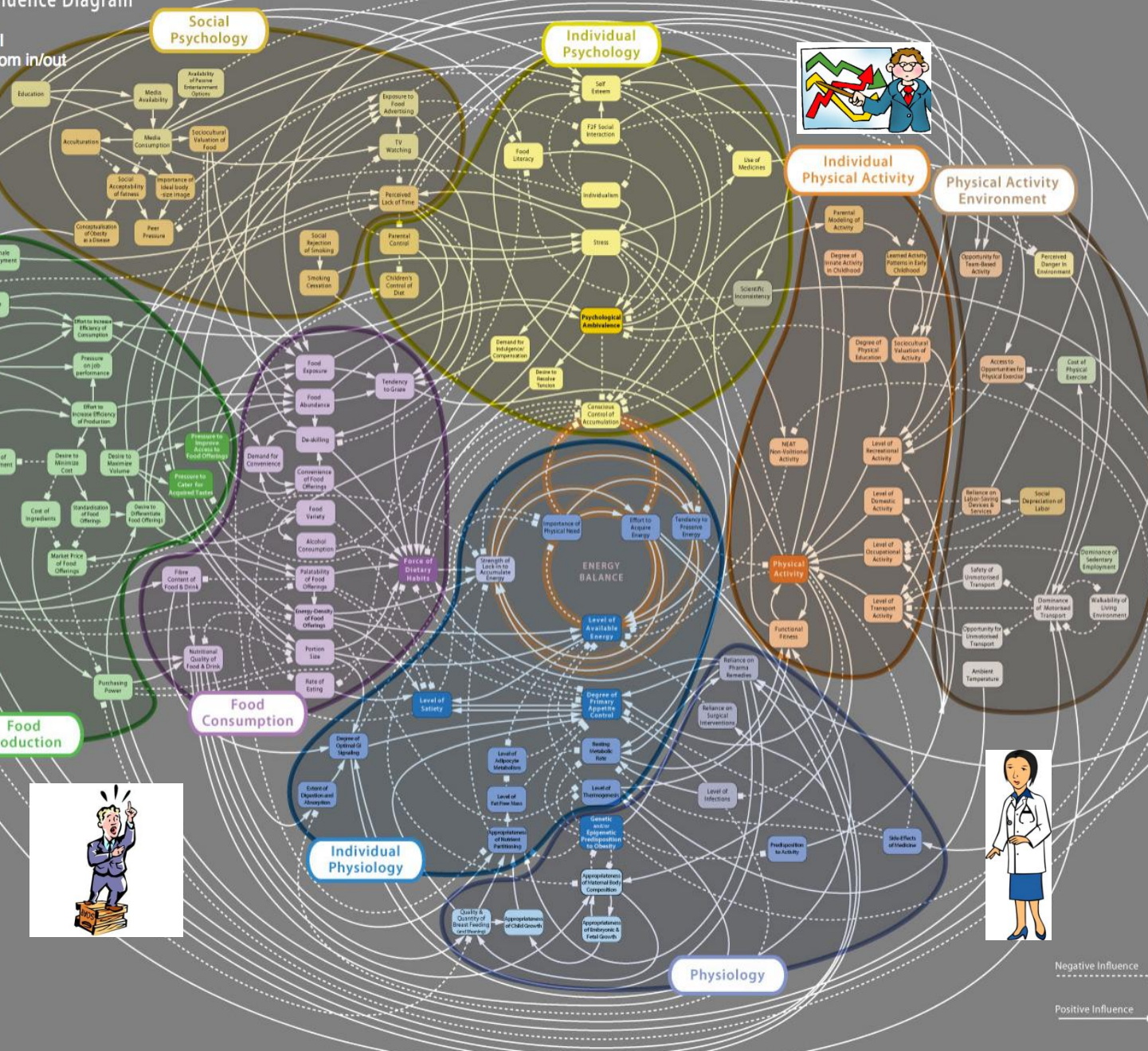


# GWG in NS, 2003-2013



Full Map  
Clusters  
Core Loop  
Individual Psychology  
Social Psychology  
Individual Activity  
Activity Environment  
Food Consumption  
Food Production  
Individual Physiology  
Physiology

Click-drag to scroll  
Double-click to zoom in/out



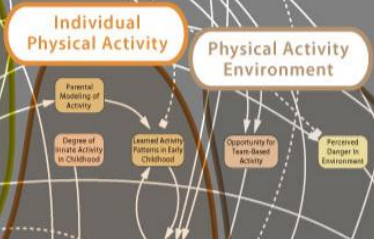
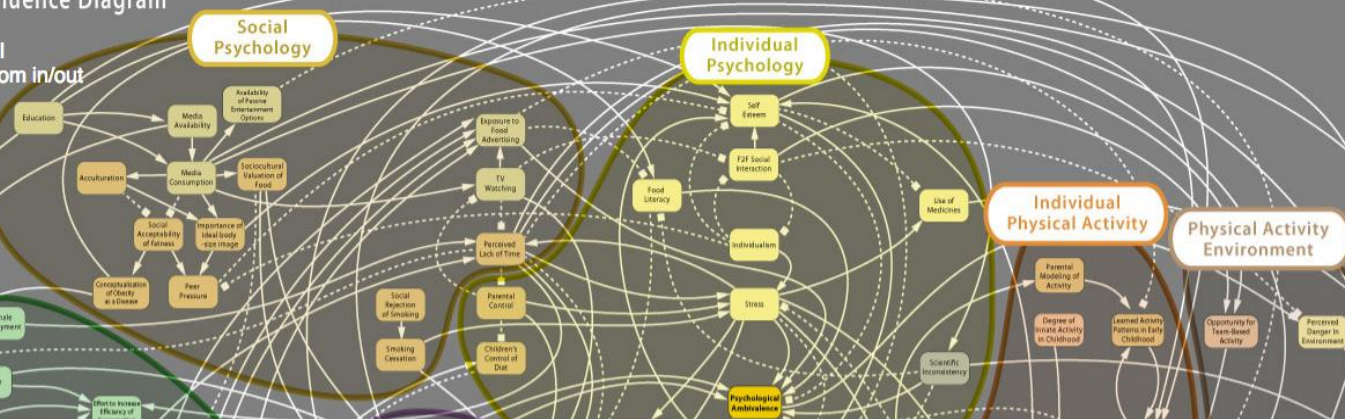
- Social
- Psychological
- Economic
- Food
- Activity
- Infrastructure
- Developmental
- Biological
- Medical

Negative Influence  
Positive Influence

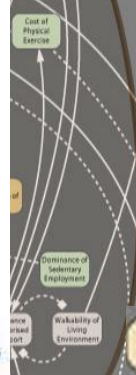
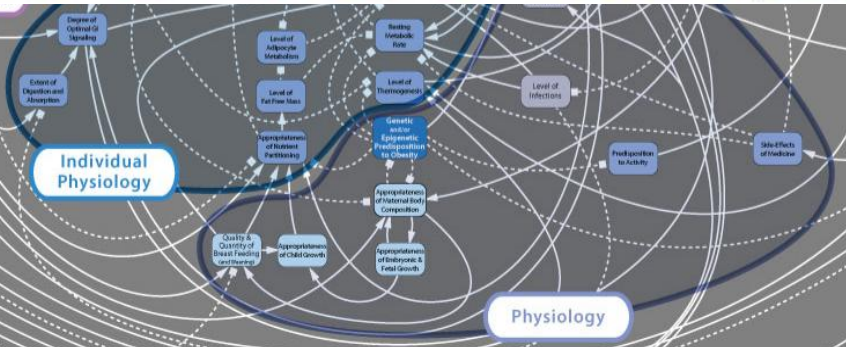


Full Map  
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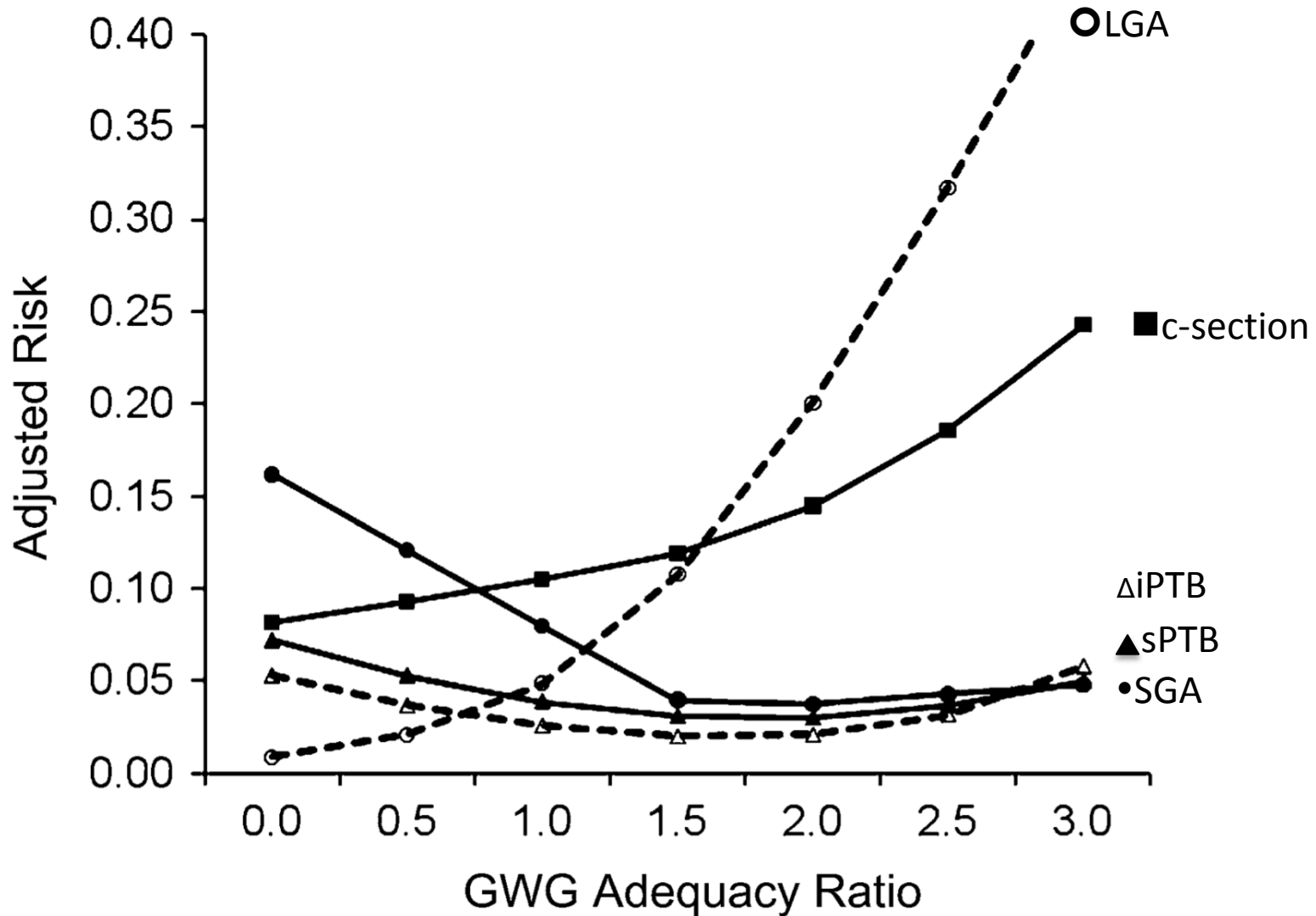
Food Production



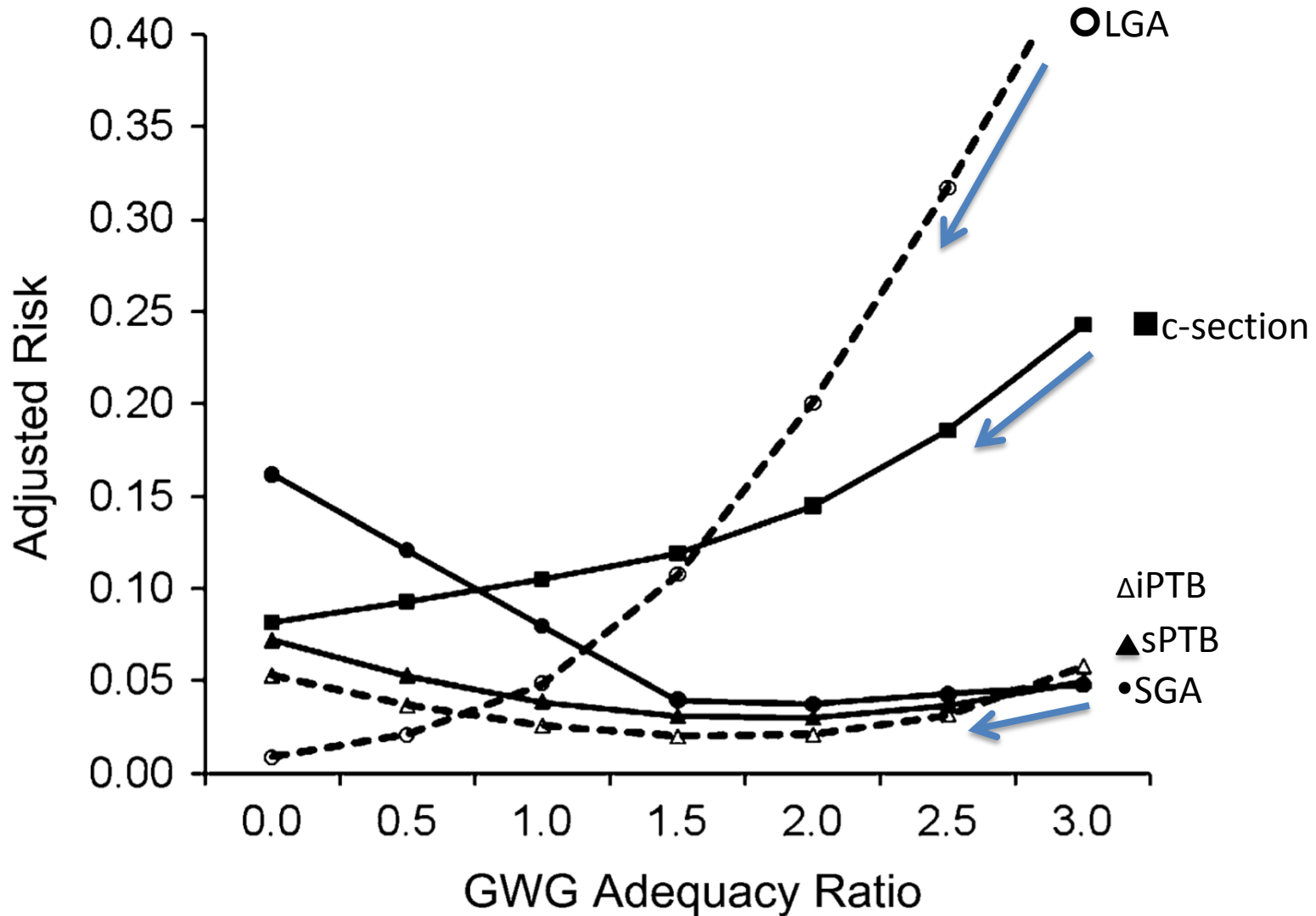
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Negative Influence  
 Positive Influence

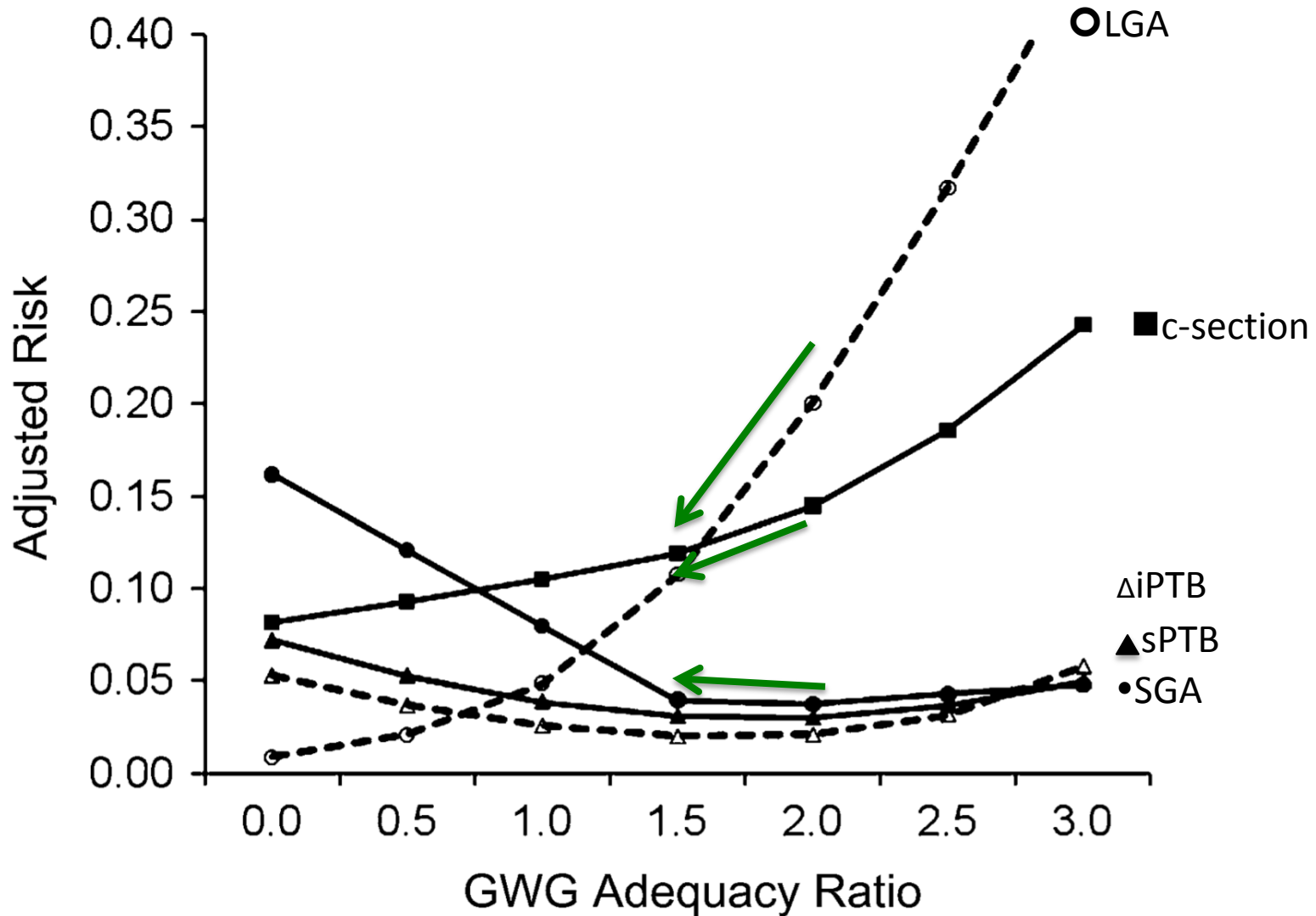
# GWG: effect on outcomes



# GWG: effect on outcomes



# GWG: effect on outcomes



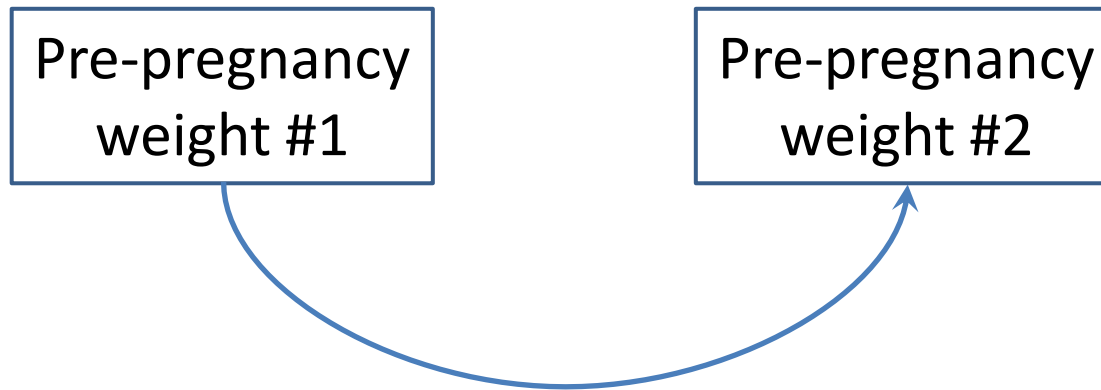
# Postpartum weight retention

**PPWR = postpartum weight – pre-pregnancy weight**

- no standard definition (e.g., postpartum weight when?)
- postpartum weight is not routinely measured and/or recorded in population-based databases



# Interpregnancy weight change



**postpartum weight retention**  
+  
**“regular” age-related weight gain**

# Interpregnancy weight change

Prepregnancy BMI	Loss >1 kg	Stable $\pm 1$ kg	Gain >1-<5 kg	Gain $\geq 5$ kg
underweight	11%	21%	33%	35%
normal weight	21%	22%	29%	27%
overweight	27%	14%	23%	35%
obese	34%	12%	23%	35%
all women	25%	18%	26%	31%

median 2.3

interquartile range -0.9 to 6.8

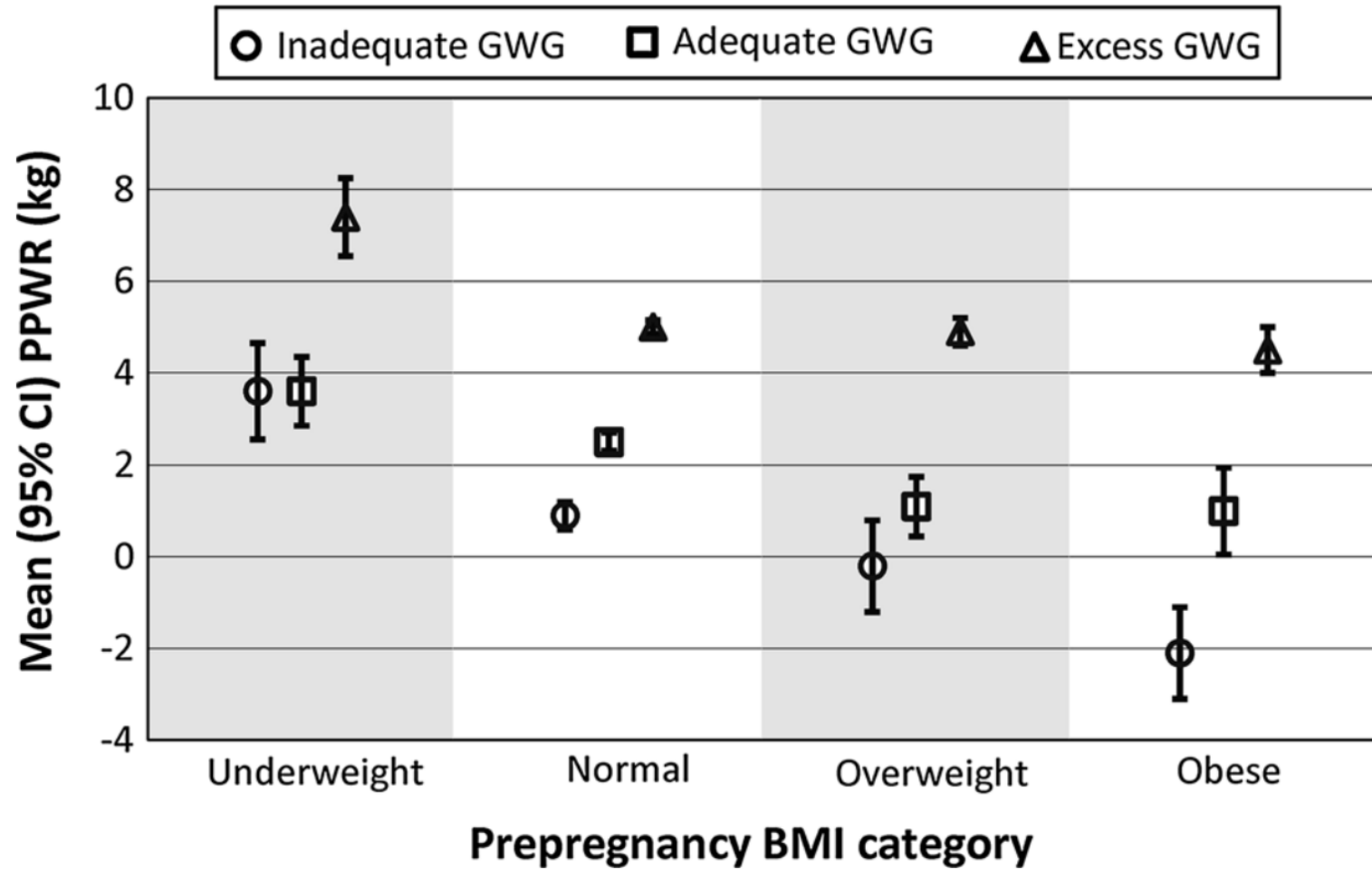
# Impact of GWG on maternal long term weight

## Weight gain according to GWG in 1<sup>st</sup> pregnancy

GWG, kg	Adjusted* mean weight gain, kg	(95% CI)
<10	6.1	(4.8-7.4)
10-<15	7.4	(6.6-8.2)
15-<20	9.9	(9.1-10.7)
≥20	13.2	(12.0-14.4)

*Adjusted for years between pregnancy and weight measurement, maternal age, maternal pre-pregnancy BMI; p = 0.026*

# Impact of GWG on interpregnancy weight change



# Postpartum weight retention

- impacts outcomes in subsequent pregnancies
- influences maternal long term weight and associated chronic diseases
- intervention may have a double-barreled effect:
  - weight retention reduction
  - +
  - adoption of healthful behaviours → family health

# TAKE HOME POINTS

## PRE-PREGNANCY BMI

- many NS women do not enter pregnancy at an ideal weight (3.9% underweight, 24.6% overweight, 23.0% obese)
- among overweight or obese women, the amount of weight loss needed to achieve an ideal BMI can be substantial
- even incremental advances toward an ideal BMI will have a large impact on perinatal health

# TAKE HOME POINTS

## GESTATIONAL WEIGHT GAIN

- most women have guideline-discordant GWG (15.8% below, 57.9% above)
- there are no absolute indicators of which women will gain too much; the prevalence is high among all groups of women
- among women with excess GWG, half exceeded the recommendations by at least 4.8 kg
- even incremental advances toward recommended GWG will have beneficial effects on perinatal outcomes

# TAKE HOME POINTS

## POSTPARTUM WEIGHT RETENTION

- median interpregnancy weight gain  
2.3 kg (interquartile range: -0.9 to 6.8)
- influenced strongly by GWG
- influences maternal short and long term health
- may be a beneficial focus of intervention



# Thank you

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Armson, Sara Kirk, Jillian Ashley-Martin,  
Helena Piccinini-Vallis