

# Perinatal Outcomes of Women with Pregravid BMIs $\geq 30\text{kg/m}^2$ Enrolled for Care at AABC Birth Centers

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# WHITE ADIPOSE TISSUE FUNCTIONS

*LARGEST GLANDULAR TISSUE  
IN BODY*

VASCULAR TONE  
CONTROL,  
COAGULATION,  
FIBRINOLYSIS

IMMUNITY

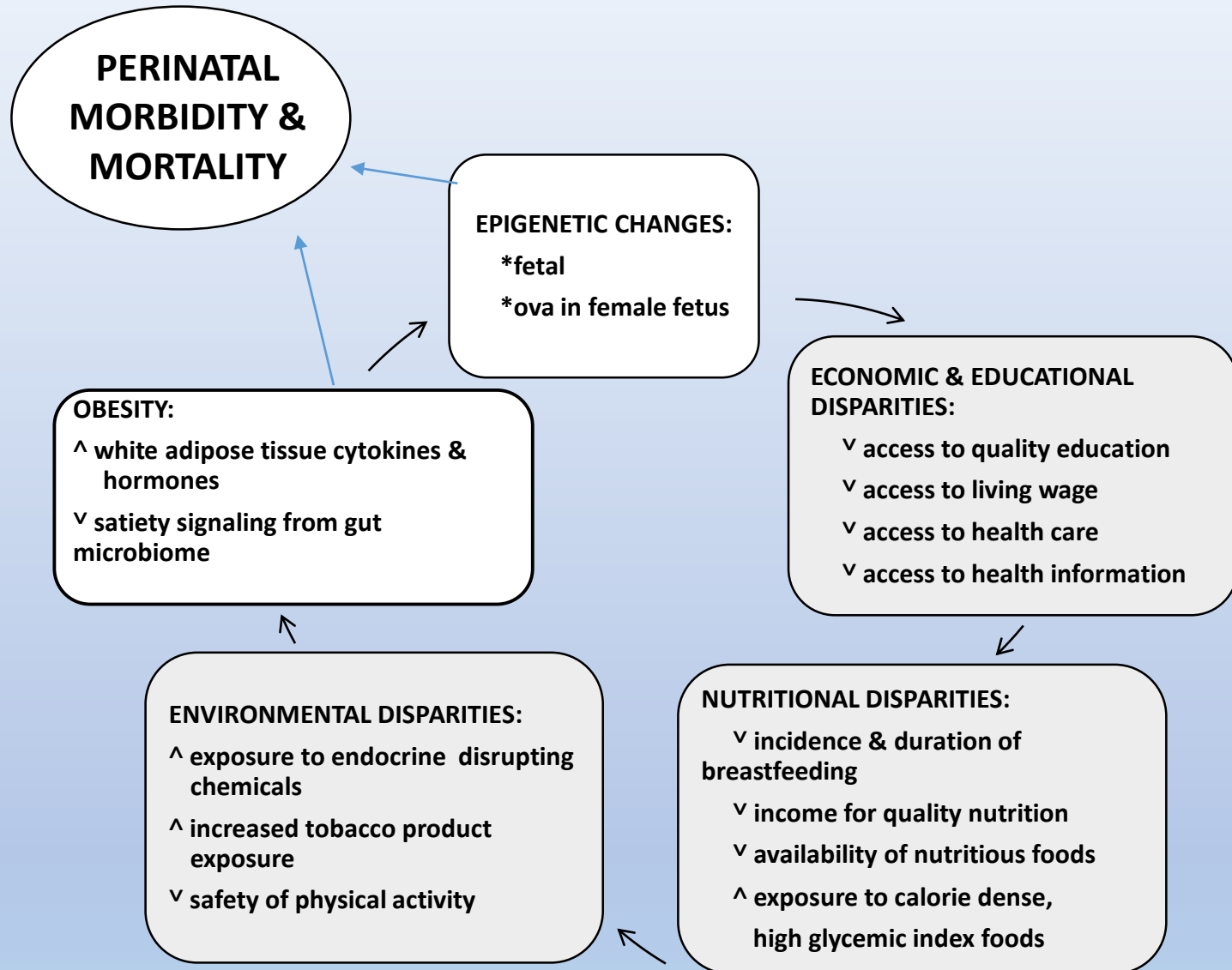
APPETITE  
REGULATION,  
WEIGHT  
HOMEOSTASIS



ANGIOGENESIS

GLUCOSE & LIPID  
METABOLISM

# Obesity has less to do with personal choice than with socioeconomic limits on choices & epigenetics



# Obesity is more than

*-a BMI  $\geq$  30*

*-over-eating*

*-lack of physical  
activity*

Obesity is an intergenerational adaptation to multiple socio-economic disparities, and social and physical environments that alter the hypothalamic–pituitary–adrenal axis (HPA) through exposure to chronic stress and endocrine-disrupting chemicals, and broken, nonnutritive food systems.

Jevitt 2020

# BACKGROUND

- Relationship between BMIs  $\geq 30$  & perinatal morbidity and mortality in medical literature
- Women with obese BMIs receive care in free standing birth centers, although usually considered high risk
- Birth center care generally provided by midwives



# STUDY PURPOSE

Determine the safety for women with BMIs  $\geq 30$  receiving antepartum, intrapartum and postpartum care in a free standing birth centers



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# American Association of Birth Centers Perinatal Data Registry

- Data entered by birth centers, regular training sessions
- More than 400 data points
- Manual with definition of terms + visible in data entry program
- Regular review by AABC research committee
- Follows women from prenatal registry through birth including hospital transfers

## AABC UDS/PDR List of Variables

### Part 1 - Initial OB Visit

Lines read from left to right:

Letter=Column in Excel Data File

X=variable requested from Perinatal Data Registry by Jevitt

Name of variable

(possible responses to variable)

*Sentences in italics and blue are questions for Susan Stapleton about interpretation of the data entries.*

A-xAge \* (age in years)

B-xPrimary Payment Method \* (Medicaid, private insurance, cash payment)

C-xYears of Education (Total # of Years) (GED=12) \*

D-xMaternal Ethnicity \*

E-xMaternal Race \*

F-xIf Hispanic, specify: \*

G-xMarital or Partner Status \* (married, single, divorced)

H-xMedical History \*

If Substance Abuse selected, check all that apply:

I-smoker

L-anorexia/bulimia

# 85 birth centers entered data in PDR for this study





# Human Subjects Research Approval

- American Association of Birth Centers Research Committee
- American Association of Birth Centers Board of Directors
- Yale University Institutional Review Board

*Data analyzed by Yale Center for Analytical Sciences*



YALE SCHOOL OF NURSING



# Withstanding scrutiny:

*The analysis was limited to nulliparous women:*

- 1<sup>st</sup> birth most likely to be complicated
- Increasing parity and age have effects on weight and birth outcomes
- Limited women contributing to data set more than once (more than 1 birth at center)



# FREQUENCY BY BMI CATEGORY

Parity = 0, births during 2012-2015

BMI Category	Frequency	Percent
Missing data	<b>2562</b>	<b>21.35</b>
Underweight	<b>413</b>	<b>3.44</b>
Normal	<b>5881</b>	<b>49.02</b>
Overweight	<b>2058</b>	<b>17.15</b>
Obese	<b>1084</b>	<b>9.03</b>
	<b>9023</b> records examined	

# FREQUENCY BY OBESE BMI CATEGORY

Parity = 0

<b>Obesity Category</b>	<b>N (1084)</b>	<b>Percent Of All Nulliparas</b>
<b>Class 1 (30-34.9)</b>	<b>723</b>	<b>6.03</b>
<b>Class 2 (35-39.9)</b>	<b>258</b>	<b>2.15</b>
<b>Class 3 (40+)</b>	<b>103</b>	<b>0.86</b>

*Obesity classes were too small to analyze individually.*

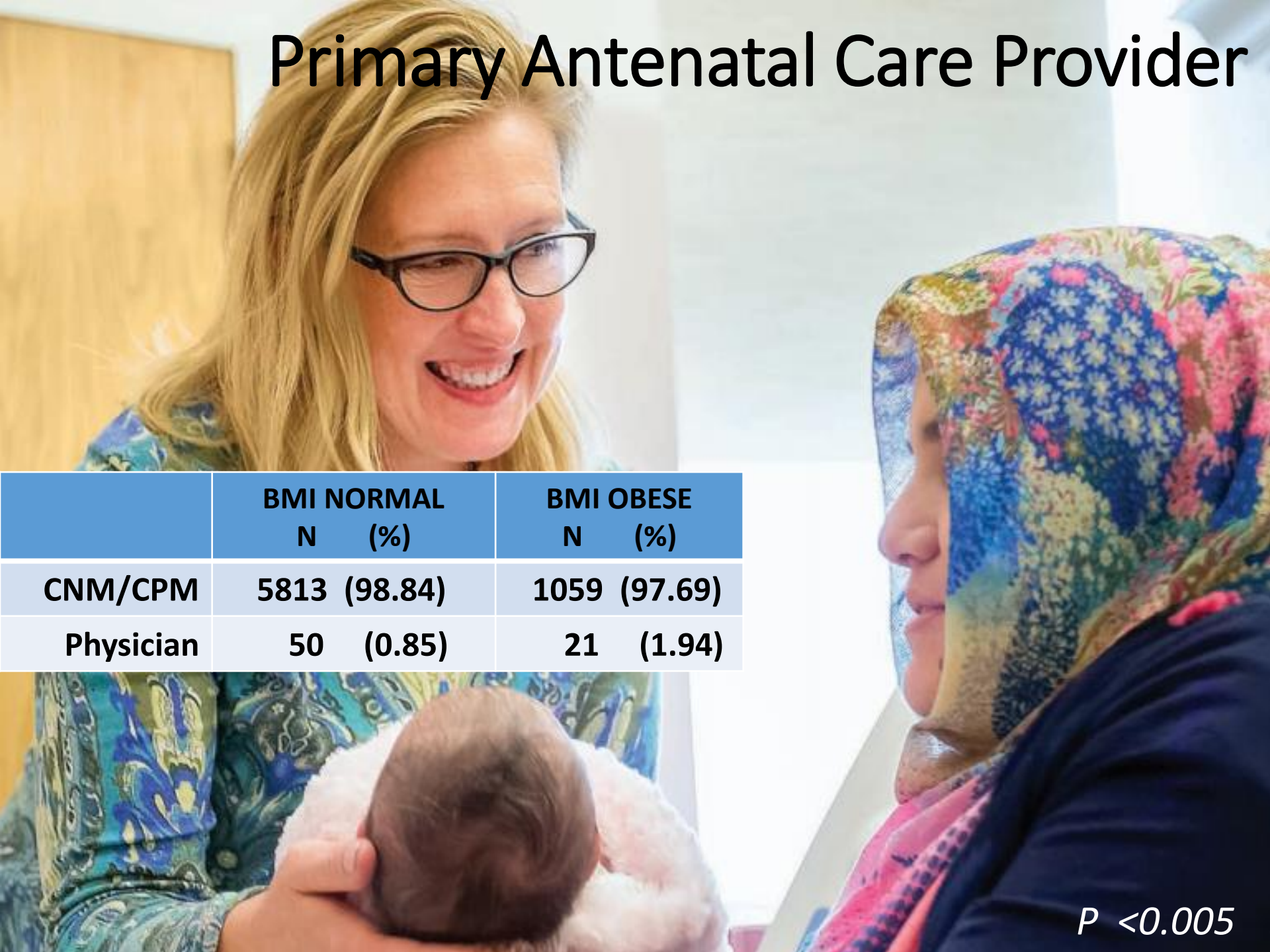
# Findings-Overall Data Set

- Between nulliparous women with normal or obese BMIs, there were no differences in:

- Age
- Years of education
- Regular physical activity
- Diagnostic ultrasound use during prenatal care

60% of women with obese BMIs had no antenatal complications

# Primary Antenatal Care Provider



	<b>BMI NORMAL</b>	<b>BMI OBESE</b>
	<b>N (%)</b>	<b>N (%)</b>
<b>CNM/CPM</b>	<b>5813 (98.84)</b>	<b>1059 (97.69)</b>
<b>Physician</b>	<b>50 (0.85)</b>	<b>21 (1.94)</b>

*P* <0.005

# Findings



Consistent with the literature, compared with women of normal BMIs, women with BMIs  $\geq 30$  were more likely to:

- Have government insurance for pregnancy (associated with low income in US)
- Be Hispanic or Black
- Be single

*Socioeconomic determinants of health*

# Antenatal Course

## Nulliparas

	BMI NORMAL N (%)	BMI OBESE N (%)	P
<b>Hypertensive disorders</b>	<b>170 (2.89)</b>	<b>91 (8.39)</b>	<b>&lt;0.001</b>
<b>Gestational diabetes</b> <i>US prevalence 3-5%</i>	<b>103 (1.75)</b>	<b>46 (4.24)</b>	<b>&lt;0.001</b>
<b>Macrosomia (&gt;4500g)</b>	<b>16 (0.27)</b>	<b>24 (2.21)</b>	<b>&lt;0.001</b>
<b>Post Term &gt; 42 weeks 0 days</b>	<b>70 (1.19)</b>	<b>27 (2.49)</b>	<b>&lt;0.001</b>
<b>No prenatal complications</b>	<b>4149 (70.55)</b>	<b>655 (60.42)</b>	<b>&lt;0.001</b>

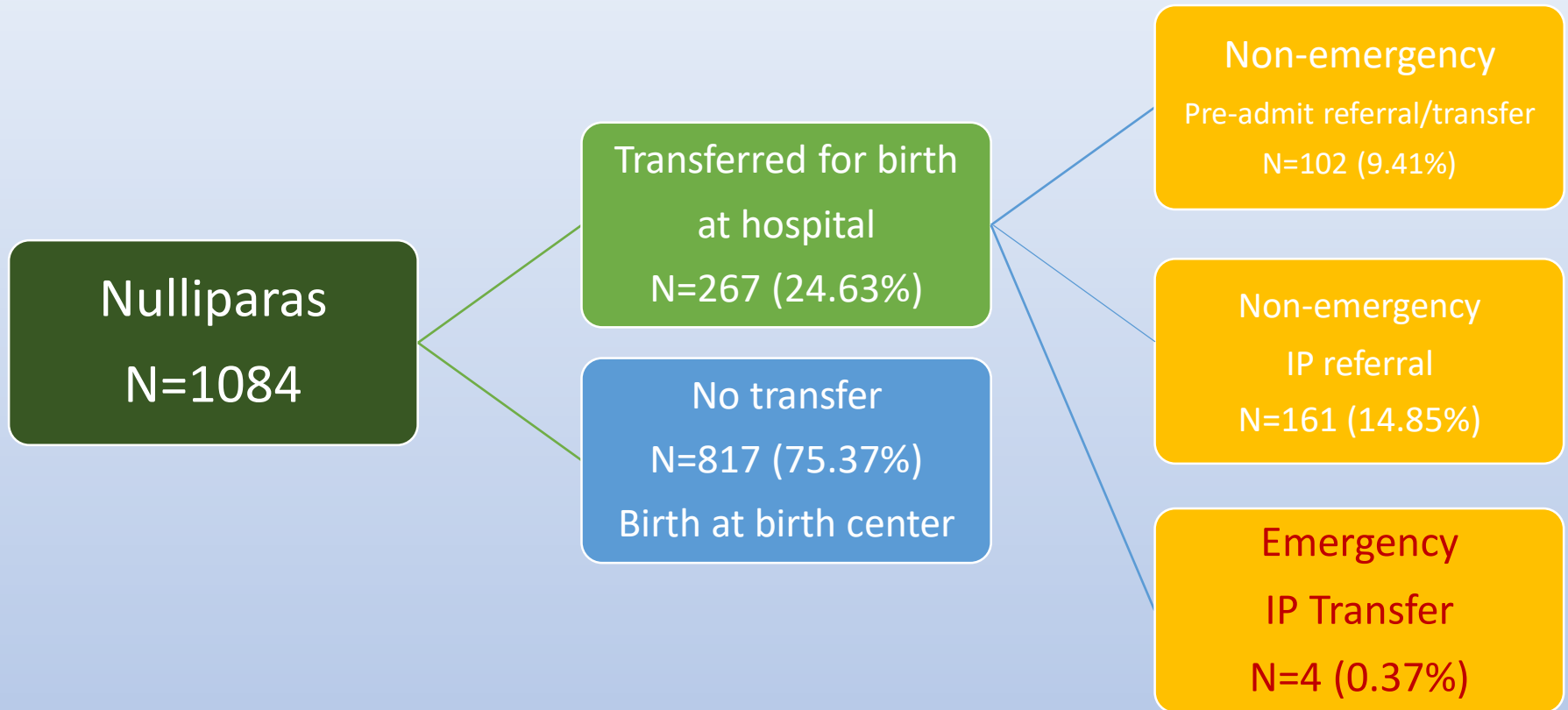


Midwives provided care for 98% of birth center births & 50% of births in hospital after transfer.



Primary Birth Care by Midwives

# Nulliparas BMI $\geq 30$ transfers to hospital



# Outcomes if transferred to hospital



	BMI NORMAL N (%)	BMI OBESE N (%)	P
Induction of labor	93 (10.56)	13 (7.93)	0.31
Augmentation of labor	424 (48.13)	73 (44.51)	0.39
Cesarean birth	314 (35.64)	60 (36.59)	0.74

# CONCLUSIONS

Nulliparas with obese BMIs *who were admitted for labor at a birth center:*

- 75% gave birth in birth center
- 3% transferred from birth center to hospital following birth
- 2% newborns transferred to the hospital postpartum-mainly respiratory issues



# Women with normal and obese BMIs had no differences in:

- Intrapartum complications
- Hypertensive disorders in labor
- Prolonged labor
- Shoulder dystocia
- Postpartum deep vein thrombosis-NONE
- Newborn weight
- 1 & 5 minute Apgar scores
- Newborn complications
- Newborn transfer to hospital
- Breastfeeding rates regardless of place or type of birth-*almost all exclusively breastfed*

# First Conundrum: Antenatal Course

	BMI NORMAL N (%)	BMI OBESE N (%)	P
No prenatal complications	4149 (70.55)	655 (60.42)	<0.001

***Why fewer complications in the women with obese BMIs?***

## Second Conundrum: Postpartum Hemorrhage

	BMI NORMAL N (%)	BMI OBESE N (%)	P
Postpartum hemorrhage	291 (8.76)	20 (5.62)	0.04

Why less postpartum hemorrhage in women with obesity?

- Physiologic 3<sup>rd</sup> stage or active management?
- Increased vigilance by midwives



## Birth Outcomes of Women with Obesity Enrolled for Care at Freestanding Birth Centers in the United States

Cecilia M. Jevitt CNM, PhD, RM , Susan Stapleton CNM, DNP, Yanhong Deng PhD, Xuemei Song MS, Kaicheng Wang MD, MPH, Diana R. Jolles CNM, PhD

First published: 30 December 2020 | <https://doi.org/10.1111/jmwh.13194>

### Introduction

Current US guidelines for the care of women with obesity generalize obesity-related risks to all women regardless of overall health status and assume that birth will occur in hospitals. Perinatal outcomes for women with obesity in US freestanding birth centers need documentation.

### Methods

Pregnancies recorded in the American Association of Birth Centers Perinatal Data Registry were analyzed ( $n = 4,455$ ) to form 2 groups of primiparous women ( $n = 964$ ; 1:1 matching of women with normal body mass indices [BMIs] and women with obese BMIs [ $\geq 30$ ]), using propensity score matching to address the imbalance of potential confounders. Groups were compared on a range of outcomes. Differences between groups were evaluated using  $\chi^2$  test for categorical variables and Student's  $t$  test for continuous variables. Paired  $t$  test and McNemar's test evaluated the differences among the matched pairs.

### Results

The majority of women with obese BMIs experienced uncomplicated perinatal courses and vaginal births. There were no significant differences in antenatal complications, proportion of prolonged pregnancy, prolonged first and second stage labor, rupture of membranes longer than 24 hours, postpartum hemorrhage, or newborn outcomes between women with obese BMIs and normal BMIs. Among all women with intrapartum referrals or transfers (25.3%), the primary indications were prolonged first stage or second stage (55.4%), inadequate pain relief (14.8%), client choice or psychological issue (7.0%), and meconium (5.3%). Primiparous women with obesity who started labor at a birth center had a 30.7% transfer rate and an 11.1% cesarean birth rate.

### Discussion

Women with obese BMIs without medical comorbidity can receive safe and effective midwifery care at freestanding birth centers while anticipating a low risk for cesarean birth. The risks of potential, obesity-related perinatal complications should be discussed with women when choosing place of birth; however, pregnancy complicated by obesity must be viewed holistically, not simply through the lens of obesity.



# 2019 Propensity Match

Kaicheng Wang, MD, & Diana Jolles, CNM, added to team

- 1:1 matching two groups of primiparas, normal BMI range or obese BMI range
- 482 in each group



# Findings of Propensity Match

- The majority of women with obese BMIs experienced uncomplicated perinatal courses and vaginal births.
- There were no significant differences in antenatal complications, proportion of prolonged pregnancy, prolonged 1<sup>st</sup> and 2<sup>nd</sup> stage labor, rupture of membranes longer than 24 hours, postpartum hemorrhage, or newborn outcomes between women with obese BMIs and normal BMIs.

# Findings of Propensity Match

- Among all women with intrapartum referrals or transfers (25.3%), the primary indications were prolonged 1<sup>st</sup> stage or 2<sup>nd</sup> stage (55.4%), inadequate pain relief (14.8%), client choice/psychological issue (7.0%), and meconium (5.3%).
- Primiparous women with obesity who started labor at a birth center had a 30.7% transfer rate and an 11.1% cesarean section rate.

# Conclusion

The risks of potential, obesity-related perinatal complications should be discussed with women when choosing place of birth; however, pregnancy complicated by obesity must be viewed holistically, not simply through the lens of obesity.



# Emerging data from midwives:

Among nulliparous, obese women in spontaneous labor, watchful waiting and hydrotherapy provided outcomes that are similar to or better than interventions such as oxytocin augmentation.

*Nicole Carlson, Elizabeth Corwin, Nancy Lowe*

## Labor Intervention and Outcomes in Women Who Are Nulliparous and Obese: Comparison of Nurse-Midwife to Obstetrician Intrapartum Care

Nicole S. Carlson, CNM, PhD, Elizabeth J. Corwin, PhD, Nancy K. Lowe, CNM, PhD

**Background:** Women who are obese have slower labors than women of normal weight, and show reduced response to interventions designed to speed labor progress like oxytocin augmentation and artificial rupture of membranes. The optimal labor management for these women has not been described.

**Methods:** This retrospective cohort study compared 2 propensity score-matched groups of women (N = 360) who were healthy, nulliparous, spontaneously laboring, and obese (body mass index  $\geq 30$  kg/m<sup>2</sup>). Labors were managed by either a certified nurse-midwife (CNM) or an obstetrician at one hospital from 2005 through 2012. Comparisons were made on a range of labor processes and outcomes.

**Results:** Women who were obese and cared for in labor by CNMs were 87.0% less likely to have operative vaginal birth (adjusted odds ratio [aOR], 0.15; 95% confidence interval [CI], 0.06-0.41) and 76.5% less likely to have third- or fourth-degree perineal lacerations (aOR, 0.31; 95% CI, 0.13-0.79) compared to a matched group of women who were obese and had similarly sized neonates but who were cared for by obstetricians. The rates of unplanned cesarean birth, postpartum hemorrhage, maternal intrapartum fever, and neonatal intensive care unit admission were similar between groups. CNM patients were significantly less likely than patients of obstetricians to have labor anesthesia, synthetic oxytocin augmentation, or intrauterine pressure catheters. By contrast, CNM patients were significantly more likely than patients of obstetricians to use physiologic labor interventions, including intermittent fetal monitoring, ambulation, and hydrotherapy.

**Discussion:** In women with spontaneous labor onset who were healthy, obese, and nulliparous, watchful waiting and use of physiologic labor interventions, characterizing CNM intrapartum care, were associated with outcomes that were similar to, or better than, those of women who were obese and exposed to more high-technology interventions characterizing intrapartum care by obstetricians. In women who were obese, physiologic labor interventions were safe for both mothers and neonates.

J Midwifery Womens Health 2017;62:29–39 © 2017 by the American College of Nurse-Midwives.

**Keywords:** cesarean birth, hydrotherapy, interventions, intrapartum, labor, labor dystocia, obesity, physiologic labor, pregnancy

### INTRODUCTION

Women who are obese are at particular risk for slow labor progress,<sup>1</sup> a complication known as labor dystocia.<sup>1,2</sup> Among nulliparous women with body mass index (BMI) greater than or equal to 40 kg/m<sup>2</sup>, it can take more than 7 hours longer to progress from 4 cm dilatation to 10 cm than among similar women with normal BMI.<sup>2</sup> Women who are obese also show decreased response to the 2 primary clinical interventions used to speed labor progress: synthetic oxytocin infusion<sup>3,4</sup> and artificial rupture of membranes (AROM).<sup>5</sup> Unfortunately, these research findings of slower labor progress and decreased response to labor interventions are not integrated in modern labor management protocols for women who are obese, despite the fact that more than one-third of childbearing women in the United States are obese, with higher proportions among racial and ethnic minorities.<sup>6</sup>

As a result of their slower labors and decreased response to commonly used intrapartum interventions, women who are obese are more often exposed to multiple labor interventions,<sup>7</sup> but nevertheless have higher rates of unplanned cesarean birth.<sup>8–11</sup> In a large, multisite study, for each 1 kg/m<sup>2</sup> in-

crease in maternal BMI, there was a 2% to 5% increase in the cesarean birth rate (cesarean birth rate among normal weight women 11.1% versus 42.8% among women with BMI  $\geq 40$  kg/m<sup>2</sup>).<sup>12</sup> Nulliparity<sup>10</sup> and maternal comorbid conditions like gestational diabetes and hypertension<sup>12</sup> further increase the risk of cesarean birth among women who are obese. When women who are obese experience cesarean birth, they are at heightened risk for a range of poor postoperative outcomes, including infection,<sup>13,14</sup> postpartum hemorrhage, and prolonged hospitalization.<sup>15</sup>

Although maternal obesity involves multiple physiologic changes that may contribute to women's slow labor progress and decreased response to labor interventions,<sup>16</sup> it is possible that excellent maternal and neonatal outcomes can still be achieved when women who are obese are managed optimally. In women of mixed weights, care by nurse-midwives<sup>17–19</sup> is associated with decreased risk of cesarean birth, and physiologic labor interventions (intermittent electronic fetal monitoring, ambulation, hydrotherapy) are associated with decreased use of high-technology interventions (epidural anesthesia, AROM, oxytocin augmentation) and fewer operative births.<sup>20,21</sup> However, in randomized controlled trials, some physiologic labor interventions were not individually associated with vaginal birth,<sup>22</sup> and neither physiologic labor interventions nor care by

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Rowe R, Knight M, Kurinczuk JJ, on behalf of the UK Midwifery Study System (UKMidSS). Outcomes for women with BMI>35kg/m<sup>2</sup> admitted for labour care to alongside midwifery units in the UK: A national prospective cohort study using the UK Midwifery Study System (UKMidSS). PLoS ONE. 2018;13(2):e0208041.

- Women in 122 alongside birth centers with “severe obesity” = BMI  $\geq$  35
- Women with obesity (n=1126) no more likely than those without obesity (n=2238) to have
  - admission to a higher level maternity unit
  - augmentation of labor
  - cesarean birth
  - 3<sup>rd</sup> or 4<sup>th</sup> degree laceration
  - blood transfusion

# Rowe, Knight, & Kurinczuk, 2018

- 67.9% of nulliparas & 96.3% of multiparas with BMIs  $\geq 35$  had uncomplicated vaginal births
- Women with BMIs  $\geq 35$  were more likely to have an urgent cesarean section (12.2% v 6.5%, aRR=1.80)
- Women with BMIs  $\geq 35$  were more likely to have an a postpartum hemorrhage  $\geq 1500$ ml (5.1% vs. 1.7%, aRR=3.01)

# The impact of maternal obesity on intrapartum outcomes in otherwise low risk women: secondary analysis of the Birthplace national prospective cohort study

J Hollowell,<sup>a</sup> D Pillas,<sup>a</sup> R Rowe,<sup>a</sup> L Linsell,<sup>a</sup> M Knight,<sup>a</sup> P Brocklehurst<sup>a,b</sup>

<sup>a</sup> National Perinatal Epidemiology Unit, University of Oxford, Oxford, UK <sup>b</sup> Institute for Women's Health, University College London, London, UK

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*Accepted 22 July 2013. Published Online 11 September 2013.*

Nulliparous low risk women of normal weight had higher absolute risks and were more likely to require obstetric intervention or care than otherwise healthy multiparous women with BMI > 35 kg/m<sup>2</sup>.



# Why are these outcomes so good?



- Young women without co-morbid disease
- Self-select women pledged to self-care
- Excellent health teaching from midwives
- Risk screening with care within a system with access to appropriate levels of care

Sharma AM, Kushner RF. A proposed clinical staging system for obesity. *Int J Obesity*. 2009; 33(3):289-95.



*International Journal of Obesity* (2009) 1–7  
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## REVIEW

# A proposed clinical staging system for obesity

AM Sharma<sup>1</sup> and RF Kushner<sup>2</sup>

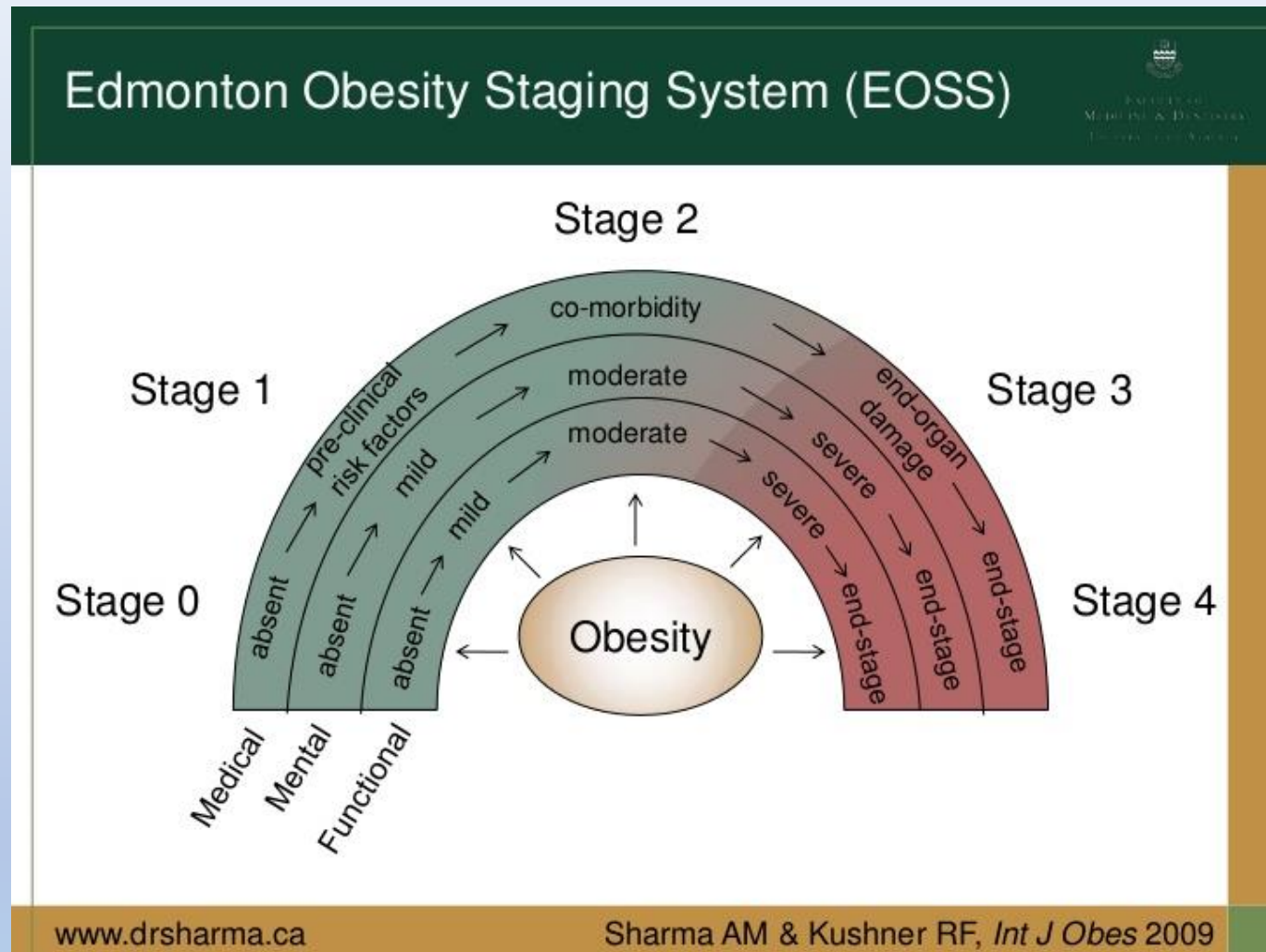
<sup>1</sup>*Division of Endocrinology, Department of Medicine, University of Alberta, Edmonton, Alberta, Canada* and <sup>2</sup>*Division of General Internal Medicine, Department of Medicine, Northwestern University Feinberg School of Medicine, Chicago, IL, USA*

Current classifications of obesity based on body mass index, waist circumference and other anthropometric measures, although useful for population studies, have important limitations when applied to individuals in clinical practice. Thus, these measures do not provide information on presence or extent of comorbidities or functional limitations that would guide decision making in individuals. In this paper we review historical and current classification systems for obesity and propose a new simple clinical and functional staging system that allows clinicians to describe the morbidity and functional limitations associated with excess weight. It is anticipated that this system, when used together with the present anthropometric classification, will provide a simple framework to aid decision making in clinical practice.

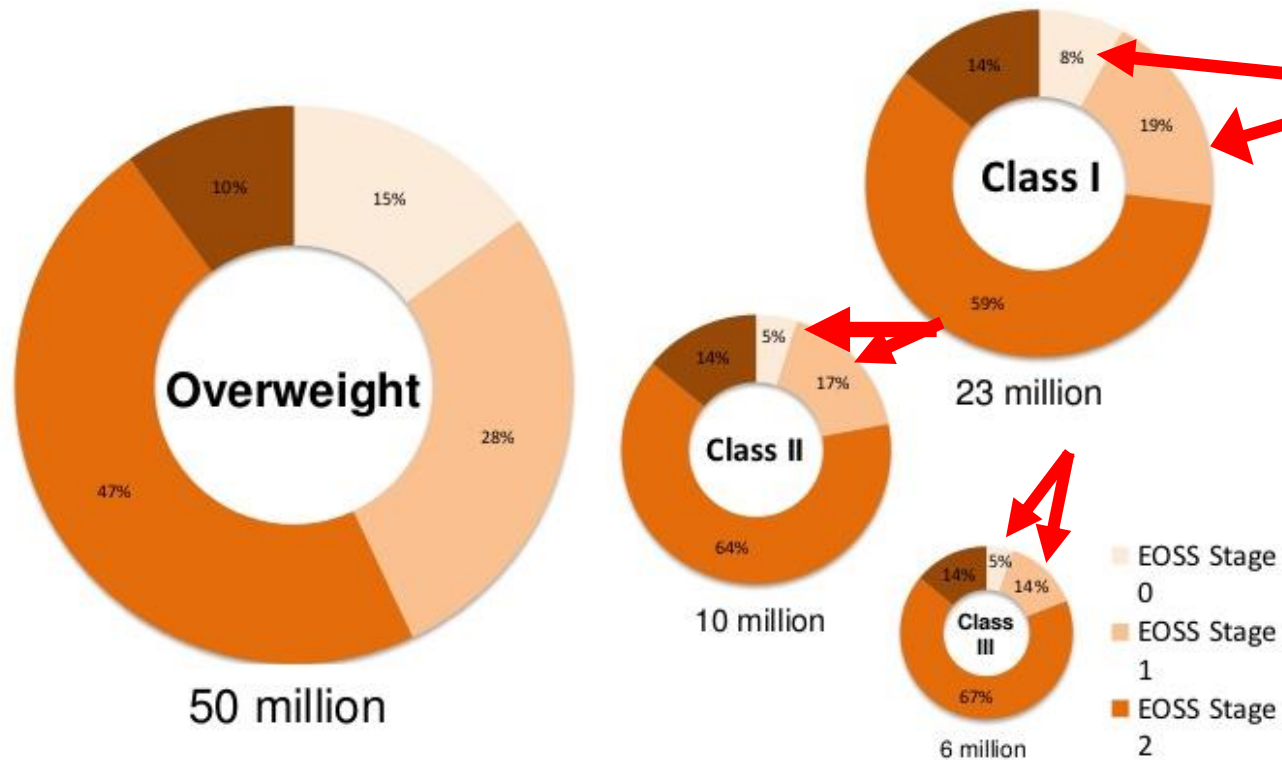
*International Journal of Obesity* advance online publication, 3 February 2009; doi:10.1038/ijo.2009.2

**Keywords:** body mass index; obesity staging; obesity diagnosis; obesity treatment

# Not all obese women are at risk-



# EOSS Distribution Across BMI Categories NHANES III (1988-1994)



# Take away points:



- Individuals with obesity but without co-morbid conditions can have uncomplicated perinatal outcomes
- Midwifery care can assist those individuals to optimize perinatal outcomes

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