

# White Paper

## Obesity and Pregnancy: Inherent Risks and the Benefits of Weight Loss

By Andrea M. Pampaloni, Ph.D.

Obesity is at epidemic levels and more than one-third of women who become pregnant are obese.<sup>1</sup> A woman's body mass index (BMI) prior to pregnancy is an independent predictor of multiple pregnancy risks.<sup>2</sup> While many women struggle to lose weight after childbirth, women with obesity prior to pregnancy face a host of health issues for themselves and their and child.

### RISKS TO PREGNANT WOMEN WITH OBESITY

Obesity can negatively affect fertility making it difficult to conceive, and the likelihood of complications extends into and beyond pregnancy. No pregnancy is completely free of risk, but many conditions are significantly heightened for women with obesity compared to women of normal weight.<sup>3 4 5</sup>

**Gestational diabetes:** Pregnant women who become insulin resistant and develop high blood glucose levels during their pregnancy are diagnosed with gestational diabetes mellitus (GDM). GDM accounts for almost 90 percent of diabetic pregnancies and women with obesity are at high risk for its development. Glucose levels build — causing hyperglycemia — which increases the likelihood of preeclampsia, premature delivery, and caesarean delivery. Left untreated, excess glucose can cross the placenta and increase the fetus' blood glucose level, leading to macrosomia and neonatal hypoglycemia. These babies are at increased risk of longer-term insulin resistance and females are more likely to develop gestational diabetes during their pregnancy.<sup>6 7</sup>

**Gestational hypertension:** Women without prior chronic hypertension that develop high blood pressure after 20 weeks of pregnancy equal to or greater than 140/90mmHg experience gestational hypertension (GH). Although GH typically ends after childbirth, mothers may be at increased risk of developing hypertension in the future. GH affects five to 10 percent of pregnancies and can lead to preeclampsia, fetal growth restriction, placental abruption, preterm delivery, or Caesarean delivery.<sup>8</sup> GH also has been linked to an increased risk of type 2 diabetes in adult offspring.<sup>9</sup>

**Preeclampsia:** Obesity is the leading attributable risk for preeclampsia.<sup>10</sup> It occurs after 20 weeks of pregnancy and is diagnosed based on persistent gestational hypertension or shortly after giving birth. It is associated with proteinuria, problems with the kidney or liver, fluid in the lungs, and visual disturbances.<sup>11</sup> Preeclampsia is the leading cause of mortality and morbidity for mother and child, including later life cardiovascular disease;<sup>12</sup> in rare cases, the mother may suffer a stroke.<sup>13</sup> Women with obesity with preeclampsia also have higher post-partum hemorrhage rates.<sup>14</sup> If undiagnosed, eclampsia could develop, causing seizures.<sup>15</sup> The fetus of preeclamptic women is at risk for hypoxia. Babies with fetal macrosomia also have increased risk of hypoxia and may sustain shoulder dystocia or brachial

**ROBARD CORPORATION**

Leaders in Weight Management  
800.222.9201 | [www.Robard.com](http://www.Robard.com)

plexus injuries, and diabetes in the mother increases these risks. Babies with fetal macrosomia also are more likely to become obese in childhood and adulthood which increases their risk of developing diabetes and cardiovascular disease.

**Caesarian delivery:** Caesarean section (C-Section) deliveries are the most common medical procedure performed in the U.S. each year, accounting for more than 30 percent of births.<sup>16</sup> Obesity increases the need for a c-section<sup>17</sup> and is an independent risk factor for emergency c-section deliveries.<sup>18</sup> Gestational diabetes, hyperglycemia, and preeclampsia are associated with Caesarian births, and the likelihood of a Caesarean delivery and preeclampsia is higher if the woman has polycystic ovary syndrome.<sup>19</sup> Though generally safe, c-sections are not without risk.

**Surgical site infection:** Obesity is one of the most significant risk factors for surgical skin site infections following Caesarean deliveries,<sup>20</sup> and women with obesity undergoing this type of delivery are more likely to have other surgical or post-surgical complications including increased blood loss.<sup>21</sup> Surgical infections are associated with longer hospital stays, likelihood of readmission, and increased emotional stress for the patient.<sup>22</sup> Women with a BMI > 40kg/m<sup>2</sup> are at even higher risk for infection, particularly if they smoke or have increased open wound time.<sup>23</sup>

Because of these and other conditions, women with obesity have lower implantation rates and a lower chance of giving birth to a healthy baby.<sup>24</sup> Complications can extend beyond childbirth for women with obesity. Post-pregnancy weight loss is difficult for women with obesity and weight retention after delivery is associated with longer-term health risks and possible complications for future pregnancies.<sup>25</sup>

Additionally, male infertility, which is strongly linked to obesity, contributes to approximately 50 percent of infertility cases. Male infertility is associated with decreased chance of pregnancy, increased number of miscarriages, and decreased live birth rates.<sup>26 27</sup>

Because of the range and severity of pregnancy-related complications for women with obesity, a higher level of care is required throughout pregnancy, delivery, and the post-partum period. Greater attention by staff and specialized medical resources are required. For example, labor and delivery time is longer for women with obesity and it can be difficult to monitor the fetus.<sup>28</sup>

## RISKS TO THE FETUS AND NEWBORN

Obesity in one or both parents can affect their child from pre-conception throughout the child's life. Women with obesity are more likely to have excessive gestational weight gain which increases the likelihood of childhood obesity and also leads to an increased risk of childhood metabolic dysfunction.<sup>29</sup> To minimize these risks, the recommended weight gain for women with obesity before pregnancy is 11 to 20 pounds, or about half of the weight gain recommended for normal weight women.<sup>30 31</sup>

Additional risks to the fetus and newborn resulting from parental obesity are discussed below.

**Miscarriage:** The spontaneous loss of a fetus prior to the twentieth week of pregnancy constitutes a miscarriage. While the most common cause of miscarriage is chromosomal abnormalities,<sup>32</sup> there also is a strong association between obesity and miscarriage rates.<sup>33 34 35</sup>

**Stillbirth:** Fetuses that die after 20 weeks of pregnancy are classified as stillbirths.<sup>36</sup> Multiple studies confirm a link between obesity and stillbirth, and the risk increases as the mother's BMI increases, though links to explain the connection remain undetermined.<sup>37 38 39</sup>

**Fetal macrosomia:** Women with obesity and women with diabetes are more likely to give birth to babies weighing over eight pounds and 13 ounces regardless of gestational age<sup>i</sup>. Delivering a large baby often necessitates an episiotomy, induced labor, or Caesarian section. Previous macrosomic births, gestational diabetes, and preeclampsia also increase the likelihood of having a newborn with macrosomia.<sup>40 41</sup>

**Birth defects:** Increasing evidence suggests a long-term impact of maternal obesity and excessive gestational weight gain on several genetic anomalies. Among these are neural tube defects, cardiovascular anomalies, anencephaly, hydrocephaly, cleft lip and palate, spina bifida, and limb reduction defects.<sup>42 43</sup>

## WEIGHT LOSS AND PREGNACY

Obesity is a chronic disease with a host of negative health outcomes including diabetes, cardiovascular disease, hepatic dysfunction, oxidative stress, sleep apnea, and more.<sup>44</sup> These conditions, and others, affect women who are trying to conceive whether by natural or assisted methods. Weight loss consistently is advised as the best course of action to avoid obesity-related complications during and after pregnancy. Any weight loss program undertaken during pregnancy should be carefully monitored to ensure the safety of the mother's and fetus's health.

Because the safety of weight loss during pregnancy to mothers and fetuses is unknown, attempts to lose weight should be undertaken prior to or between pregnancies.<sup>45</sup> Many obesity-related conditions that affect pregnancy are reversible and studies indicate that pre-pregnancy or inter-pregnancy weight loss can increase fertility and the likelihood to become pregnant. Cohort studies found that overweight and obese women who lost weight between pregnancies was associated with a decrease in GDM and preeclampsia.<sup>46</sup>

Exercise is encouraged for all persons with obesity including pregnant women, and this applies even if they were not physically active prior to their pregnancy. In 2015, the American College of Obstetricians and Gynecologists issued new recommendations advising physicians to encourage patients with obesity to “maintain or adopt a healthy lifestyle before, during, and beyond pregnancy” through exercise and “judicious weight control”.<sup>47</sup> Women with obesity should consult their obstetrician to develop a plan and start off in very small increments of just five minutes per day, working up to 30 to 45 minutes per day.<sup>48 49</sup> Because pregnant women regularly visit their physician, there are frequent opportunities to check in on the woman's progress and address any concerns.

In sum, women with obesity face increased risks during pregnancy. To reduce these risks, current research encourages women to lose weight prior to becoming pregnant to improve perinatal outcomes for themselves and the fetus.<sup>50</sup> Dietary modifications and physical activity benefit the health of obese, pregnant women and their fetus and also often improve the mother's emotional well-being.

---

<sup>i</sup> *The American College of Obstetricians and Gynecologists (ACOG) note that some guidelines measure fetal macrosomia at nine pounds and four ounces.*

## REFERENCES

1. Gilmore, L.A. & Redman, L.M. (2016). Evidence-based research for weight management of the obese woman around the time of conception is not as simple as you think! *Fertility and Sterility*, 106, 1049-1050.
2. National Research Council, Institute of Medicine, Board on Children, Youth, and Families, Food and Nutrition Board, Committee to Reexamine IOM Pregnancy Weight Guidelines. (2009). Determining optimal weight gain. In *Weight gain during pregnancy: Reexamining the guidelines*. Washington, D.C.: National Academies Press.
3. Warren, M., Beck, S., & Rayburn, J. (2018, September). *The state of obesity: Better policies of a healthier America 2018*. Trust for America's Health & Robert Wood Johnson Foundation.
4. Marchi, J., Berg, M., Dencker, A., Olander, E.K., Begley, C. (2015). Risks associated with obesity in pregnancy, for the mother and baby: A systematic review of reviews. *Obesity Reviews*, 16, 621-638.
5. Committee on Ethics. (2019, January). ACOG committee opinion: Ethical considerations for the care of patients with obesity. *The American College of Obstetricians and Gynecologists*, Number 763, e90-e96.
6. American Diabetes Association. (2016, November). What is gestational diabetes?
7. Stewart, Z.A. & Murphy, H.R. (2015). *Gestational diabetes*. *Medicine*, 43, 44-47.
8. American College of Obstetricians and Gynecologists. (2018, May). *Preeclampsia and high blood pressure during pregnancy*, FAQ 034.
9. Kajantie, E., Osmond, C., & Eriksson, J.G. (2017). Gestational hypertension is associated with increased risk of type 2 diabetes in adult offspring: The Helsinki Birth Cohort Study. *American Journal of Obstetrics and Gynecology*, 216, 281.e1-281.e7.
10. Roberts, J.M., Bodnar, L.M., Patrick, T.E., & Powers, R.W. (2011). The role of obesity in preeclampsia. *Pregnancy Hypertension*, 1, 6-16.
11. Task Force on Hypertension in Pregnancy. (2013, November). Hypertension in pregnancy. *The American College of Obstetricians and Gynecologists*.
12. Shen, M., Smith, G.N., Rodger, M., White, R. R., Walker, M.C., & Wen, S.W. (2017). Comparison of risk factors and outcomes of gestational hypertension and preeclampsia. *PLOS One*, 12.
13. American College of Obstetricians and Gynecologists. (2016, April). *Obesity and pregnancy*, FAQ 182.
14. Talmor, A., & Dunphy, B. (2015). Female obesity and infertility. *Best Practice and Research Clinical Obstetrics & Gynaecology*, 29, 498-506.
15. Shen et al.
16. Yuan, C., Gaskins, A.J., Blaine, A.I., Zhang, C., Gillman, M.W., Missmer, S.A., Field, A.E., & Chavarro, J.E. (2018). Cesarean birth and risk of offspring obesity in childhood, adolescence and early adulthood. *JAMA Pediatrics*, 170.
17. Berendzen, J.A. & Howard, B.C. (2013). Association between cesarean delivery rate and body mass index. *Tennessee Medicine*, 106, 35-37, 42.
18. Pettersen-Dahl, A., Murzakanova, G., Sandvik, L., & Laine, K. (2017). Maternal body mass index as a predictor for delivery method. *Acta Obstetrica et Gynecologica Scandinavica*, 97, 212-218.
19. Melo, A.S., Ferriani, R.A., & Navarro, P.A. (2015). Treatment of infertility in women with polycystic ovary syndrome: Approach to clinical practice. *Clinics*, 70, 765-769.
20. Yuan et al.
21. Dias, M., Dick, A., Reynolds, R.M., Lahti-Pulkkinen, M., & Denison, F.C. (2019). Predictors of surgical site skin infection and clinical outcome at Caesarean section in the very severely obese: A retrospective cohort study. *PLOS One*, 14.
22. Yuan et al.
23. Dias et al.
24. Dag, Z.O. & Dilbaz, B. (2015). Impact of obesity on infertility in women. *Journal of the Turkish-German Gynecological Association*, 16, 111-117.
25. Poston, L., Caleyachetty, R., Cnattingius, S., Corvalan, C., Uauy, R., Herring, S., & Gillman, M.W. (2016). Preconceptional and maternal obesity: Epidemiology and health consequences. *The Lancet - Diabetes & Endocrinology*, 4, 1025-1036.
26. Craig, J.R., Jenkins, T.G., Carrell, D.T., & Hotaling, J.M. (2017). Obesity, male infertility, and the sperm epigenome. *Fertility and Sterility*, 107, 848-859.
27. Palmer, N.O., Bakos, H.W., Fullston, T., & Lane, M. (2012). Impact of obesity on male fertility, sperm function and molecular composition. *Spermatogenesis*, 2, 253-263.
28. American College of Obstetricians and Gynecologists. (2016, April). *Obesity and pregnancy*, FAQ 182.
29. Catalano, P.M. & Shankar, K. (2017, February). Obesity and pregnancy. *thebmj*, 356, 282-285.
30. Centers for Disease Control and Prevention. (2019, January). *Reproductive health: Weight gain during pregnancy*.
31. American Pregnancy Association. (2015, July). *Eating for two when over or under weight*.
32. American College of Obstetricians and Gynecologists. (2015, August). *Early pregnancy loss*, FAQ 090.
33. Dag & Dilbaz
34. Hart, R. & Hunter, T. (2018). *Reproductive consequences of obesity*. Online access: Intech
35. Silvestris, E., dePergola, G., Rosania, R., & Loverro, G. (2018). Obesity as disruptor of the female fertility. *Reproductive Biology and Endocrinology*, 161, 1-13.
36. Centers for Disease Control and Prevention. (2019, May). *Stillbirth*.
37. Amark, H., Westgren, M., & Persson, M. (2018). Prediction of stillbirth in women with overweight or obesity: A register-based cohort study. *PLOS One*, 13.
38. Carmichael, S.L., Blumenfeld, Y.J., Mayo, J., Wei, E., Gould, J.B., Stevenson, D.K., Shaw, G.M., & March of Dimes Prematurity Research Center. (2015). Prepregnancy obesity and risks of stillbirth. *PLOS One*, 10.
39. Chu, S.Y., Kim, S.Y., Lau, J., Schmid, C.H., Dietz, P.M., Callaghan, W.M., & Curtis, K.M. (2007). Maternal obesity and risk of stillbirth: A meta-analysis. *American Journal of Obstetrics and Gynecology*, 197, 223-228.
40. Mohammadbeigi, A., Farhadifar, F., Zadeh, N.S., Mohammadsalehi, N., Rezaiee, M., & Aghaei, M. (2013). Fetal macrosomia: Risk factors, maternal, and perinatal outcome. *Annals of Medical & Health Sciences Research*, 3, 546-550.
41. Silvestris et al.

42. Talmor & Dunphy
  43. Gaillard, R. (2015). Maternal obesity during pregnancy and cardiovascular development and disease in offspring. *European Journal of Epidemiology*, 30, 1141-1152.
  44. Manna, P. & Jain, S.K. (2015). Obesity, oxidative stress, adipose tissue dysfunction, and the associated health risks: Causes and therapeutic strategies. *Metabolic Syndrome and Related Disorders*, 13, 423-444.
  45. Gilmore & Redman
  46. Catalano & Shankar
  47. Communications Office. (2015, November). Ob-gyns continue to fight obesity epidemic, promote exercise during pregnancy and the postpartum period. *The American College of Obstetricians and Gynecologists*
  48. American College of Obstetricians and Gynecologists. (2016, April). *Obesity and pregnancy*, FAQ 182.
  49. Silvestris et al.
  50. Catalan & Shankar
- 

## ABOUT ROBARD CORPORATION

Robard Corporation, a privately-owned company headquartered in central New Jersey, provides health care professionals with a turnkey solution to operate their own medically-supervised obesity treatment program. Respected leaders in the weight loss and management industry for more than 40 years, Robard's evidence-based programs are complimented by scientifically-designed nutrition products and best-in-class business services to help physicians, surgeons and hospitals treat mildly overweight to morbidly obese patients. To learn more, call us at (800) 222-9201 or visit [www.Robard.com](http://www.Robard.com).

**ROBARD CORPORATION**

Leaders in Weight Management  
800.222.9201 | [www.Robard.com](http://www.Robard.com)