Weight Gain During Pregnancy: Reexamining the Guidelines

Committee to Reexamine IOM Pregnancy Weight Guidelines

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Presented by
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A joint project between:

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Board on Children, Youth and Families

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Committee to Reexamine IOM Pregnancy Weight Guidelines

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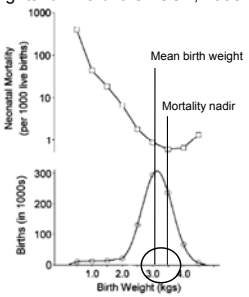
The conditions for new guidelines

- New guidelines are expensive, so something has to have changed to justify the expense
  - Different conditions of the population
  - New data
  - New concepts or opportunities for analysis
- Political will and donors are also needed
  - 2006 workshop created these conditions

1990 scientific approach

- Calculated the GWG needed to achieve the birth weight associated with minimal fetal/neonatal mortality
  - This generally occurs at birth weights 200 g above the mean birth weight of the population

Weight-specific neonatal mortality and the distribution of weights for live births: USA, 1998



From: Wilcox AJ. *Int J Epidemiol* 2001;**30**:1233.

Study objectives

- Review evidence on the relationship between weight gain patterns before, during and after pregnancy and maternal and child health outcomes
- Within a life-stage framework consider factors in relation to weight gain during pregnancy that are associated with maternal and infant health outcomes

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Study objectives

- Recommend revisions to the existing guidelines, where necessary, including the need for specific pregnancy weight guidelines for underweight, normal weight, and overweight and obese women and adolescents and women carrying twins or higher-order multiples
- Consider a range of approaches to promote appropriate weight gain
- Identify gaps in knowledge and recommend research priorities

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Important features

- We did new science
  - Trade-off between mother and infant
  - Quantitative risk analysis
- We did not go as far as some may desire
  - Toward recommendations for the women with BMI ≥ 35 kg/m^2
  - Toward implementation of our recommendations
- Report is structured conceptually with attention to important public health models

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Background

- Continued high rates of preterm birth and infant mortality
- Increases in:
  - Prepregnancy BMI
  - Cesarean delivery
  - Postpartum weight retention
  - Childhood obesity
- Only a minority of women gain within the guidelines!

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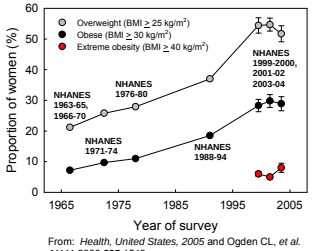
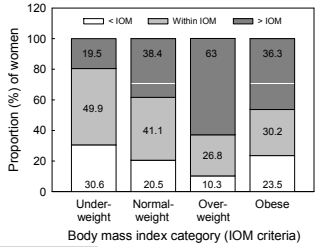
Prevalence of overweight, obesity and extreme obesity among women 20-39* y old: US, 1963-2004



From: *Health, United States, 2005* and Ogden CL, *et al. JAMA* 2006;**295**:1549.
*Ages 20-35 through NHANES 1988-94

Distribution of GWG relative to 1990 guidelines by prepregnancy BMI category (PRAMS, 2002-03)



Action: Data needed

- HHS should conduct routine surveillance of GWG and PPWR on a nationally representative sample of women
  - Report results by prepregnancy BMI, age, racial/ethnic group and socioeconomic status
- States should adopt the revised birth certificate
  - Contains prepregnancy weight, height, weight at delivery and gestational age at last weight

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GWG 101

Component	Increase at term (kg)
Fetus	3.40
Placenta	0.65
Amniotic fluid	0.80
Maternal tissue (uterus, mammary glands)	1.38
Blood (plasma and red cell volume)	1.45
Maternal stores (fat)	3.35
Extracellular extravascular fluid	1.48
TOTAL	12.5

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GWG 101

Component	Increase at term (kg)
Fetus	3.40 (2.5 – 5.0)
Placenta	0.65
Amniotic fluid	0.80
Maternal tissue (uterus, mammary glands)	1.38
Blood (plasma and red cell volume)	1.45
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TOTAL	12.5

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Research needed

- NIH should provide support for studies
  - In all classes of obese women on the determinants and impact of GWG, pattern of GWG and its composition on maternal and child outcomes
  - On eating behaviors, patterns of dietary intake and physical activity and metabolic profiles of pregnant (especially the obese) women who experience low gain or weight loss

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Determinants of GWG

- Analysis was based on ecological and lifecourse perspectives
- Environmental factors:
  - Societal/institutional
  - Environmental
  - Neighborhood/community
  - Interpersonal/family
- Maternal factors :
  - Sociodemographic
  - Genetic characteristics
  - Developmental programming
  - Epigenetics
  - Anthropometric and physiological
  - Medical, psychological and behavioral

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Research needed

- NIH should provide support for studies in large and diverse populations of women to understand how dietary intake, physical activity, food insecurity and, more broadly, the social, cultural and environmental context affect GWG.

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Maternal outcomes of GWG

From: Viswanathan M, et al. AHRQ Publ. No. 08-E09, 2008.

Outcome category	Evidence rating
Antepartum outcomes Maternal discomforts of pregnancy, hyperemesis, abnormal glucose metabolism, hypertensive disorders, gallstones	Weak
Intrapartum outcomes PROM, preterm labor, post-term pregnancy, induction of labor, length of labor, mode of delivery, VBAC, vaginal lacerations, shoulder dystocia, cephalopelvic disproportion, labor/delivery complications	Weak (except moderate for cesarean delivery)
Postpartum outcomes Lactation, fat accrual, short-, intermediate- and long-term weight retention, interpregnancy weight retention, premenopausal breast cancer	Weak or no evidence (except moderate for intermediate-term weight retention)

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Research needed

- NIH should provide support for observational and experimental studies on the association between GWG and
  - Glucose abnormalities and gestational hypertensive disorders that take into account the temporality of the diagnosis of the outcome
  - The development of glucose intolerance, hypertension and other CVD risk factors as well as mental health and cancer later in life

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Research needed

- NIH should provide support for studies that
  - Explore mechanisms, including epigenetic mechanisms, that underlie effects of GWG on maternal and child outcomes
  - Address the extent to which optimal GWG differs not only by maternal prepregnancy BMI but also by other factors such as age, parity, racial/ethnic group, socioeconomic status, co-morbidities and maternal/paternal/fetal genotype

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Infant outcomes of GWG

From: Viswanathan M, et al. AHRQ Publ. No. 08-E09, 2008.

Outcome category	Evidence rating
Birth outcomes Preterm birth, birth weight, low birth weight, macrosomia, large-for-gestational age, small-for-gestational age, Apgar score	Strong (except weak for Apgar score)
Postnatal outcomes Perinatal mortality, neonatal hypoglycemia, neonatal distress, hyperbilirubinemia, neonatal hospitalization, other infant morbidity, infant BMI, other infant growth	Weak

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Research needed

- NIH should provide support for observational and experimental studies to assess the impact of GWG on a range of child outcomes
  - Duration of gestation
  - Weight and body composition at birth
  - Neurodevelopment, obesity and related outcomes, and asthma later in childhood

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New approaches to development of the guidelines

- Considered outcomes for the mother, not just the infant, and the inevitable trade-offs between them
- Commissioned new analyses
  - Ellen Nohr: DNBC (1996-2002), extension of trade-off analyses
  - Amy Herring: NIMHS (1988), black and white women
  - Cheryl Stein: NYC subsample (1995-2003), black and white women
  - Jim Hammitt: quantitative risk analysis

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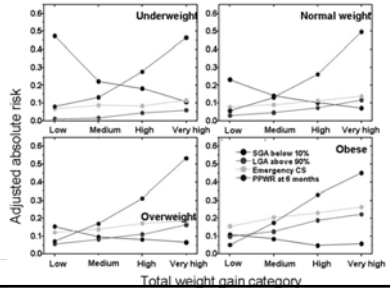
GWG-specific risks for pregnancy outcomes by prepregnancy BMI category among primiparous women



New recommendations

Prepregnancy BMI category	Total weight gain (kg)	Rate of weight gain 2nd and 3rd trimester (kg/wk)
Underweight (< 18.5 kg/m^2)	12.5-18	0.51 (0.44-0.58)
Normal-weight (18.5-24.9 kg/m^2)	11.5-16	0.42 (0.35-0.50)
Overweight (25.0-29.9 kg/m^2)	7-11.5	0.28 (0.23-0.33)
Obese (≥ 30.0 kg/m^2)	5-9	0.22 (0.17-0.27)

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*Calculations assume a first-trimester weight gain of 0.5-2.0 kg

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Provisional guidelines*: mothers of twins

Prepregnancy BMI category	Weight gain at term (kg)
Normal-weight	17-25
Overweight	14-23
Obese	11-19

*Based on the interquartile (25th-75th percentile) of gains of women who delivered twins at term (37-42 wk gestation) with birth weights ≥ 2,500 g
Note: Insufficient data are available to offer a guideline for underweight women

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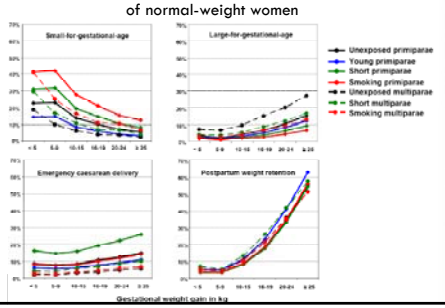
GWG-specific risks pregnancy outcomes among subtypes of normal-weight women



Recommendations for special populations

- Short stature: no modification
- Young age: no modification; use adult BMI tables
- Racial/ethnic subgroups: no modification
- Primiparity: no modification, but trade-off should be studied further
- Smokers: no modification, but stop smoking

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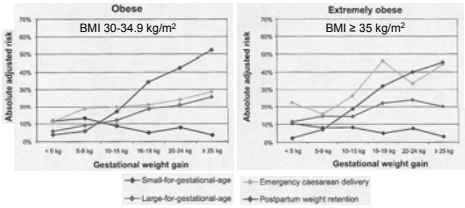
Risk of SGA, LGA, emergency cesarean delivery and postpartum weight retention for obese and extremely obese women by GWG: DNBC



From: *Weight Gain During Pregnancy: Reexamining the Guidelines*. Washington, DC: National Academy Press, 2009 (EA Nohr, Appendix G).

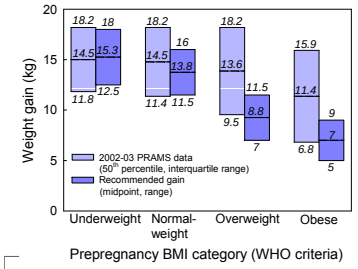
Action: Adoption of guidelines

- Federal agencies, private voluntary organizations, and medical and public health organizations should adopt these new guidelines for GWG and publicize them to their members and also to women of childbearing age.

Research: Preparing for the future

- NIH should provide support for studies to:
  - Assess the utilities (values) associated with short- and long-term health outcomes associated with GWG for both mother and child
  - Include these values in studies that employ decision analytic frameworks to estimate optimal GWG according to category of maternal prepregnancy BMI and other subgroups

Comparison of current weight gain during pregnancy (PRAMS, 2002-03) with 2009 IOM/NRC guidelines



The challenges ahead

- Conceive at a normal prepregnancy BMI
  - Requires preconceptional counseling, contraception, and, for some, weight loss
- Gain within the guidelines
  - Inform women and their health care providers of the guidelines
  - Provide individualized assistance with meeting the guidelines
    - Monitor GWG, guidance on diet and exercise

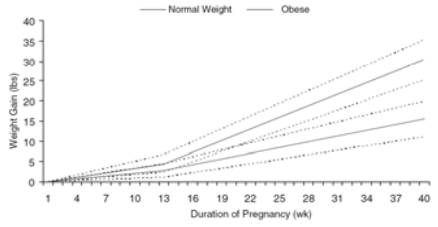
Action: Inform women and health care providers

- Federal, state and local agencies as well as health care providers should inform women of the importance of conceiving at a normal BMI and all those who provide health care or related services to women of childbearing age should include preconceptional counseling in their care

Action: Assist women to gain within the guidelines

- Those who provide prenatal care to women should offer them counseling, such as guidance on dietary intake and physical activity, that is tailored to their life circumstances

Model charts that can be adapted for use in counseling women



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Research needed

- HHS should support research to:
  - Aid providers and communities in assisting women to meet these guidelines, especially low-income and minority women
  - Examine the cost-effectiveness (in terms of maternal and child health outcomes) of interventions designed to assist women in meeting these guidelines

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Conclusions

- The guidelines themselves are not that different, but what it will take for women to gain within them represents a radical change in the care of women of childbearing age!
  - Preconceptional care
  - Improved care during pregnancy
  - Postconceptional care

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