



# Diabetes Summit for Latin America

July 1, 2010 Salvador



## Foetal and Early Life Origins of NCDs

Maternal malnutrition and small for gestational age  
(SGA) babies

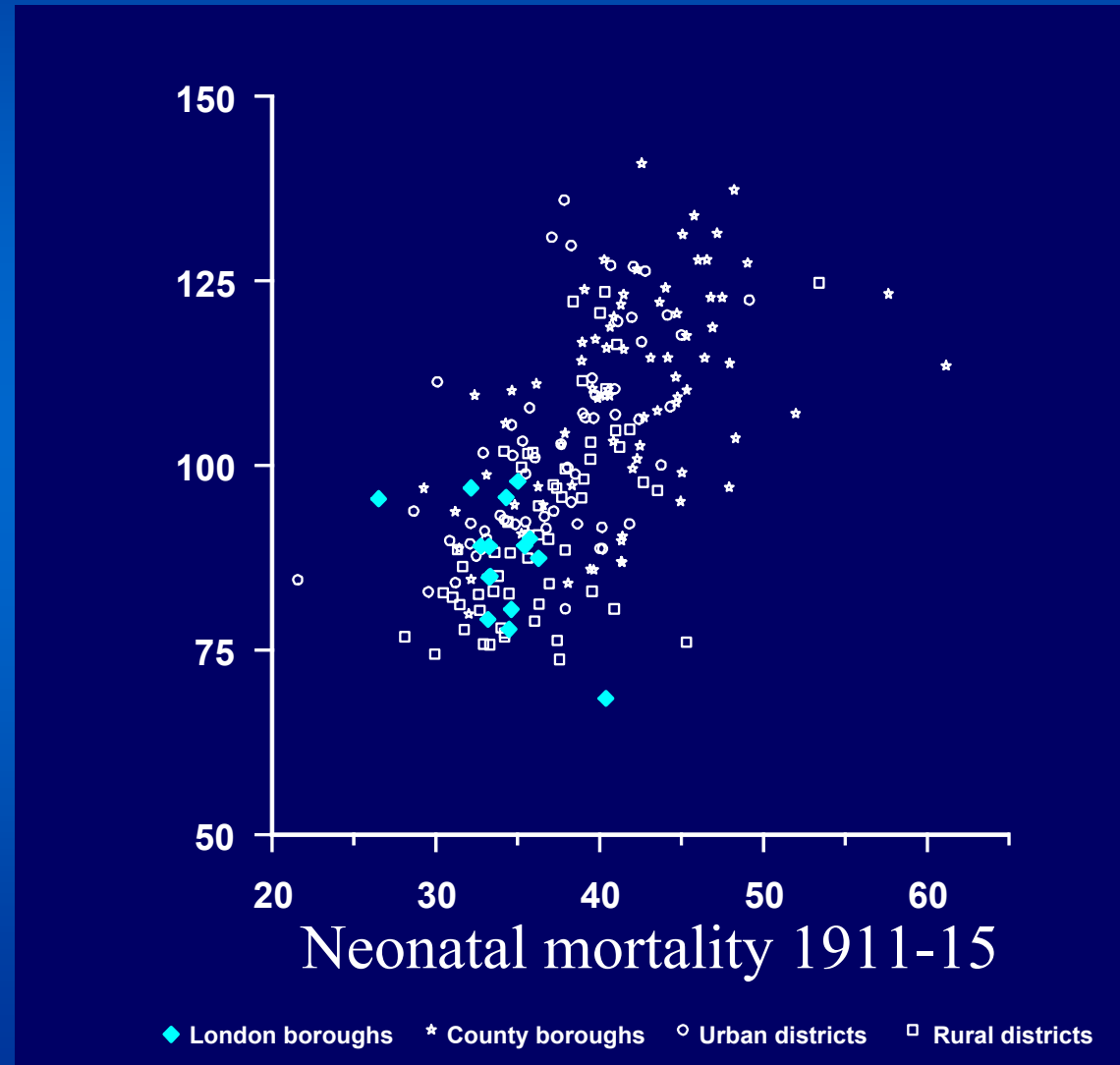
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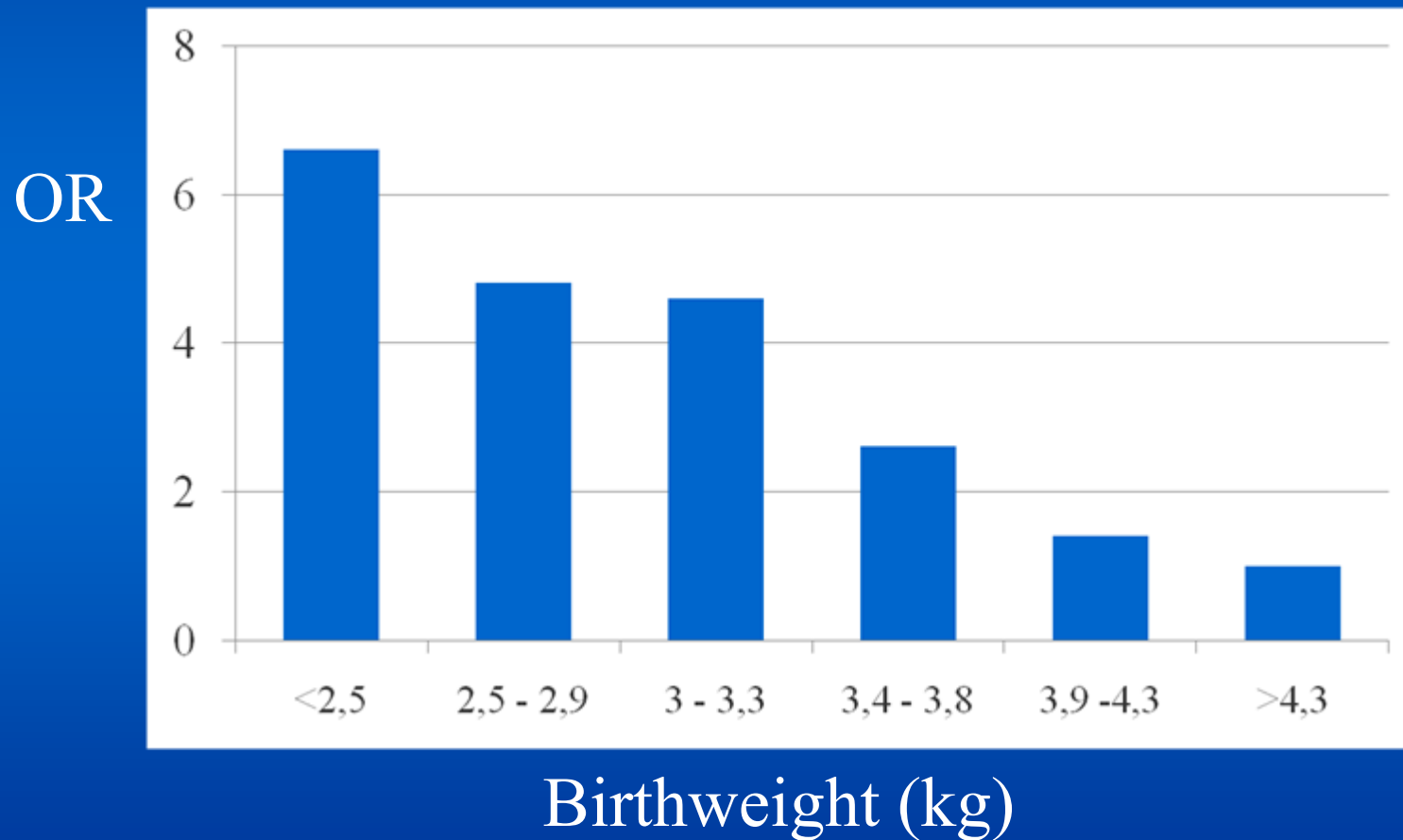
# Coronary heart disease and neonatal mortality England and Wales

Standardised  
mortality  
ratio for  
coronary  
heart disease  
1968-78



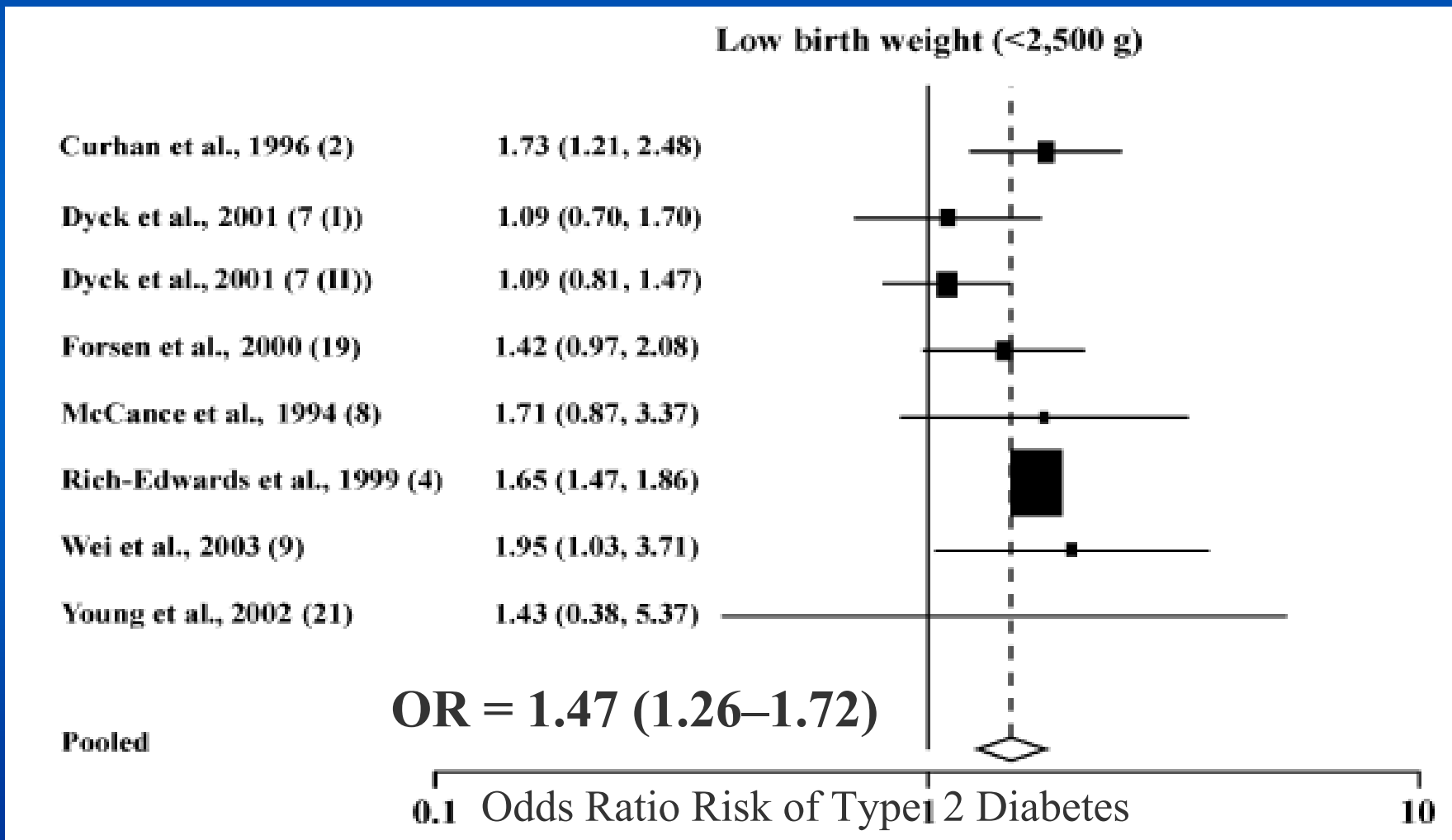


# Risk of IGT/DM According to Birthweight Hertfordshire Men, 59-70 years old

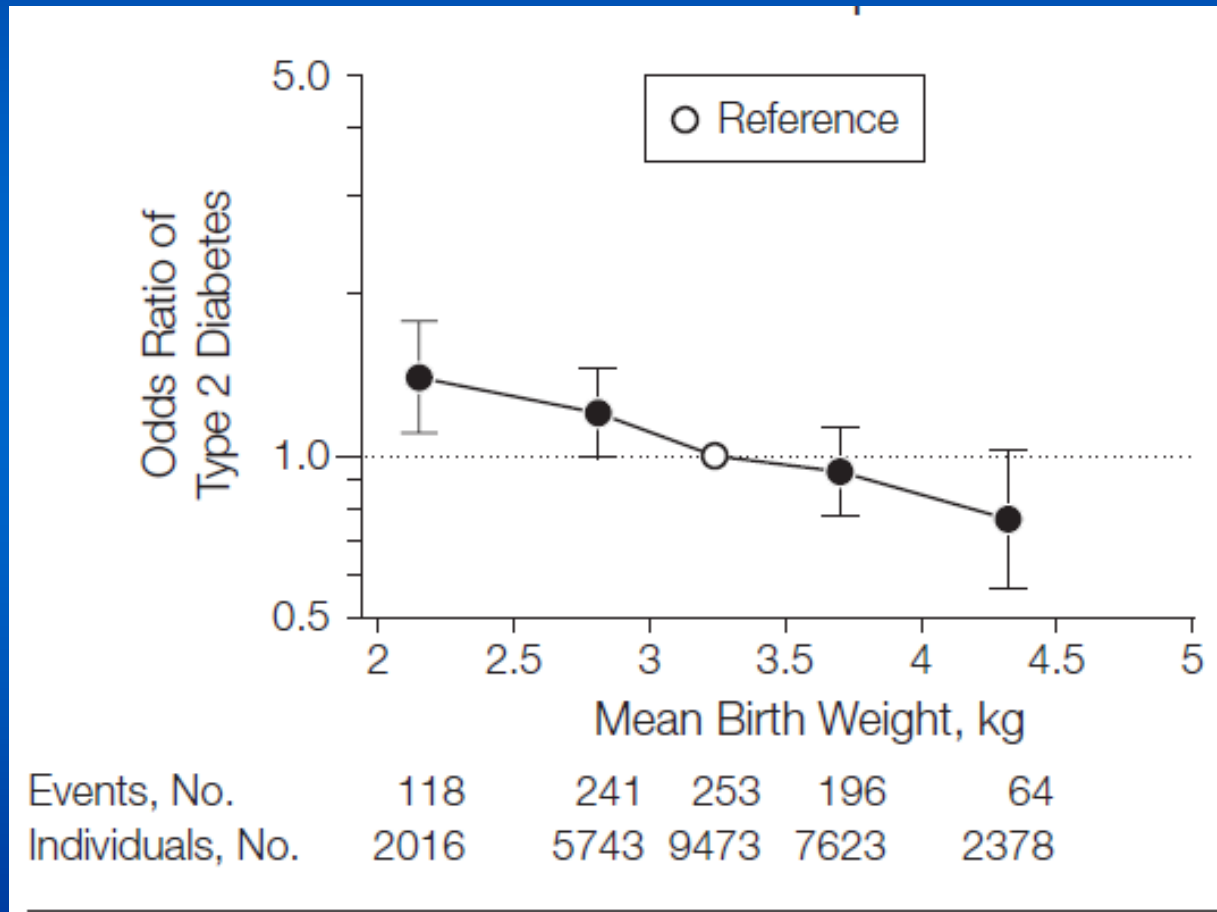


# Meta-Analysis: Birthweight and Diabetes

## Low Birthweight vs. Normal Birthweight



# Meta-analysis - Birthweight – DM



**Risk of diabetes increases 25% for each kg less of birthweight**

# What's Going On?

## Fetal Origins of Disease Hypothesis

- § Adverse fetal and early life events “program” changes in gene expression which lead to adult disease
  - | Programming: The process by which a stimulus or insult, at a sensitive or critical period of development, has lasting or lifelong significance.

# What's Going On?

## Fetal Origins of Disease Hypothesis

- § The specific stimulus leading to diabetes is thought to be intrauterine growth restriction
  - | Whether prematurity is also important is less clear
- § Much of relevant programming produces insulin resistance
  - | Chronic low grade inflammation
  - | Microvascular endothelial alterations

*Pellanda LC. Int J Cardiol 2008.*

*Liew G. Hypertension 2008; 51: 933-8.*

# What's Going On?

## Understanding the Hypothesis

- § We are here because our ancestors survived.
- § The process of survival is very complex.
- § Part of this process is the fetus responding to in utero signals
  - | Intrauterine growth restriction → Future hostile environment
    - Infection?
    - Starvation?
  - | The fetus adapts accordingly
    - Is ready to fight infection
    - Adjusts metabolism to make the most of what's available (thrifty)
    - While these adaptations have permitted survival over the eons, they cause disease in our current, very different, environment.

# Intervention

How Big An Issue is Early Life  
Programming?

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Probably Very Big

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Programming?

*Probably Very Big*

How Big An Issue is  
Low Birthweight in Latin  
America?

How Big An Issue is Early Life  
Programming?

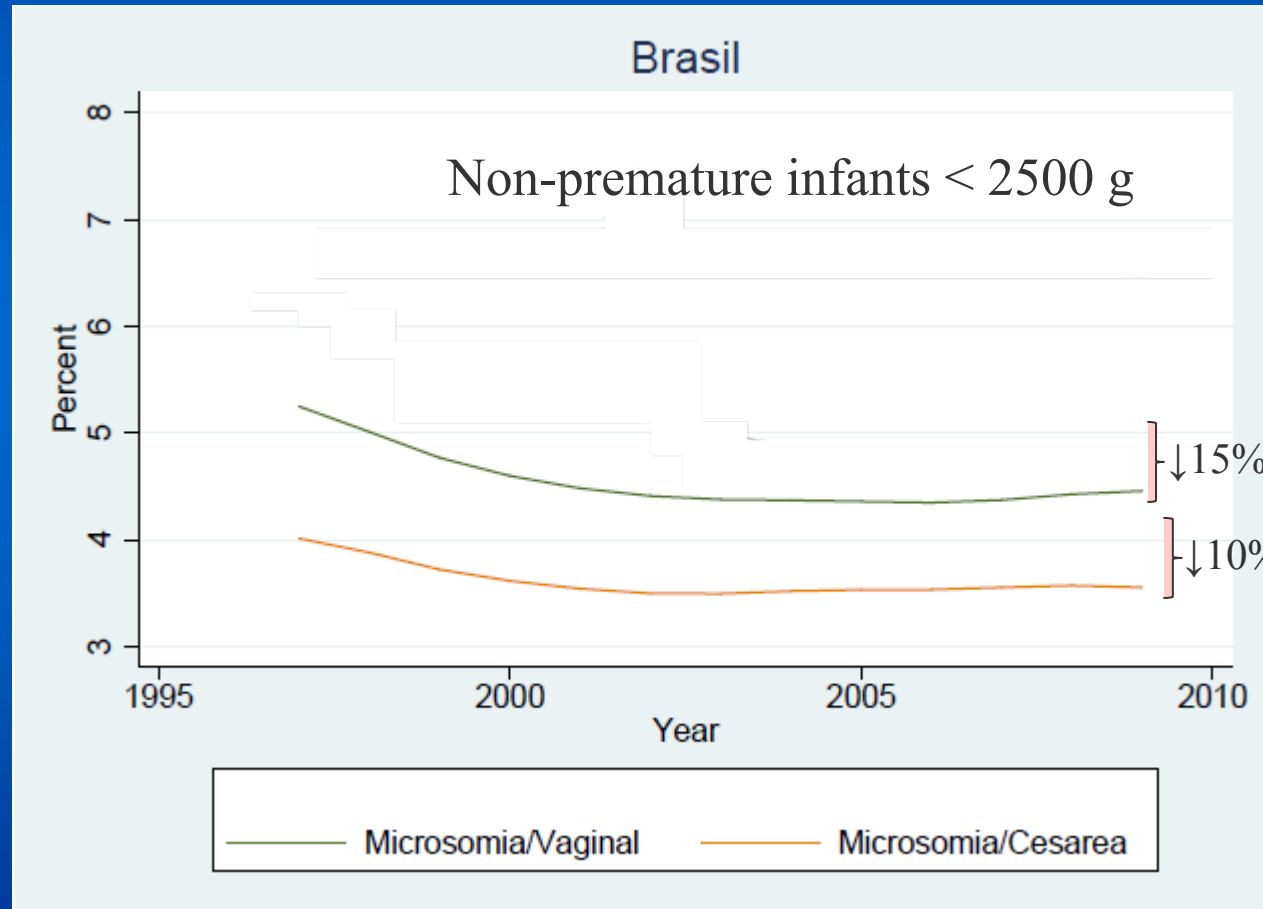
**Very Big**

How Big An Issue is  
Low Birthweight in Latin  
America?

**Important but not Huge**

# Tendencies in Microsomia, Brazil

## Brazilian Registry of Births (SINASC)



# What Can We Do Prenatally??

- Interventions to Alter Birthweight
  - Major determinants exist which cannot be altered
    - Mother's size (birthweight)
  - Micronutrient supplementation not effective
  - Strength of the evidence supporting most interventions is moderate at best

# What Can We Do Prenatally??

- Interventions to Alter Birthweight
  - Major modifiable determinants
    - Infections
    - Smoking
    - Maternal weight gain

# What Can We Do Prenatally??

- Interventions to Alter Birthweight
  - Screen and treat infections

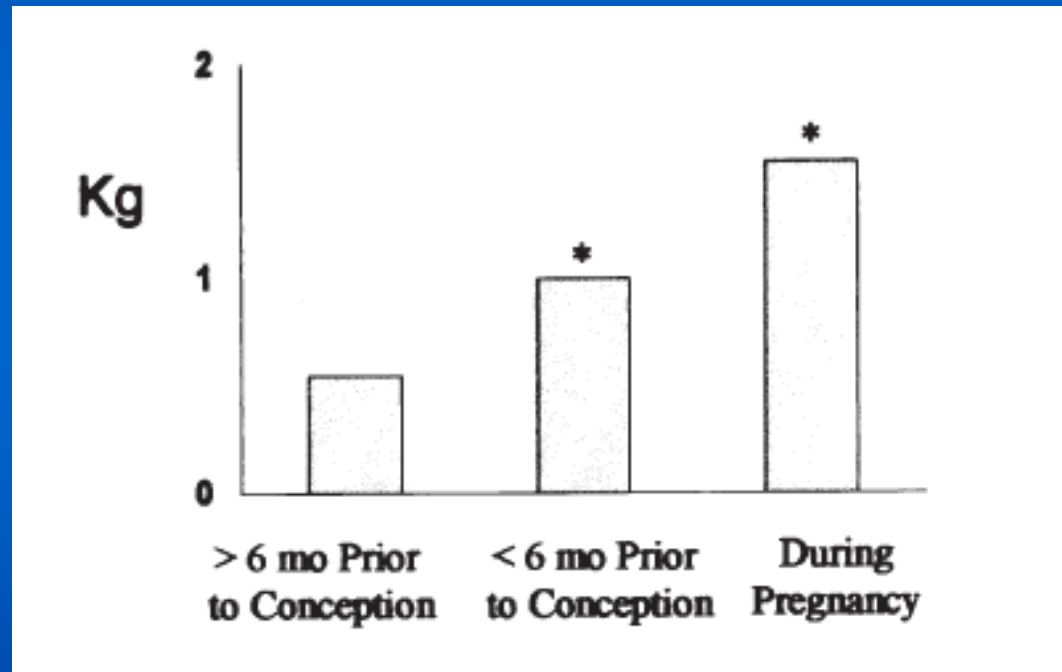
# What Can We Do Prenatally??

- Interventions to Alter Birthweight
  - Screen and treat infections
  - Encourage smokers to quit

# What Can We Do Prenatally?

## Encourage Smoking Mothers to Quit

### Brazilian Study of Gestational Diabetes



Additional<sup>†</sup> Maternal Weight Gain During Pregnancy, Quitters

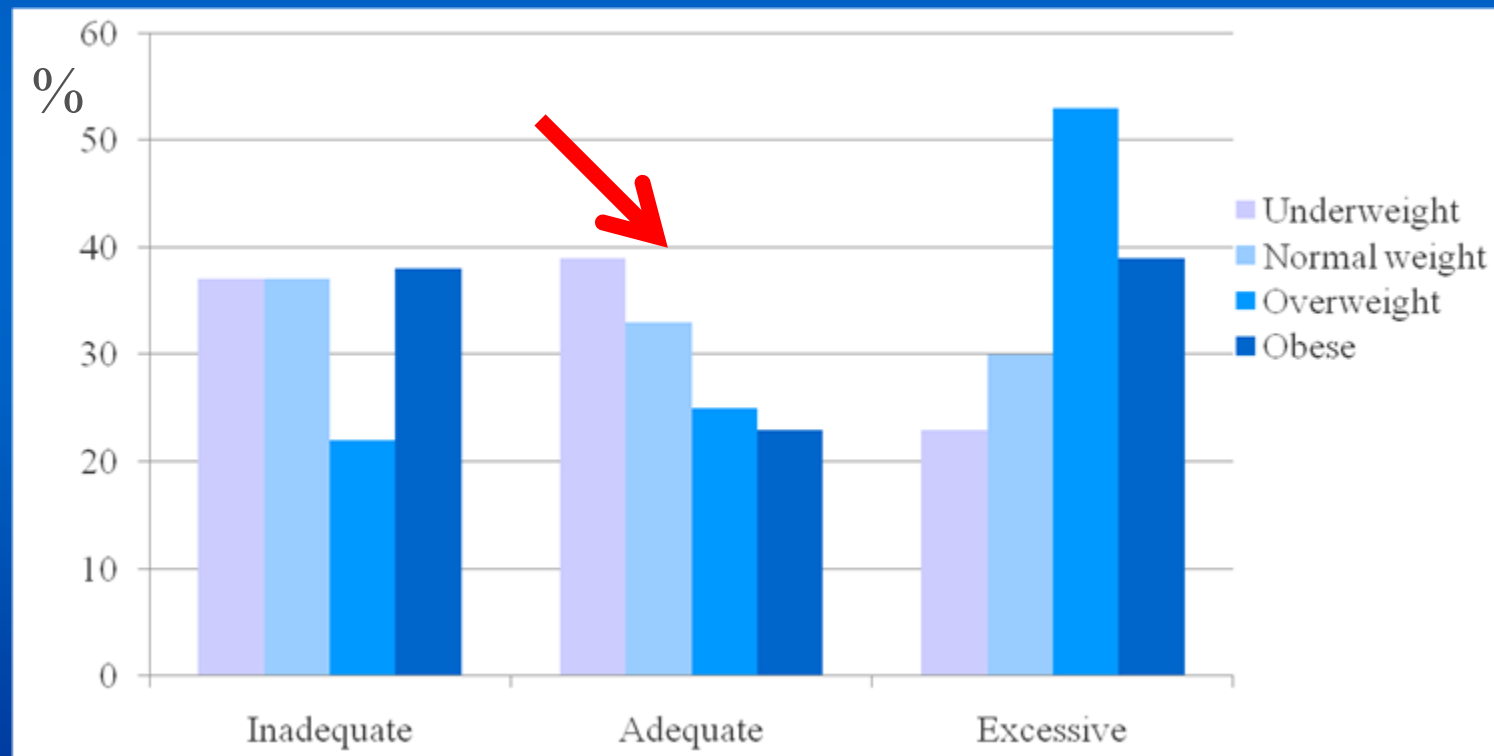
<sup>†</sup> Relative to Never Smokers

# What Can We Do In Pregnancy??

- Interventions to Alter Birthweight
  - Screen and treat infections
  - Encourage smokers to quit
  - Counsel adequate maternal weight gain during pregnancy

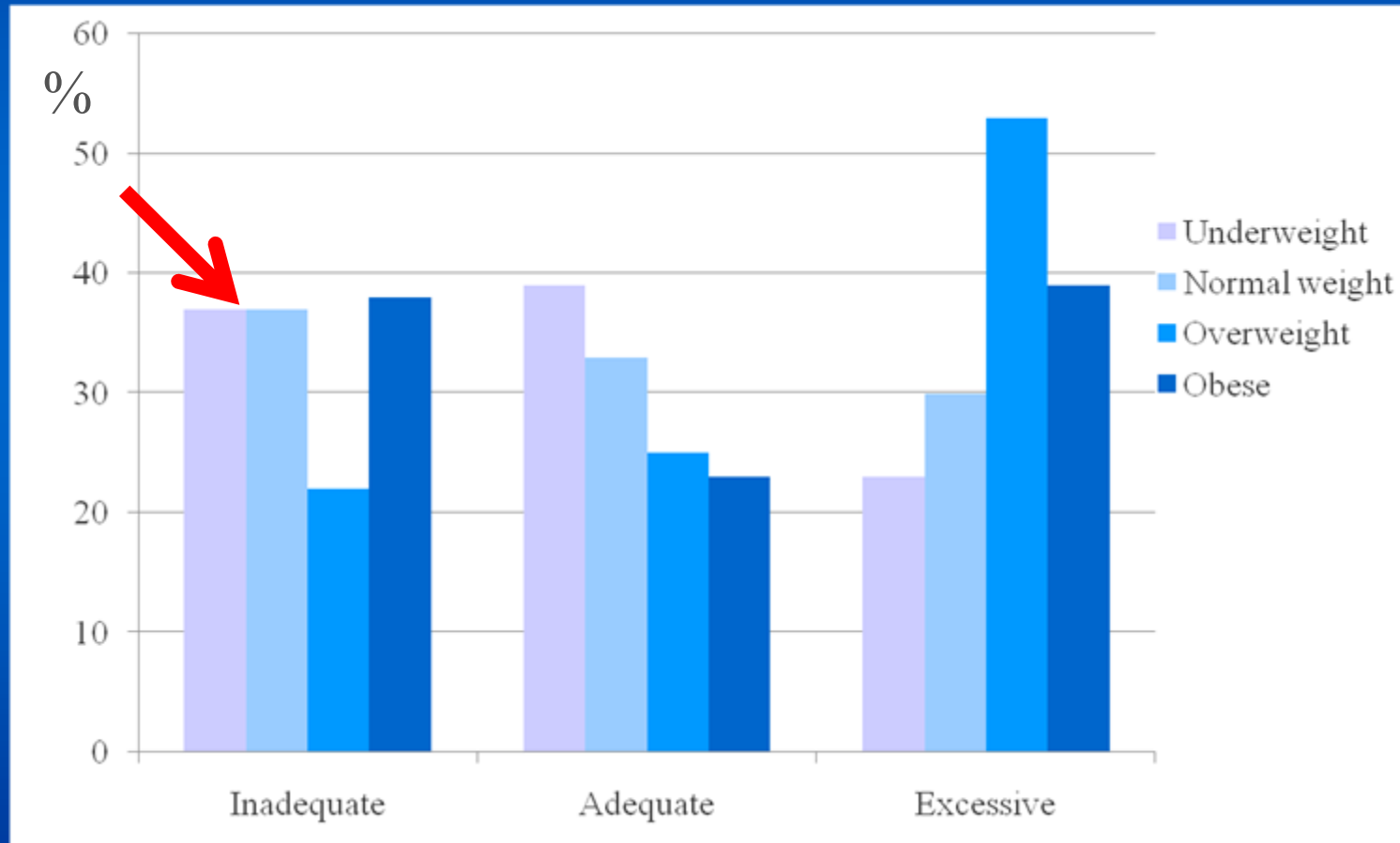
# What Can We Do??

## Maternal Weight Gain During Pregnancy Brazilian Study of Gestational Diabetes



# What Can We Do??

## Maternal Weight Gain During Pregnancy Brazilian Study of Gestational Diabetes



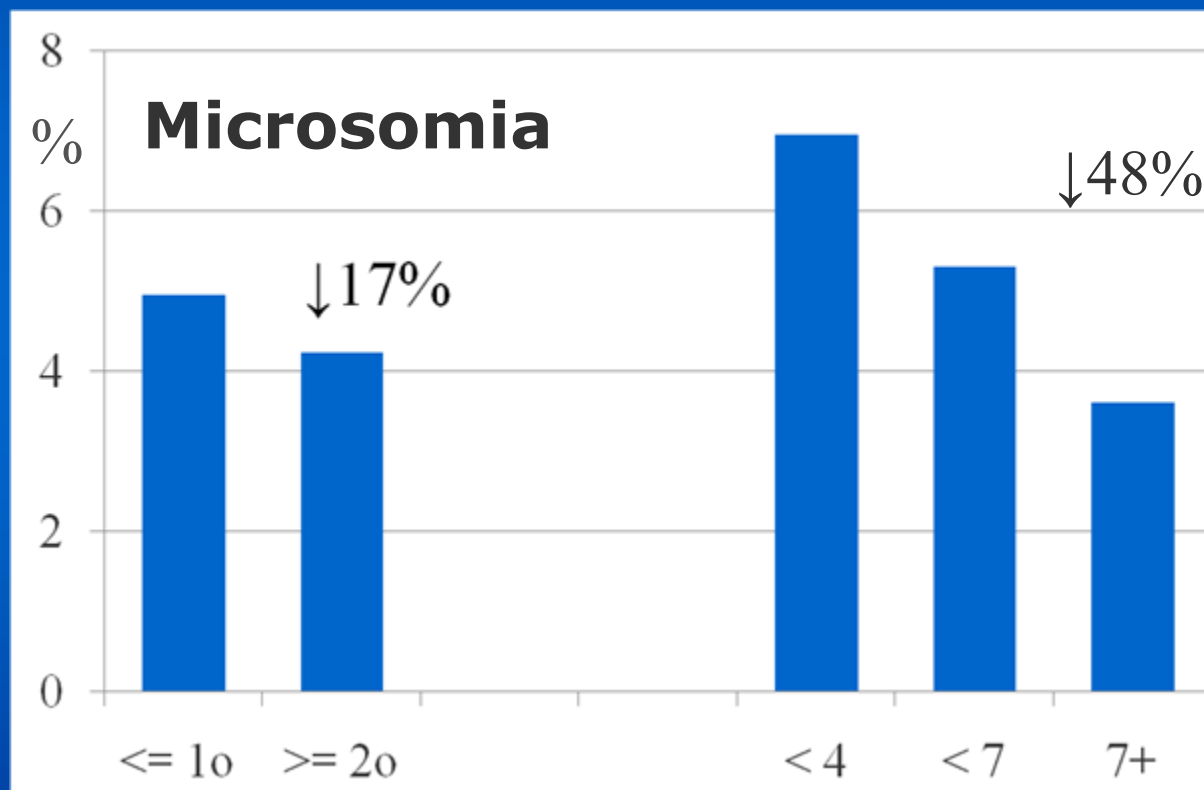
# What Can We Do In Pregnancy??

- Interventions to Alter Birthweight
  - Screen and treat infections
  - Encourage smokers to quit
  - Counsel adequate weight gain during pregnancy
- Create a more just society
- Offer quality primary care

# What Can We Do Pre-natally??

## Education and Prenatal Care

Brazilian Registry of Births (SINASC) – 2009



Mother's Educational  
Attainment

Number of Prenatal  
Visits

# Conclusions

- Events in fetal life are important diabetes determinants
- Little is known about how to intervene
- To stem the obesity and diabetes epidemics, we must:
  - Focus on early life events
    - Characterizing the noxious stimuli
    - Elucidating the pathways which lead to diabetes
    - Developing and implementing effective interventions

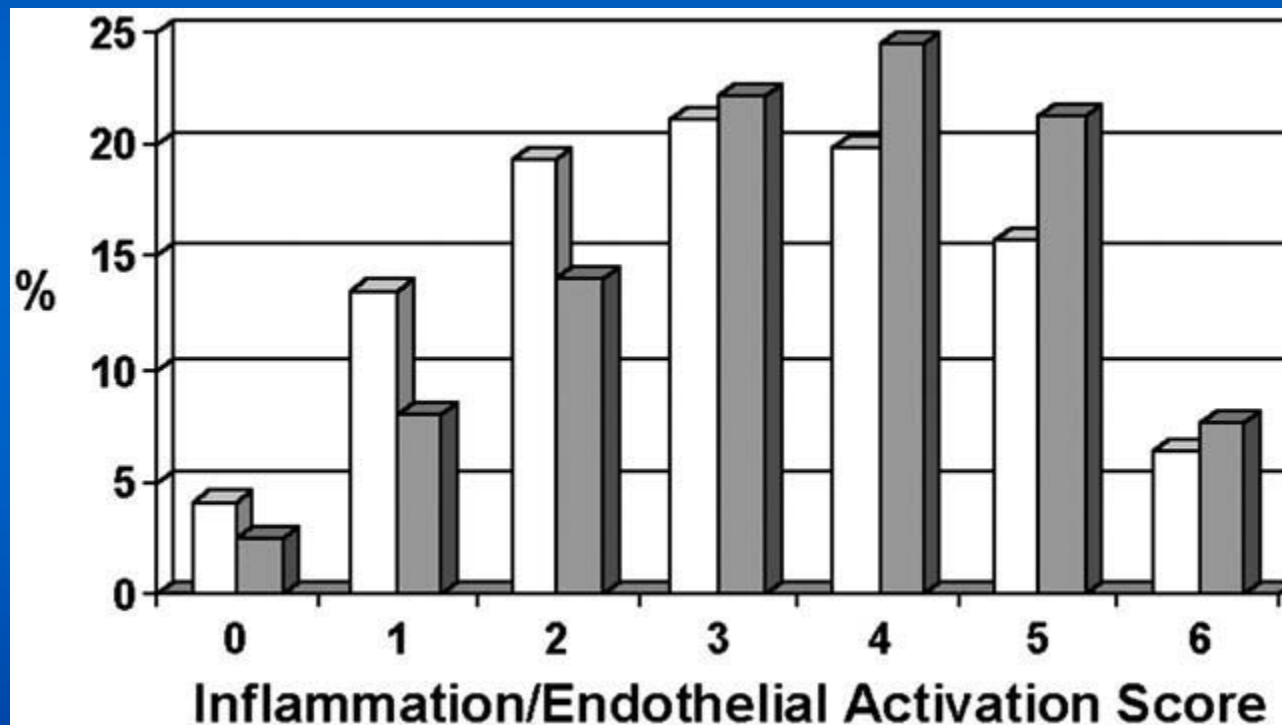
# Muito Obrigado



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# Low Birthweight Associates with Inflammation and Endothelial Activation



*Pellanda LC. Int J Cardiol 2008.*

# Tendencies in Macrosomia, Brazil

## Brazilian Registry of Births (SINASC)

