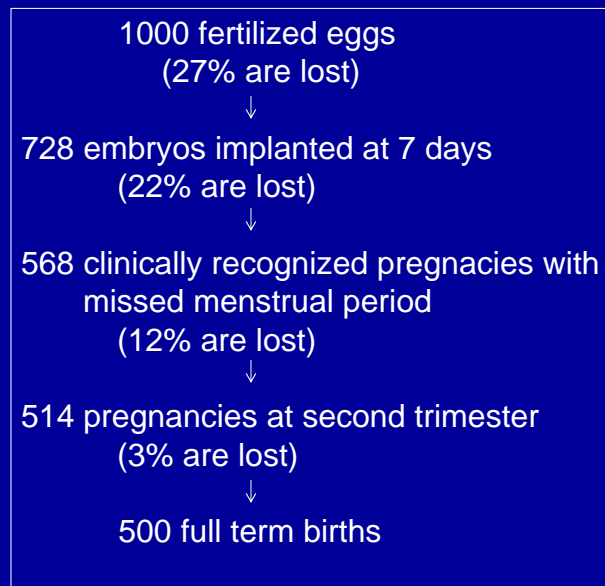


# Genetics and Pregnancy Loss

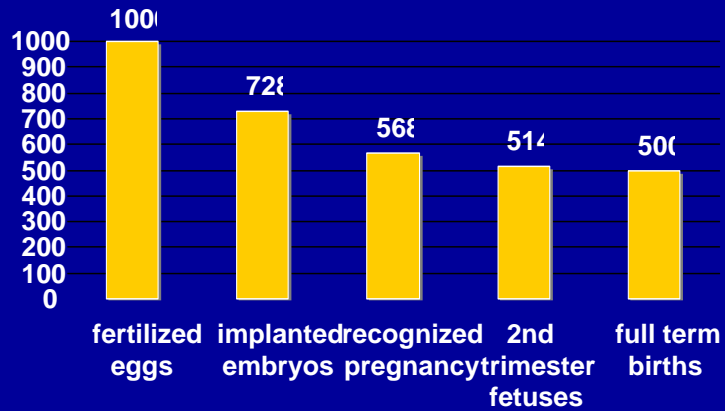
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## Estimates of Pregnancy Loss from Conception



### Rates of Pregnancy Loss from Conception

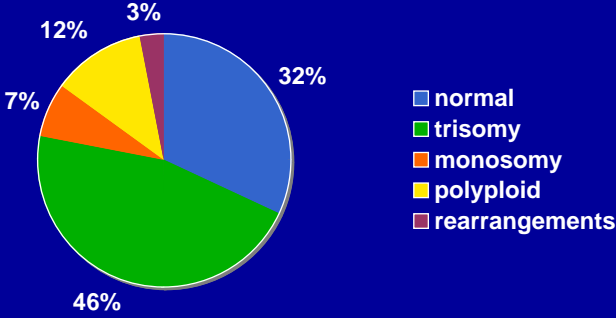


### What role does genetics play in pregnancy loss?

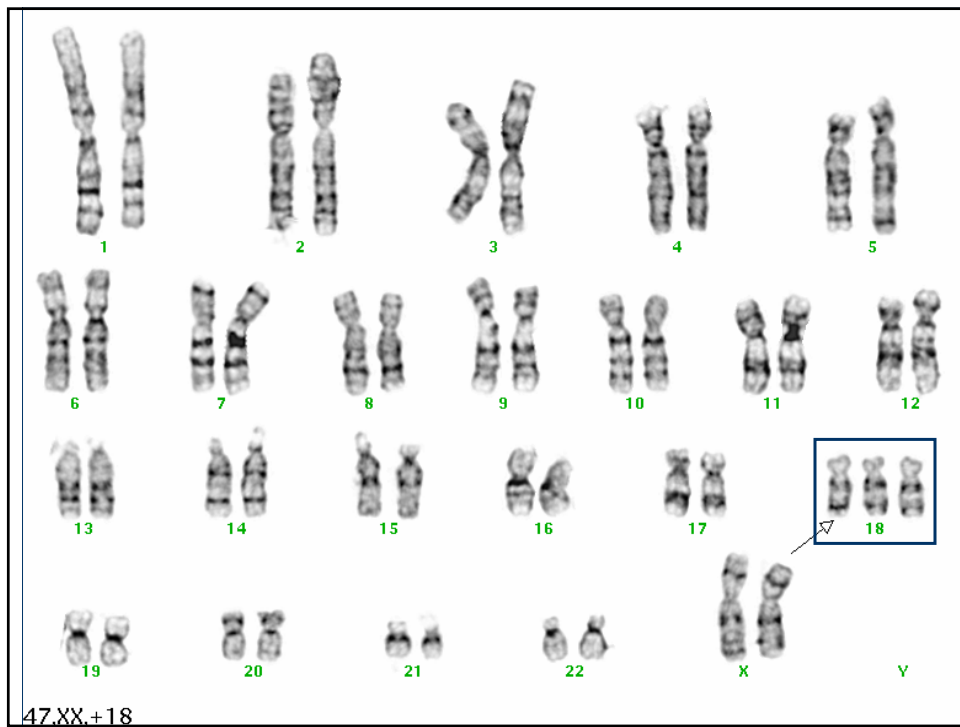
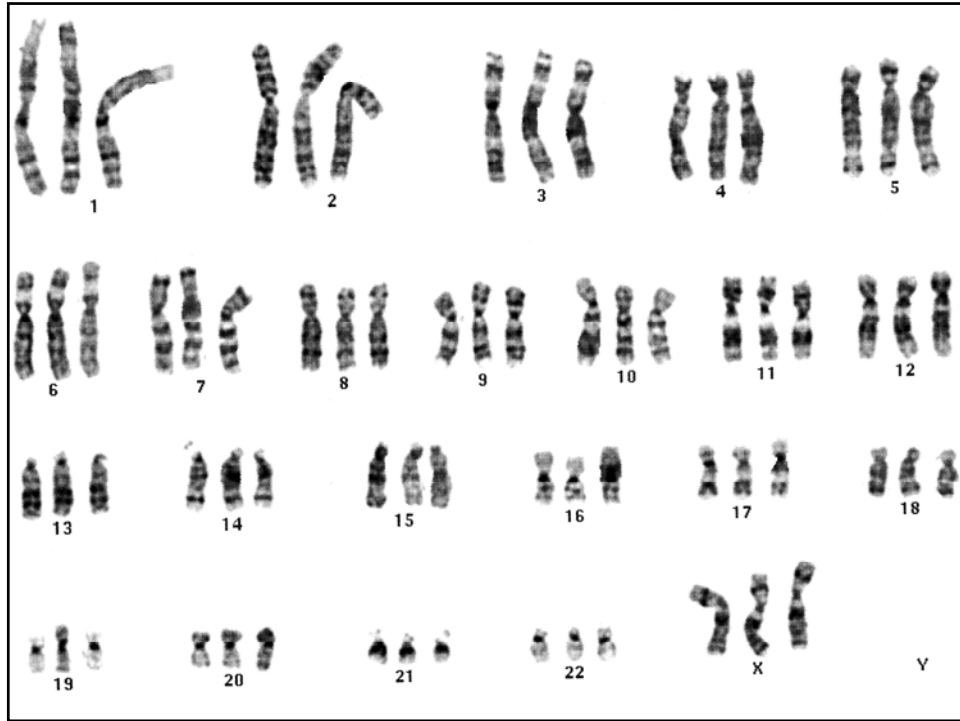
- More than 50% of miscarriages are the results of an incorrect set of chromosomes in the embryo.
- This can be determined by routine chromosome analysis from the “products of conception” passed during a spontaneous miscarriage or from a D&C.
- The most common problem is a single extra chromosome (trisomy). This usually is the result of an error during the development of the egg (oocyte).
- The proportion of oocytes with the wrong chromosome number increases exponentially with the age of the mother.

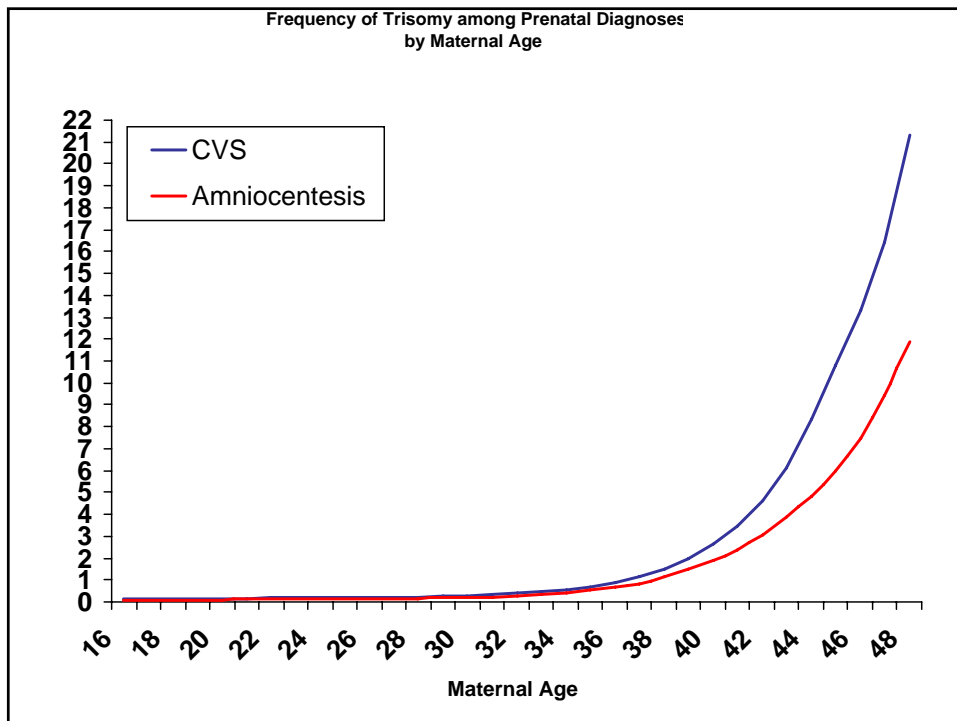
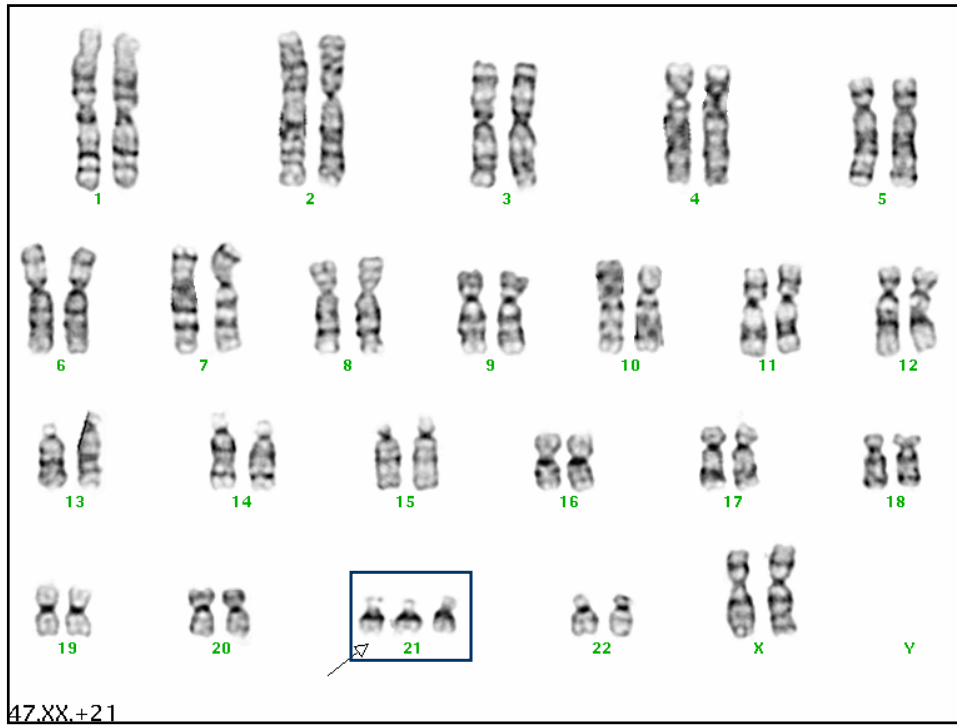


Chromosome Complements in Pregnancy Losses  
from 6- 18 wks of Gestation

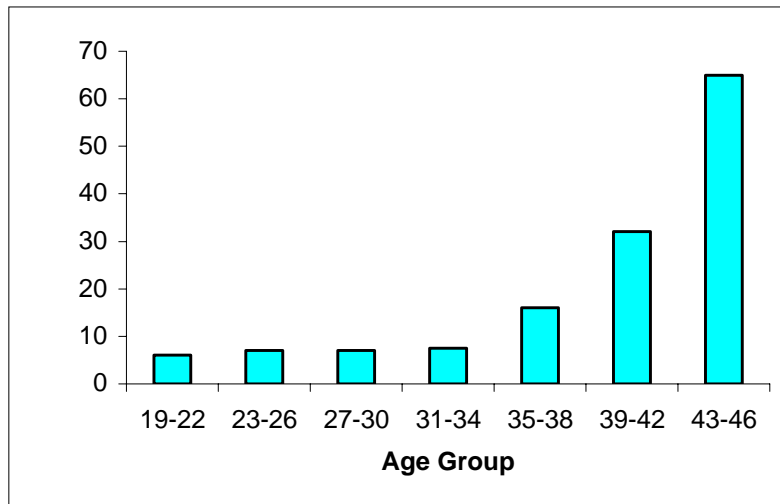


Data from Ridgewood, NJ 2003-2005





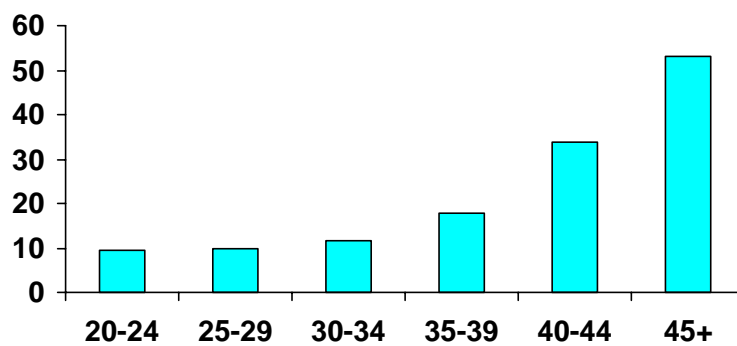
## Oocyte Aneuploidy



Adapted from (Pellestor, 2005)

## Reproductive Loss Increases with Maternal Age

### Spontaneous Abortions by Maternal Age, Hospital Based

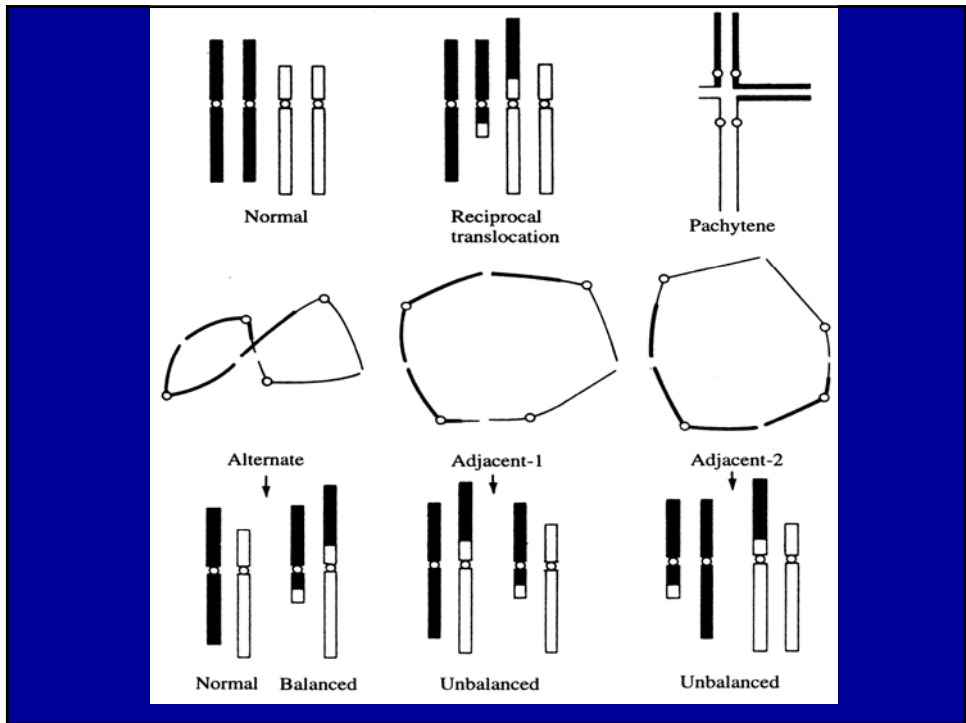
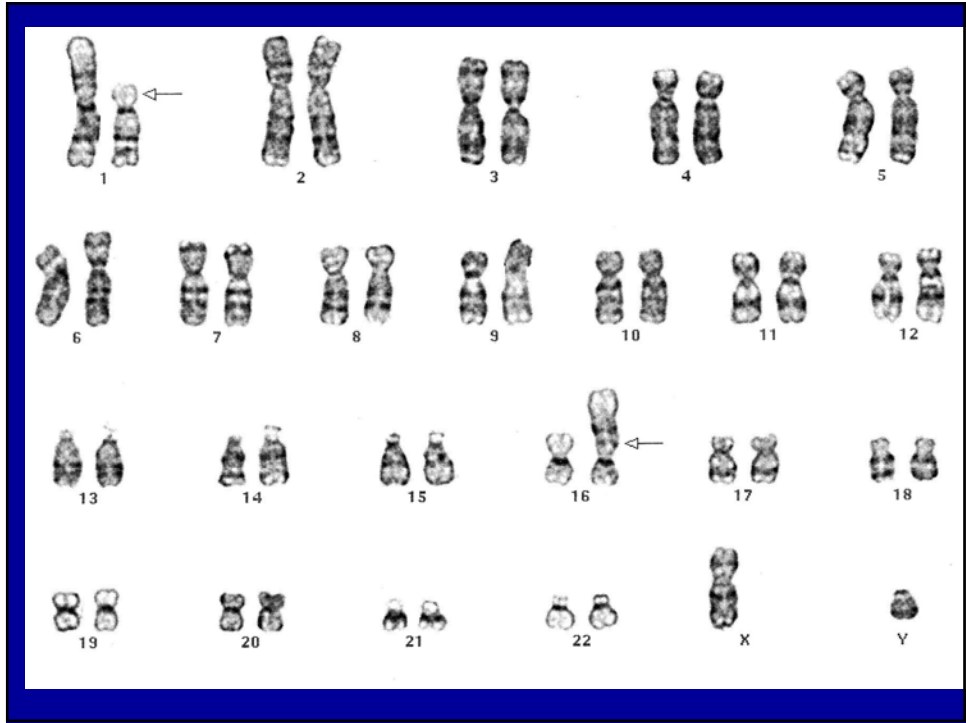


## Significance of Chromosome Testing of Embryonic Material

- In > 50% of cases (and >80% in older women) the cause of the miscarriage will be identified.
- When an error in chromosome number is detected, no further testing or treatment is indicated.
- When an error in chromosome number is present, the risk of another miscarriage is not increased above that of any woman of the same age.

## Chromosome Rearrangements

- Rarely, a parent may carry a “balanced” chromosome rearrangement that can lead to imbalance of chromosomal material in eggs or sperm
- Mothers and fathers are equally likely to carry a rearrangement
- Rearrangements are the cause of only 2% of miscarriages, but 1/25 couples with repeated miscarriage will have such a rearrangement
- Rearrangements can be detected by chromosome analysis of embryonic material, or by chromosome analysis of parental blood.
- Rearrangements predict an increased risk of miscarriage and the possibility of children with birth defects.





### Special Considerations for Research in Pregnancy Loss

- Any study of the causes or treatment of miscarriage needs to distinguish among those due to chromosome errors and those with normal chromosomes
- Miscarriages provide a rich source of material for research on the origins of chromosome errors
- Tissue needs to be obtained fresh (without fixative) and sent to the lab within 4 days for cell cultures to be successful
- Consent needs to be obtained from woman for chromosome studies on the conception at the time of the loss or D&C
- Results are clinically useful and need to be provided to doctor in a timely manner

### Issues in Research on Women with Pregnancy Loss

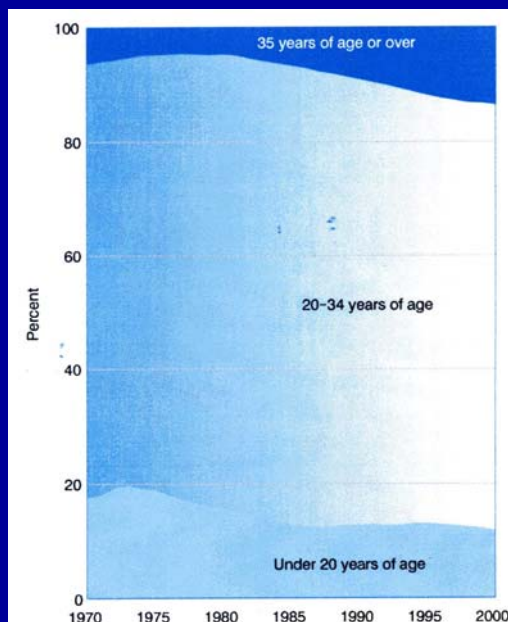
- Physicians often do not understand the usefulness of chromosome analysis, and may transmit the information to patients inaccurately or not at all.
- Women often feel their loss is not taken seriously by their doctor, and are grateful for the opportunity to learn more about the cause and participate in research.
- There are few well-documented causes and treatments for pregnancy losses with normal chromosomes. Exploitation of couples with repeated pregnancy loss may occur.

Resource: "Coming to Term: Uncovering the Truth about Miscarriage" by Jon Cohen

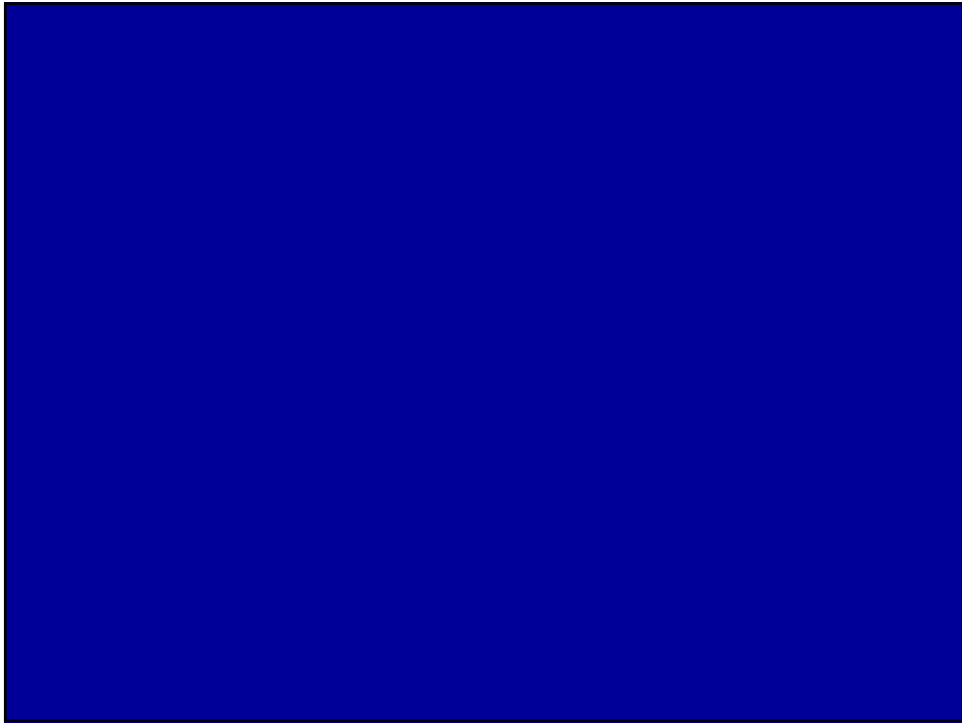
### Ethical and Social Issues

- Discovery of inherited rearrangements may have suggest testing for of family members who may carry the same rearrangement.
- Information about the origin of extra chromosomes may lead to maternal guilt. It is important to stress that chromosome abnormalities and miscarriages are common (part of normal human biology) and that nothing about lifestyle before or during the pregnancy caused the problem.
- Infertility, miscarriages and chromosome abnormalities all are increasing as the result of the increase in pregnancies among older women. This leads to increased use of assisted reproductive technologies, which consume healthcare resources.

Percent of births by Maternal Age, 1970-2000







The most effective way to reduce infertility, pregnancy losses, chromosome abnormalities detected at the time of prenatal diagnosis and the demand for assisted reproductive technology?

Reverse the pattern of delaying child-bearing until late in reproductive life

## Acknowledgements

Thanks to my colleagues in Epidemiology, Jennie Kline, Zena Stein and Mervyn Susser for many years of collaboration, discussion and friendship.