



European Association for the Study of Obesity

Maternal obesity

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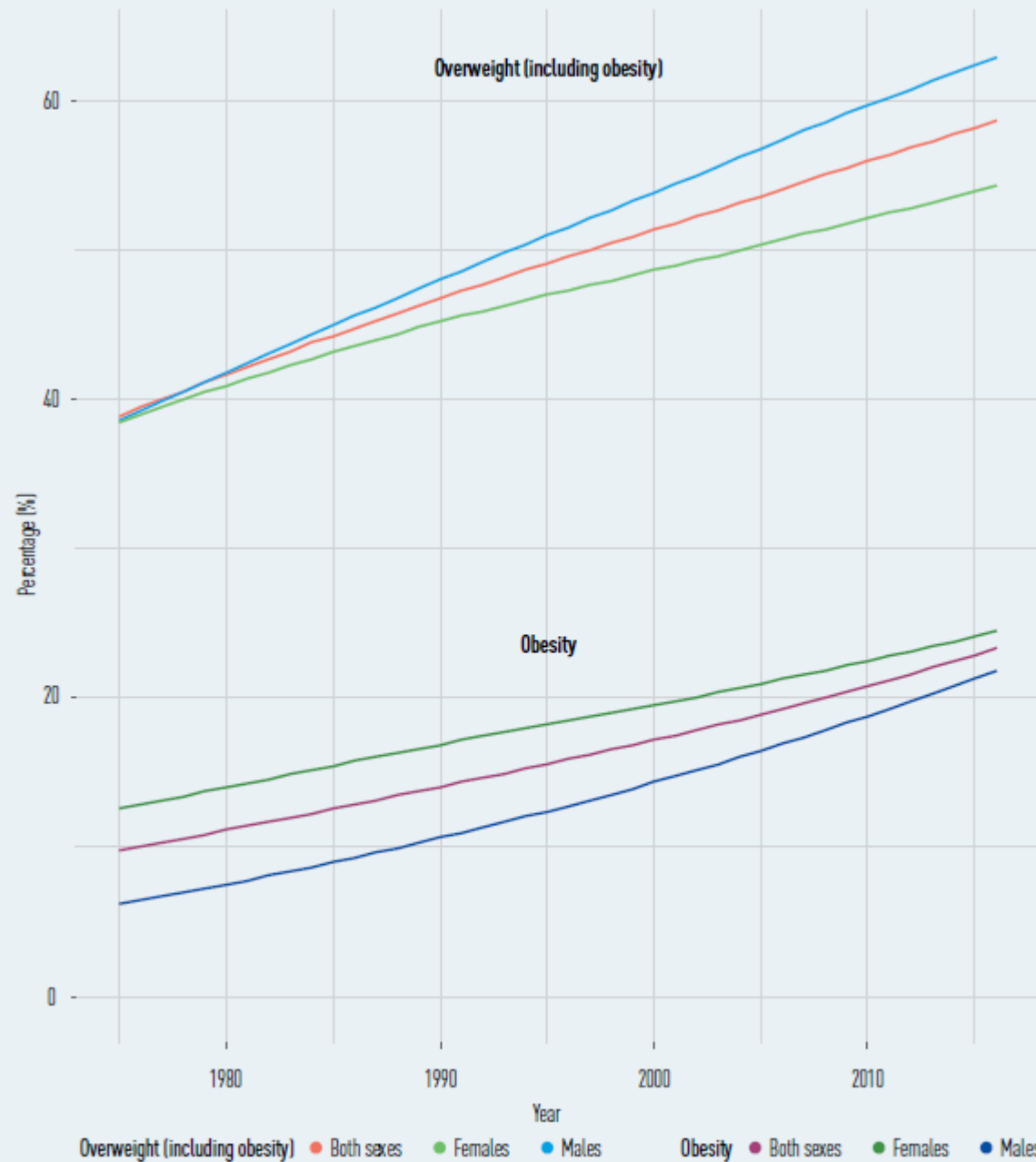
EASO Summer School – 12th July 2022

Learning Objectives

1. To be aware of the prevalence of maternal obesity.
2. To understand obesity related complications during pregnancy/ delivery/ early infancy.
3. To explain the current evidence on early life exposures which can lead to the development of childhood obesity and NCDs.
4. To consider opportunities for interventions to improve the health of women and children at each of these life course periods.

Prevalence of overweight and obesity among adults in the WHO European Region, by sex (1975–2016)

Source: WHO European Regional Obesity Report 2022. Copenhagen: WHO Regional Office for Europe; 2022. Licence: CC BY-NC-SA 3.0 IGO.



Sources: WHO estimates, 2016 (29); NCD-RisC, 2017 (30).

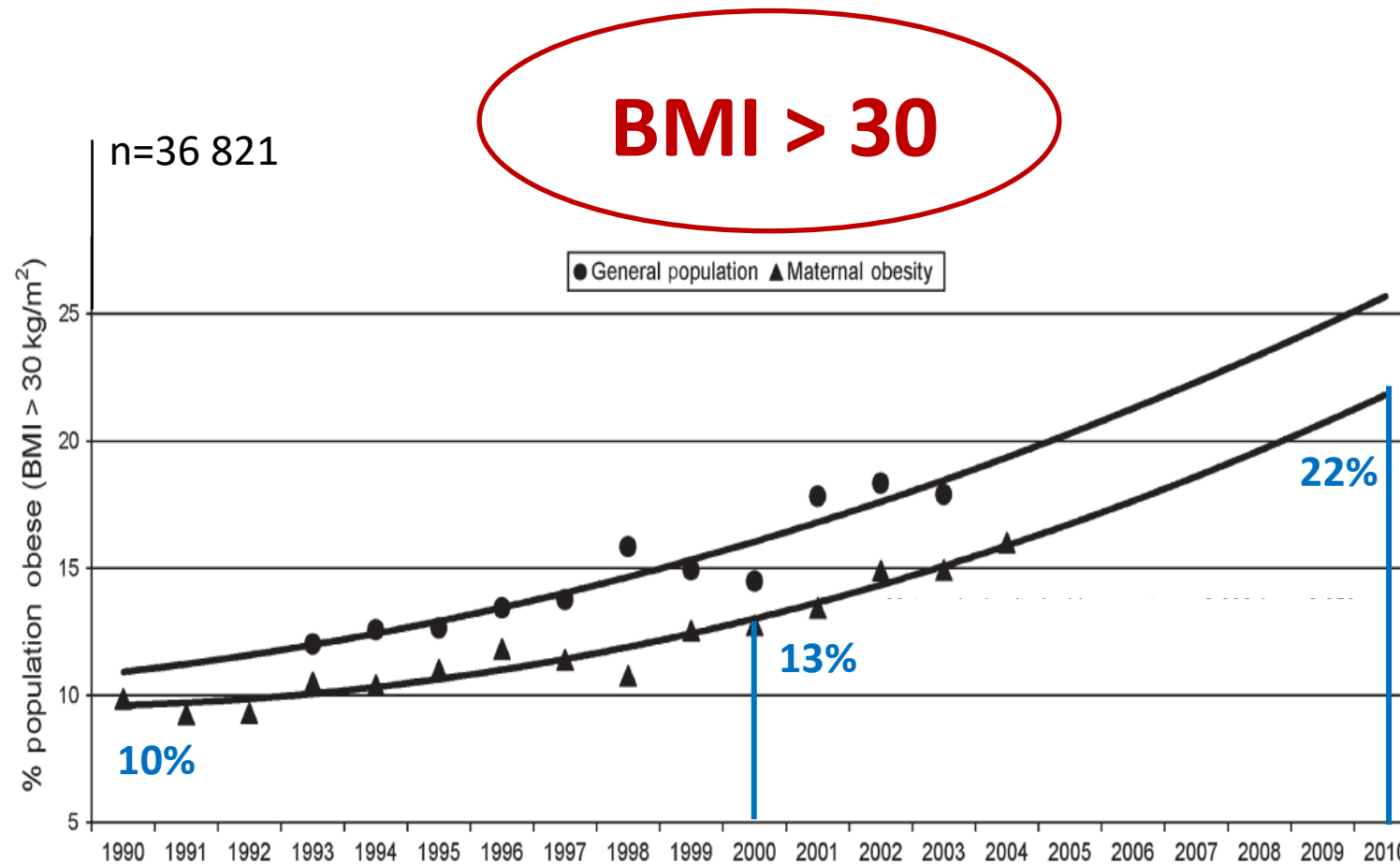
World prevalence of overweight/obesity in women in reproductive age

Women in reproductive age:

- 40% with BMI >25 kg/m²
- 15% with BMI>30 kg/m²
- Vulnerable population (low SES, migrants)
- Parallel augmentation of childhood obesity in children < 5 years

Source: *The Lancet* 2016 387, 1377-1396 DOI: (10.1016/S0140-6736(16)30054-X)

The prevalence of maternal obesity is increasing in Europe



37.5%
▲

2020

Pre-pregnancy obesity-related risks to women and offspring

Period	Women	Offspring
Before conception	Menstrual cycle dysregulation, anovulation and infertility	-
Pregnancy	Miscarriage Gestational diabetes mellitus Pregnancy-induced hypertension Preeclampsia Thrombo-embolism	Congenital defects Premature birth Large for gestational age Macrosomia (>4000 g)
Delivery	Caesarean sections Labor induction, surgical complications and failures of epidural analgesia	Stillbirth Neonatal trauma (assisted vaginal delivery and head trauma, shoulder dystocia) Low umbilical arterial pH<7.1 Low Apgar score (5 and 10')

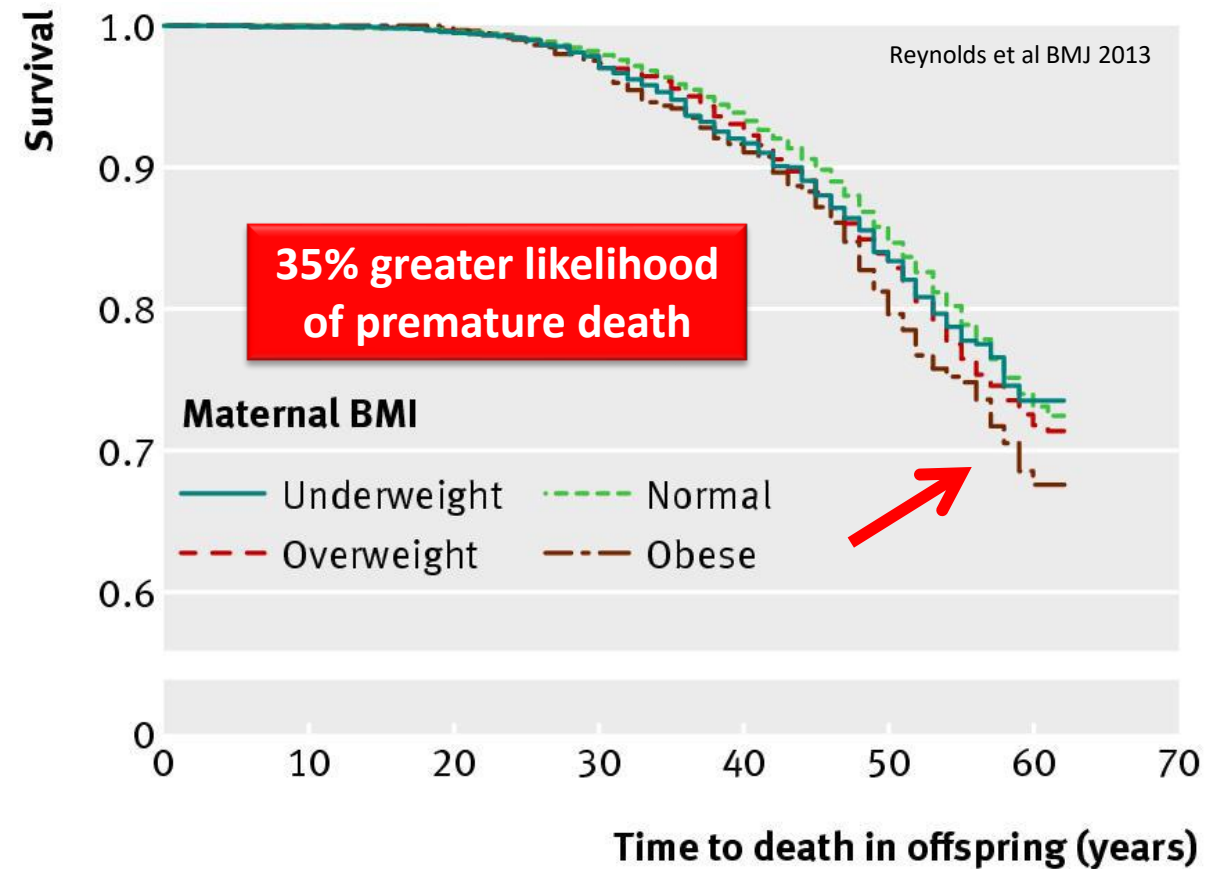
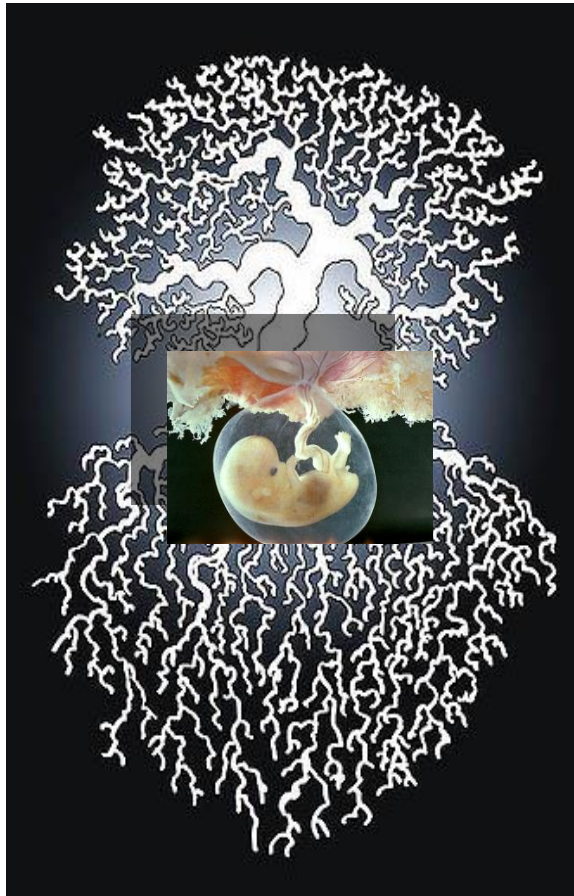
Farpour-Lambert NJ et al. Obesity and Weight Gain in Pregnancy and Postpartum: An Evidence Review of Lifestyle Interventions to Inform Maternal and Child Health Policies. Front Endocrinol 2018 Sep 26;9:546.

Pre-pregnancy obesity-related risks to women and offspring (2)

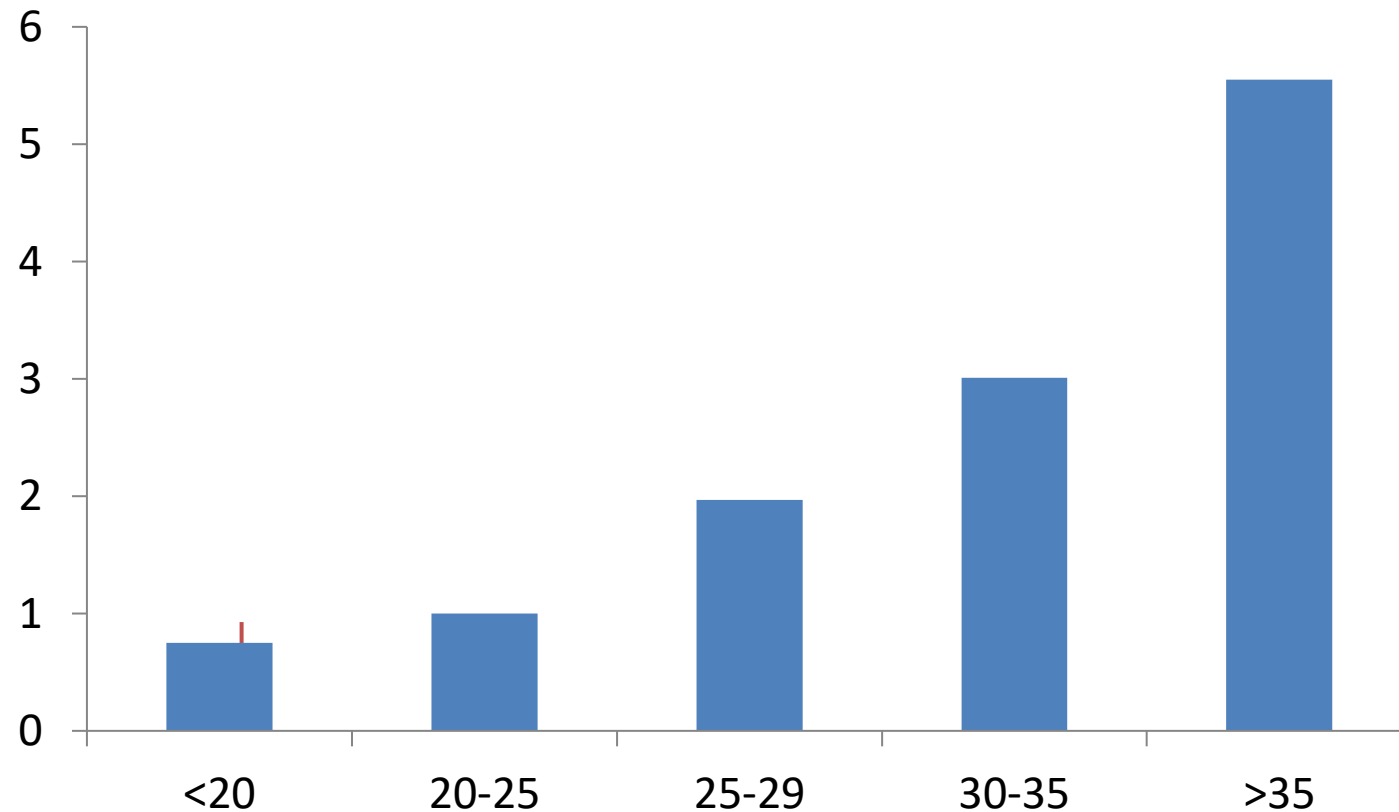
Period	Women	Offspring
Postpartum	Difficulties in initiating and sustaining breastfeeding	Systematic transfer to monitoring in case of GDM (risk of hypoglycemia) Increased admission rate in the intensive care unit
Long-term	Postpartum weight retention and inter-pregnancy obesity Type 2 diabetes Long-term vascular dysfunction	Childhood obesity and premature metabolic syndrome Premature death from cardiovascular disease

Farpour-Lambert NJ et al. Obesity and Weight Gain in Pregnancy and Postpartum: An Evidence Review of Lifestyle Interventions to Inform Maternal and Child Health Policies. Front Endocrinol 2018 Sep 26;9:546.

Maternal obesity and cardiovascular diseases in adult life in offsprings



The risk of gestational diabetes increases positively with BMI



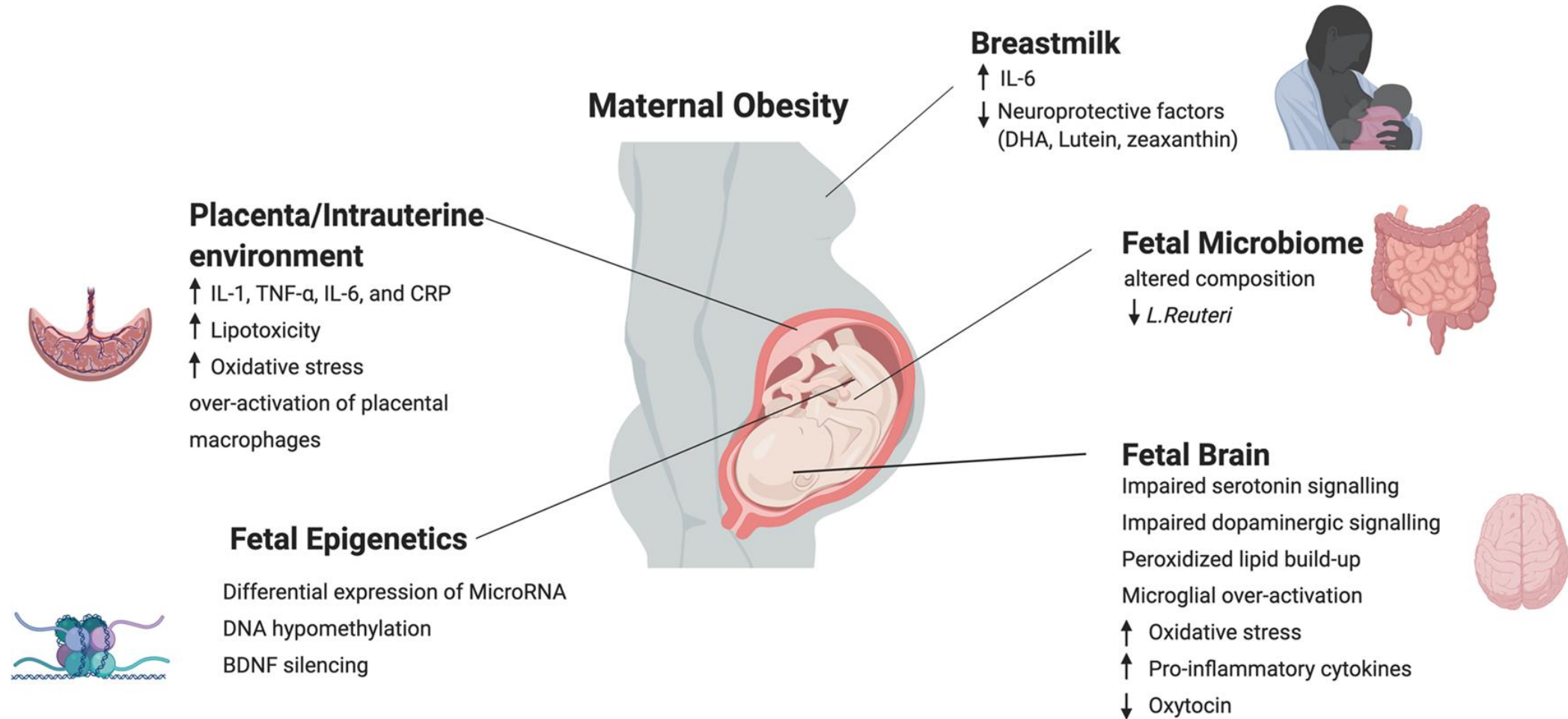
Source: Obes Rev 2009;10:194e203

Childhood obesity: Preconception/Pregnancy exposures

- Maternal BMI / obesity
- Maternal gestational weight gain (GWG)
- Gestational diabetes
- Gestational hypertension
- Small for gestational age
- Large for gestational age
- Caesarean delivery
- Maternal (and parental) smoking
- (Socio-demographic and socio-economic inequalities – e.g. deprivation and minoritised ethnic groups)

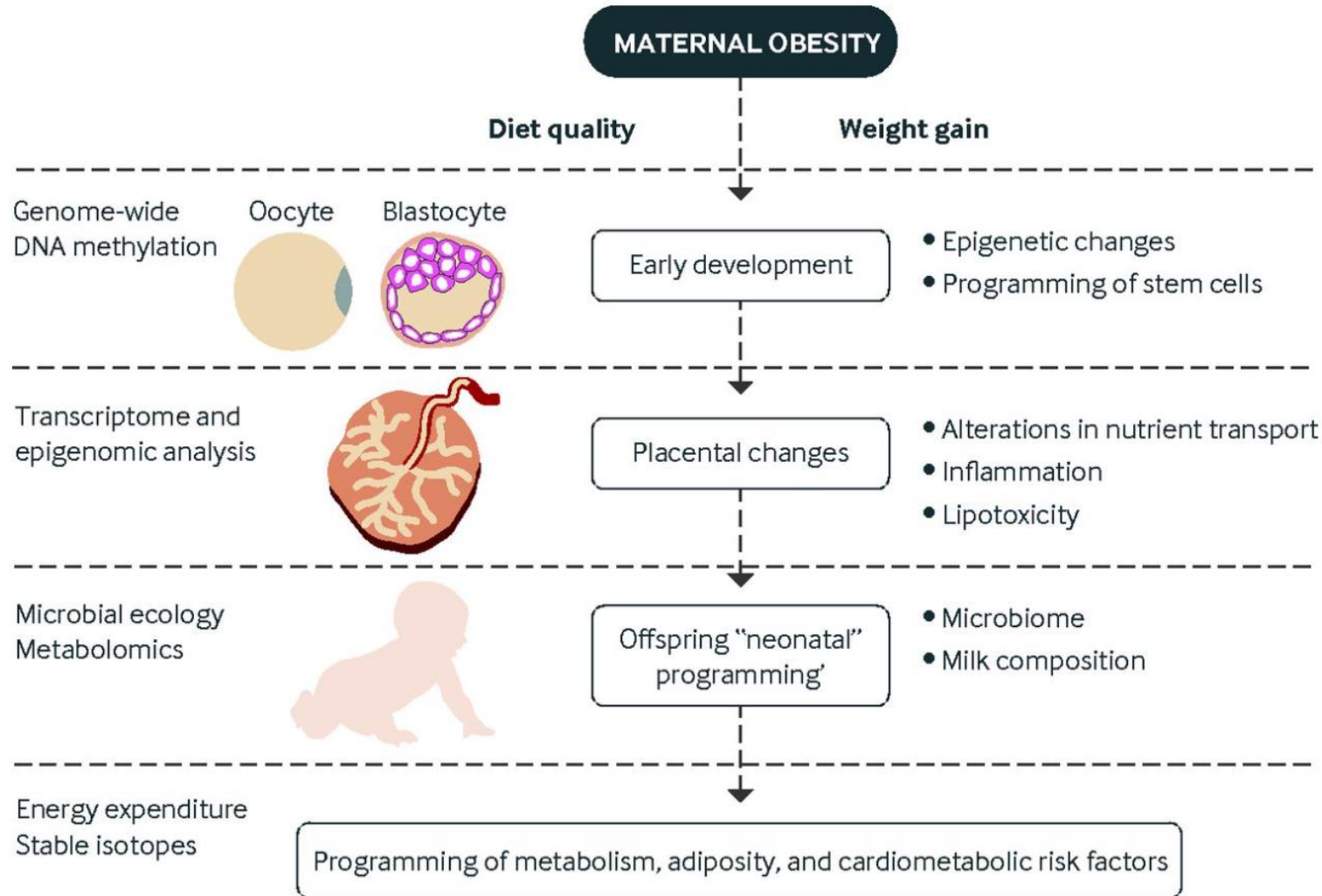
Source: Mahrshahi and Baur 2018; Woo Baidal et al 2016

Impact of maternal obesity



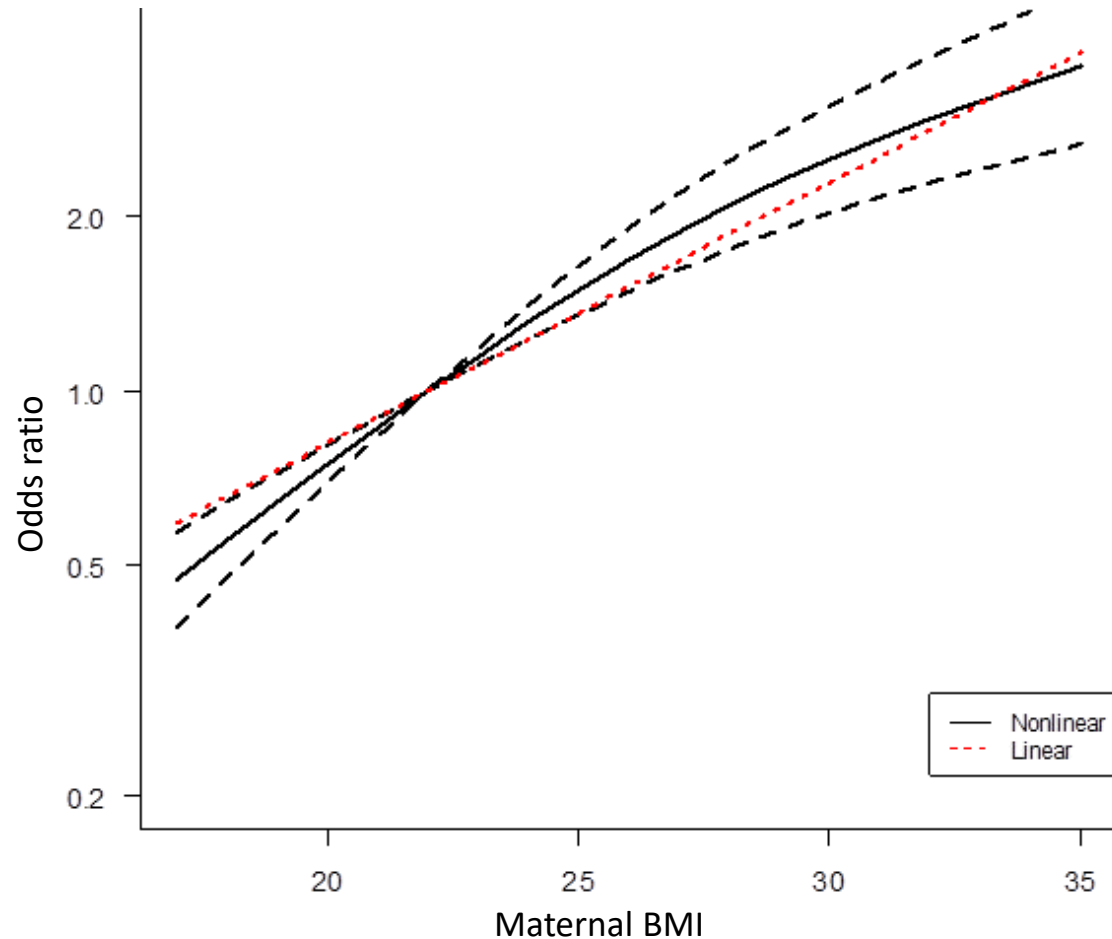
Tong, L., Kalish, B.T. *J Perinatol* 41, 928–939 (2021). <https://doi.org/10.1038/s41372-020-00871-0>

Maternal Obesity and Child Obesity



Source: Catalano and Shankar 2017

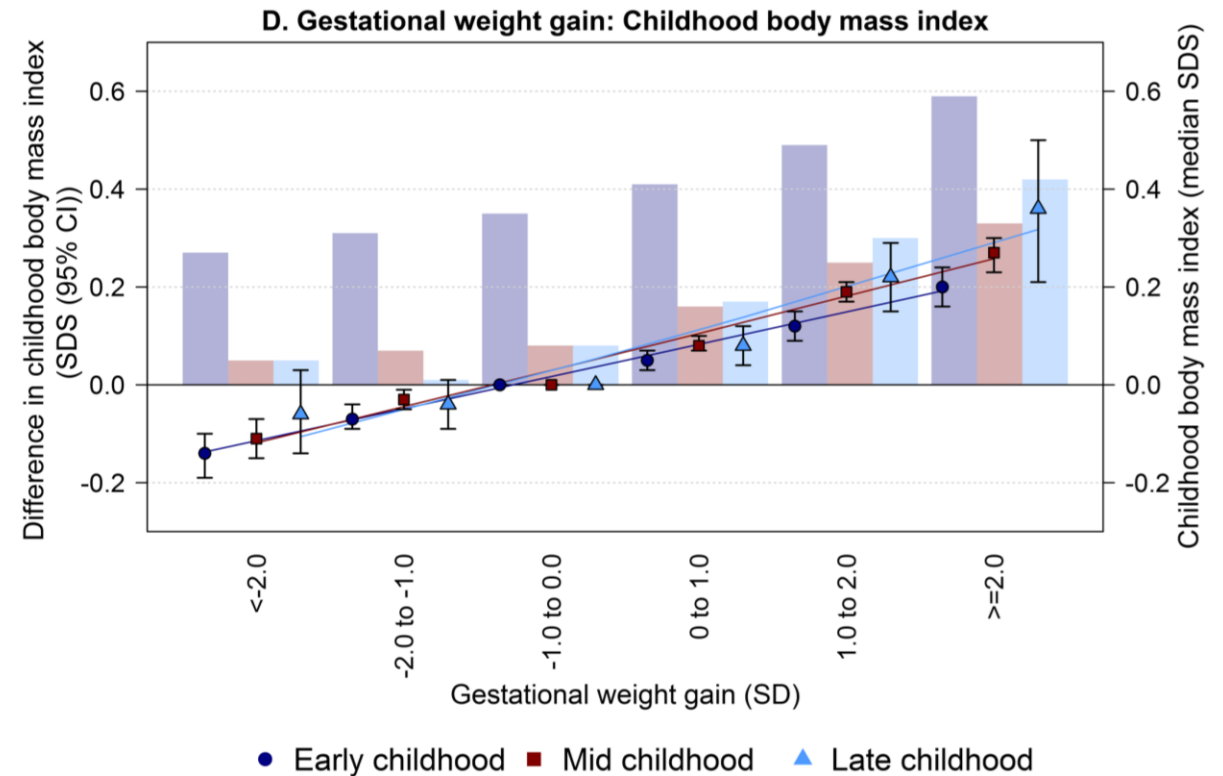
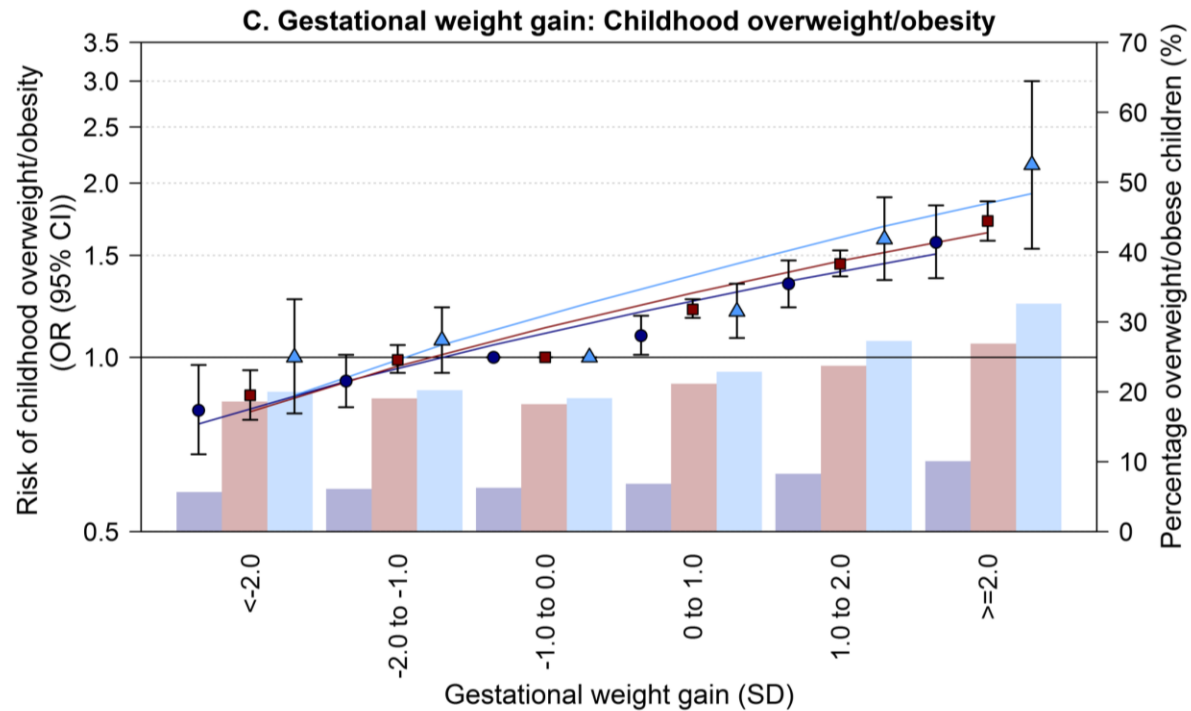
Maternal BMI and childhood obesity



Maternal pre-pregnancy BMI	Pooled Odds Ratio (95% CI)	Interpretation
Recommended BMI	1.00	Reference group
Overweight	1.89 (1.62, 2.19)	89% increased odds of child obesity
Obesity	3.64 (2.68, 4.95)	264% increased odds of child obesity

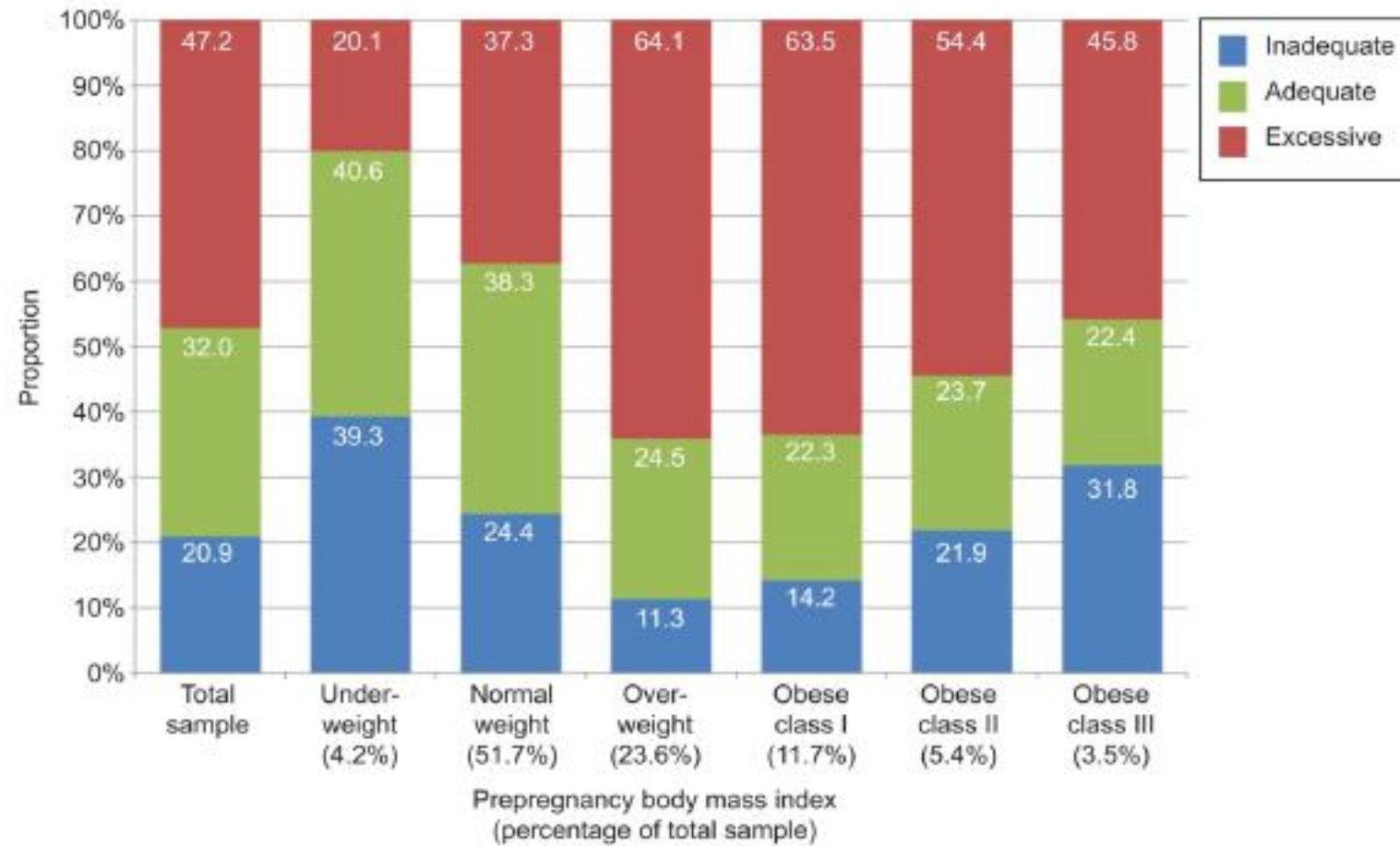
Source: Heslehurst et al. 2019)

Maternal gestational weight gain & child BMI, overweight/obesity



Source: Voerman et al. 2019

Prevalence of excessive GWG in the USA



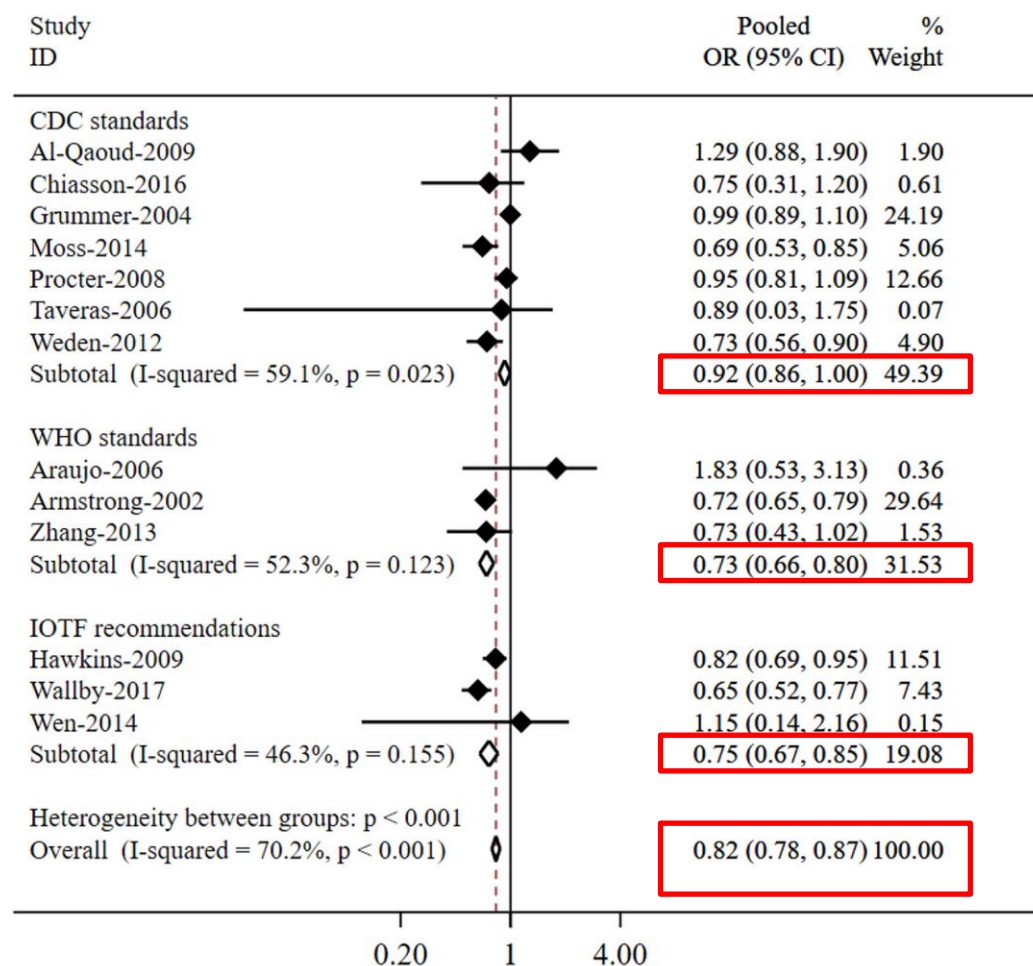
Deputy; Obstet Gynecol 2015

Postnatal/Infancy exposures : First 1000 days

- No breastfeeding
- Age at introduction of solid foods
- Parenting and feeding styles
- Infant physical activity, sedentary time and sleep
- Food environment and exposure to marketing
- Infant antibiotic use
- Stress and adverse childhood experiences
- Food insecurity and low socio-economic status

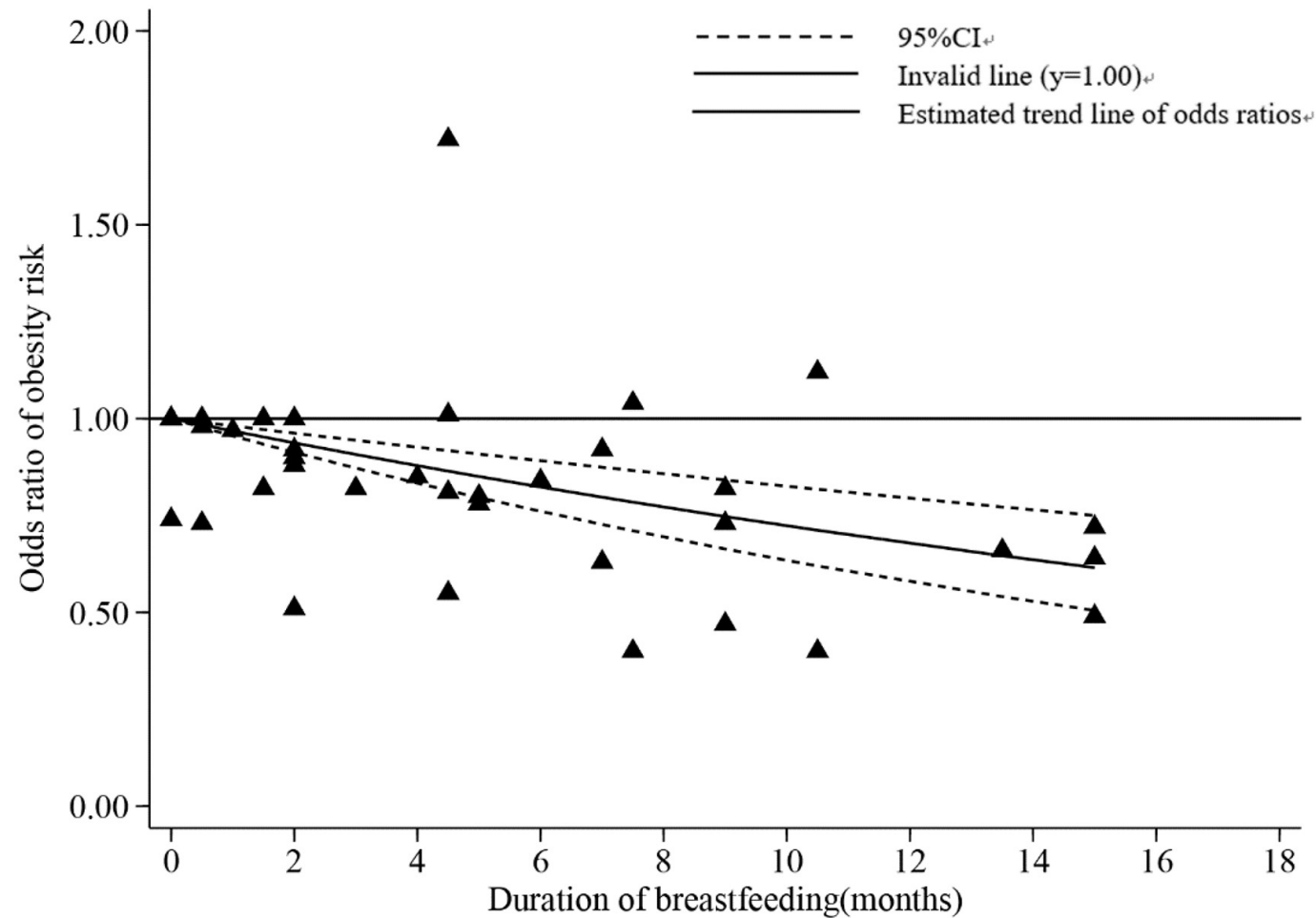
(Mihirshahi and Baur 2018; Woo Baidal et al 2016)

Breastfeeding and childhood obesity



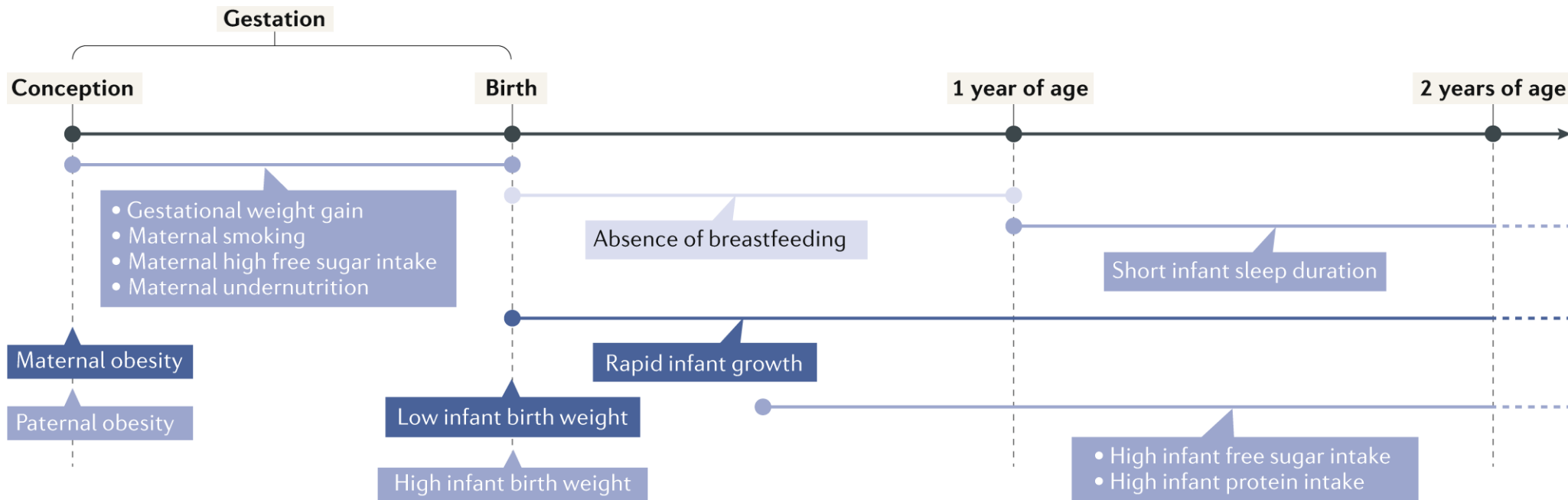
Source: Qiao et al. 2020

Duration of breastfeeding and childhood Obesity



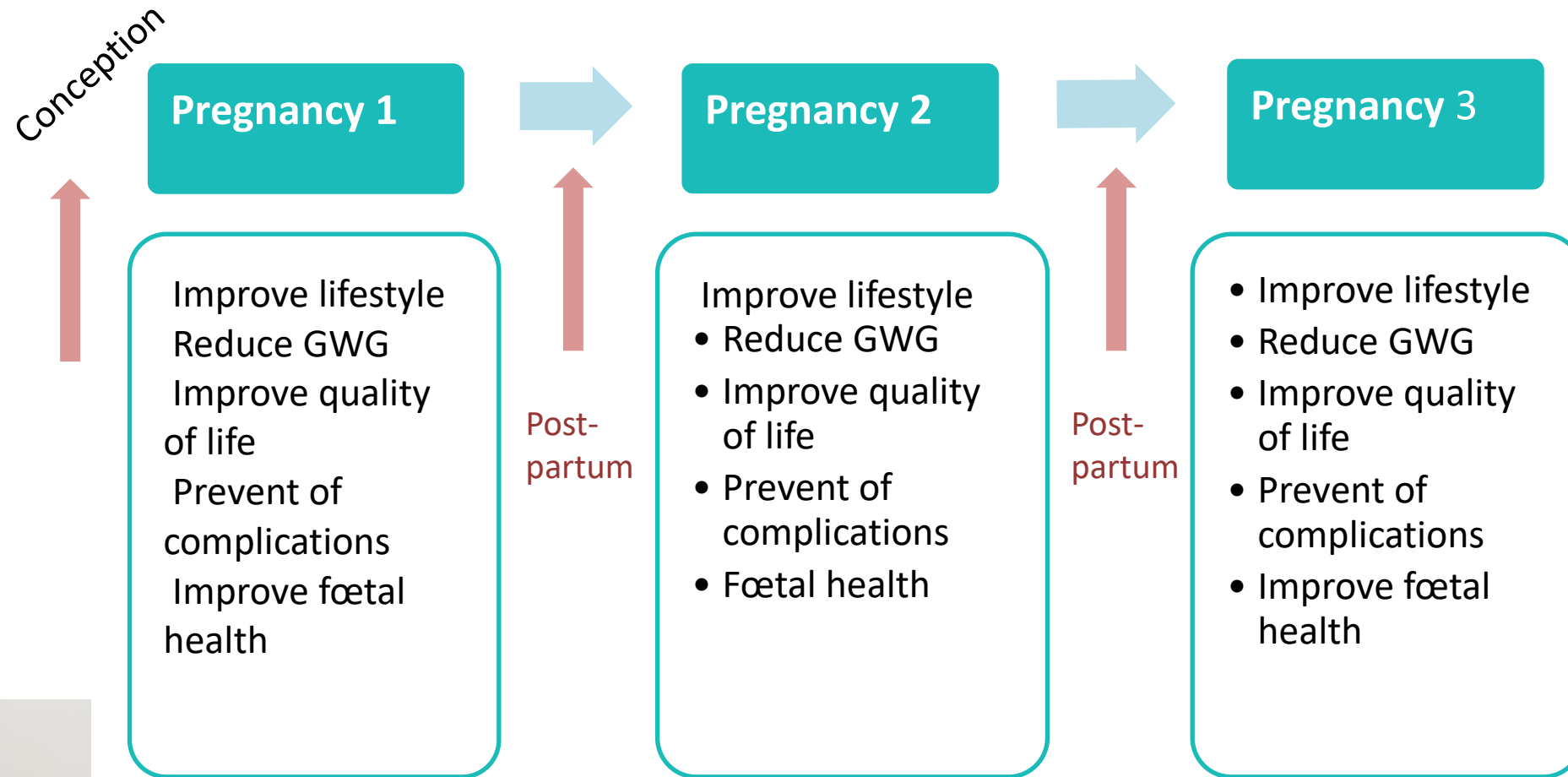
Source: Qiao et al. 2020

Childhood obesity: Summary of early exposures



Source: Larqué, E., Labayen, I., Flodmark, CE. *et al. Nat Rev Endocrinol* 15, 456–478 (2019).
<https://doi.org/10.1038/s41574-019-0219-1>

Intervention during and inter-pregnancies



Types of Intervention



Nutrition



Physical activity



Psychology



Nutrition counselling during pregnancy: WHO recommendations

- **Counselling about healthy eating and keeping physically active** during pregnancy is recommended for pregnant women to stay healthy and to prevent excessive weight gain during pregnancy.
- In undernourished populations, nutrition education on increasing **daily energy and protein intake** is recommended for pregnant women to reduce the risk of low birth weight neonates.
- A healthy diet during pregnancy contains **adequate energy, protein, vitamins and minerals**, obtained through the consumption of a variety of foods, including green and orange vegetables, meat, fish, beans, nuts, pasteurized dairy products and fruit.

Physical activity during pregnancy

Physical activity for pregnant women



Source: UK Chief Medical Officers Recommendations 2017

UK Chief Medical Officers Recommendations 2017: Physical Activity in Pregnancy.
bit.ly/startactiveinfo

Evidences based recommendations for pregnancy

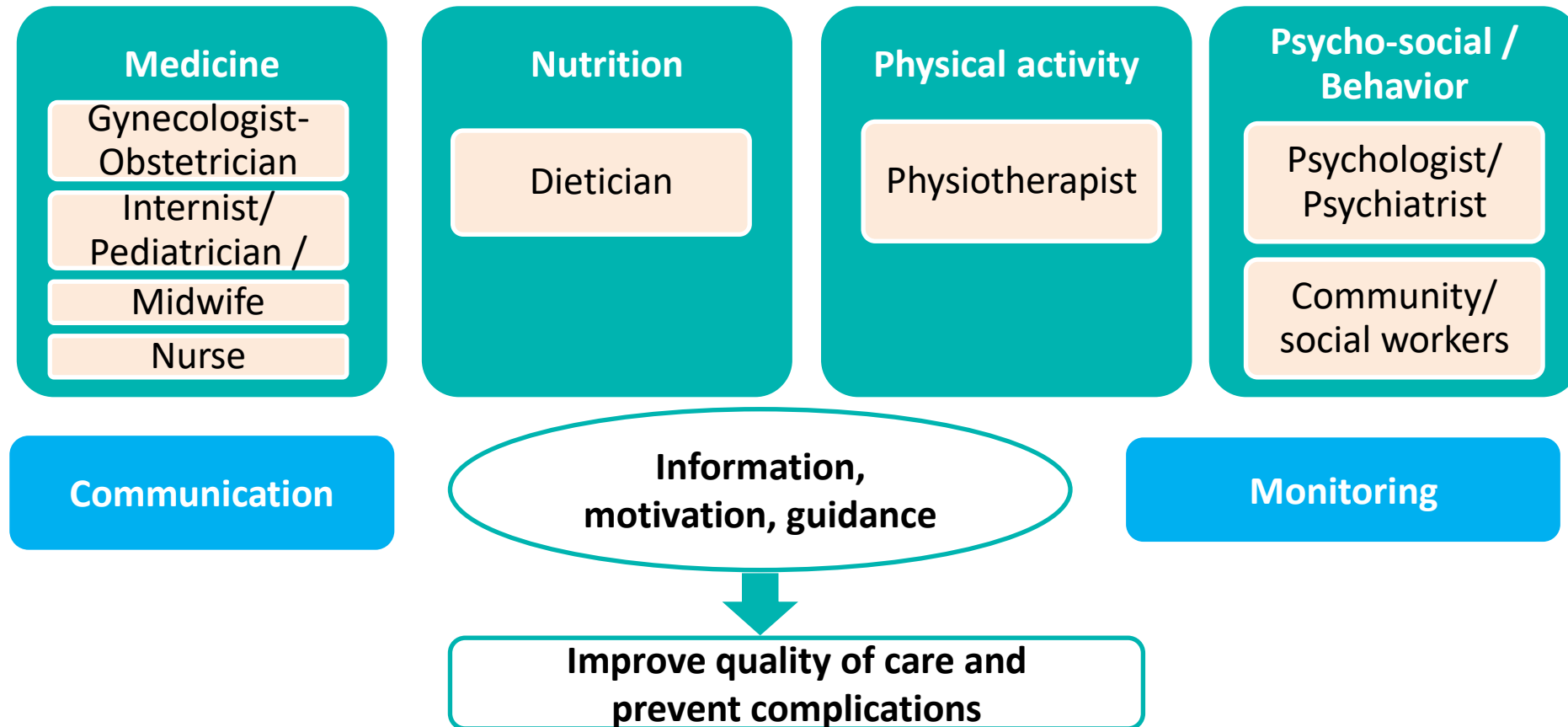
- **A balanced diet with low glycaemic load and light to moderate intensity physical activity** (30-60 minutes per day 3-5 days per week) should be recommended from the 1st trimester of pregnancy and maintained during the postpartum period.
- No evidence that the interventions evaluated in this review are associated with adverse maternal or foetal outcomes.

Farpour-Lambert NJ et al. Obesity and Weight Gain in Pregnancy and Postpartum: An Evidence Review of Lifestyle Interventions to Inform Maternal and Child Health Policies. Front Endocrinol 2018 Sep 26;9:546. doi: 10.3389/fendo.2018.00546. eCollection 2018.

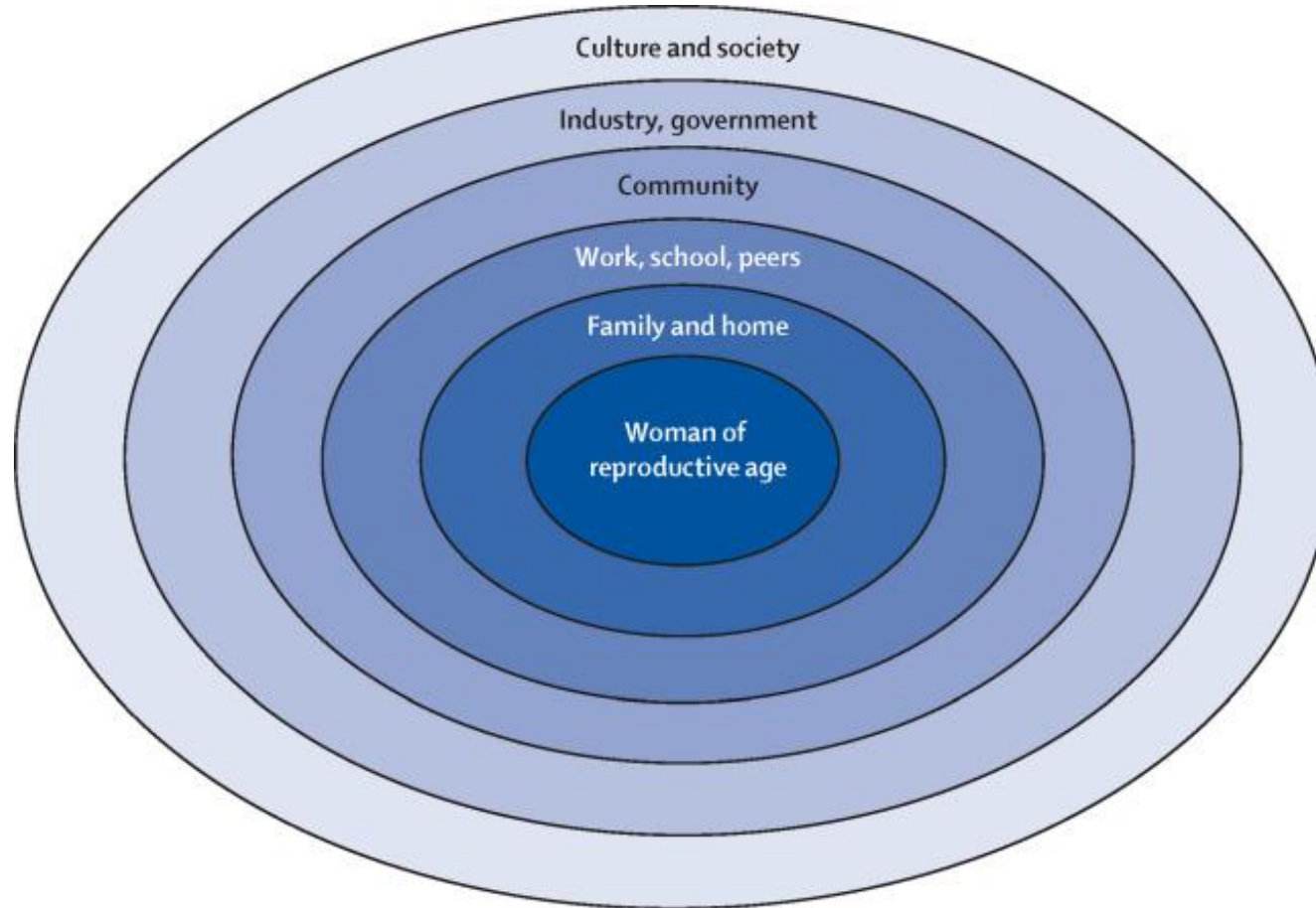
«Contrepoids»: A mother-child program for a better future

- Develop new recommendations for diet, physical activity, weight gain during pregnancy.
- Adapt antenatal and postpartum courses for women who are overweight or living with obesity.
- Create a specialized obesity consultation and a multidisciplinary care program including all pregnant women who are overweight or living with obesity and their family.
- Develop physical activity, nutrition and cooking classes for pregnant women who are overweight or living with obesity.
- Support breastfeeding in women with obesity.
- Train gynecologists-obstetricians, midwives, nurses, pediatricians (post-graduate/ continuous training).
- Develop a network of health care professionals.

A multidisciplinary approach

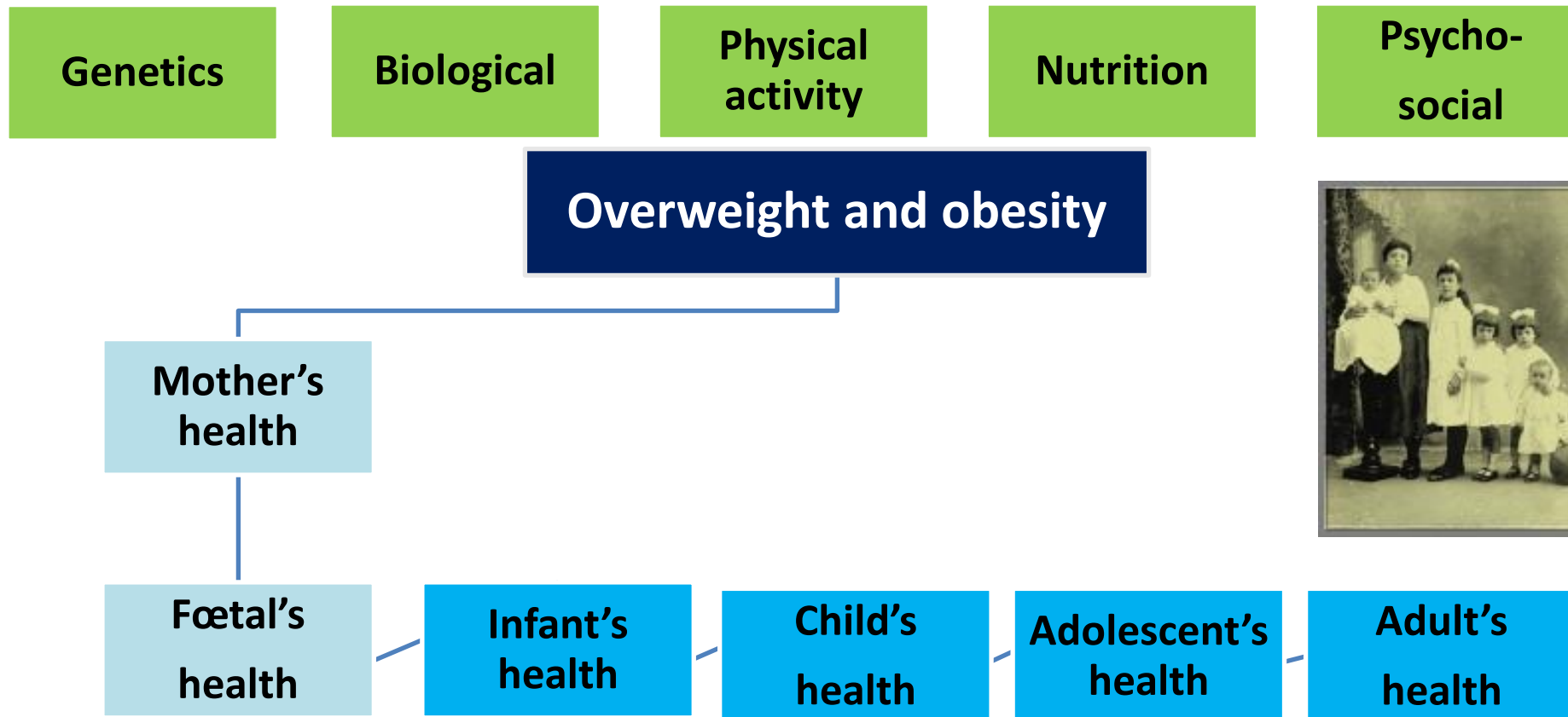


Simplified Ecological Systems Theory Model



Source: Hanson M. et al. *Lancet Diabetes Endocrinol* 2017; 5: 65–76 (adapted from Institute of Medicine, 2005)

A life course perspective



Take Home Messages

- Maternal obesity is associated with multiple complications during pregnancy and delivery.
- Early life exposures are complex and interacting.
- Early life exposures increase the risk of childhood obesity and NCDs.
- There are opportunities for intervention in the preconception, pregnancy and postnatal/infancy life course stages
- Interventions should focus on health and well-being of parents and infants holistically in order to prevent cumulative exposure to multiple risk factors.

Conclusion

“The long-term aim is to make the parents of tomorrow healthier so that they will not only have healthier lives as they grow up to become adults, but also so that they will pass on greater health to the next generation”

Mark Hanson, The Lancet 2015



Recommended Reading

- Catalano and Shankar Obesity and pregnancy: mechanisms of short term and long term adverse consequences for mother and child BMJ 2017; 356 doi: <https://doi.org/10.1136/bmj.j1>
- Heslehurst N, Vieira R, Akhter Z, Bailey H, Slack E, et al. (2019) The association between maternal body mass index and child obesity: A systematic review and meta-analysis. PLOS Medicine 16(6): e1002817. <https://doi.org/10.1371/journal.pmed.1002817>
- Mhrshahi, S. and Baur, L.A. (2018), What exposures in early life are risk factors for childhood obesity?. J Paediatr Child Health, 54: 1294-1298. <https://doi.org/10.1111/jpc.14195>
- Qiao, Dai, Zhang, Ouyang, A Meta-Analysis of the Association Between Breastfeeding and Early Childhood Obesity, Journal of Pediatric Nursing, Volume 53, 2020, Pages 57-66
- Quecke, B, Graf, Y, Epure, A-M, et al. Caesarean section and obesity in young adult offspring: Update of a systematic review with meta-analysis. Obesity Reviews. 2022; 23(2):e13368. doi:[10.1111/obr.13368](https://doi.org/10.1111/obr.13368)
- Rayfield S, Plugge E Systematic review and meta-analysis of the association between maternal smoking in pregnancy and childhood overweight and obesity J Epidemiol Community Health 2017;**71**:162-173 <https://jech.bmj.com/content/71/2/162>
- Farpour-Lambert NJ, Ells, Begona Martinez de Tejada B, Scott C. Obesity and Weight Gain in Pregnancy and Postpartum: An Evidence Review of Lifestyle Interventions to Inform Maternal and Child Health Policies. Front Endocrinol 2018 Sep 26;9:546. doi: 10.3389/fendo.2018.00546. eCollection 2018. <https://www.frontiersin.org/articles/10.3389/fendo.2018.00546/full>
- Voerman E, Santos S, Patro Golab B, Amiano P, Ballester F, et al. (2019) Maternal body mass index, gestational weight gain, and the risk of overweight and obesity across childhood: An individual participant data meta-analysis. PLOS Medicine 16(2): e1002744. <https://doi.org/10.1371/journal.pmed.1002744>
- Wang, Wu, Xiong, Chao, Jin, Liu, Hao, Wei, Yang, Yang, Introduction of complementary feeding before 4 months of age increases the risk of childhood overweight or obesity: a meta-analysis of prospective cohort studies, Nutrition Research, Volume 36, Issue 8, 2016, Pages 759-770
- Woo Baidal, Locks, Cheng, Blake-Lamb, Perkins, Taveras, Risk Factors for Childhood Obesity in the First 1,000 Days: A Systematic Review, American Journal of Preventive Medicine, Volume 50, Issue 6, 2016, Pages 761-779

Useful Links

- Good Maternal Nutrition, The Best Start in Life, WHO Regional Office for Europe
www.euro.who.int/__data/assets/pdf_file/0008/313667/Good-maternal-nutrition-The-best-start-in-life.pdf
- WHO Report on the Commission on Ending Childhood Obesity
https://apps.who.int/iris/bitstream/handle/10665/204176/9789241510066_eng.pdf



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Thank you!