

The new Brazilian gestational weight gain guideline

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DISCLOSURE

The authors declare no conflicts to disclose



OUTLINE

- Brazilian gestational weight gain guidelines
 - Timeline
 - Development of the Brazilian charts
 - Definition of the weight gain ranges
 - Tools and other products
- Final remarks

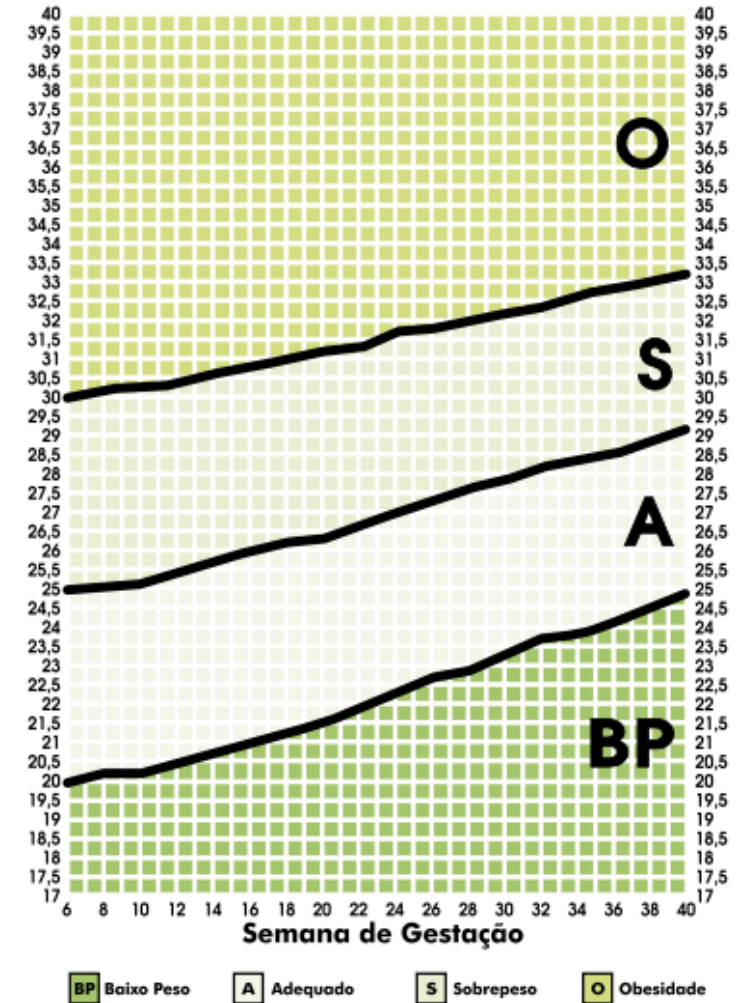


Brazilian gestational weight gain guidelines



MOTIVATION

- Adoption of tools developed in other countries to monitor maternal nutritional status during pregnancy since 1980



TIMELINE

2005-2006



- Ministry of Health working group:
Establish the adequacy of the BMI
charts in use in Brazil



TIMELINE

2005-2006

2008-2009



www.figo.org

Contents lists available at ScienceDirect

International Journal of Gynecology and Obstetrics

journal homepage: www.elsevier.com/locate/ijgo



CLINICAL ARTICLE

Evaluation of the ability of a Latin-American gestational weight curve to predict adverse pregnancy outcomes

Gilberto Kac^{a,*}, Luciana Bertoldi Nucci^b, Maria Helena Constantino Spyrides^c,
Bruce B. Duncan^d, Maria Inês Schmidt^d

- Low ability to predict the occurrence of adverse outcomes
- Classify excessive weight as “normal”
- Solution: to create new Brazilian GWG charts



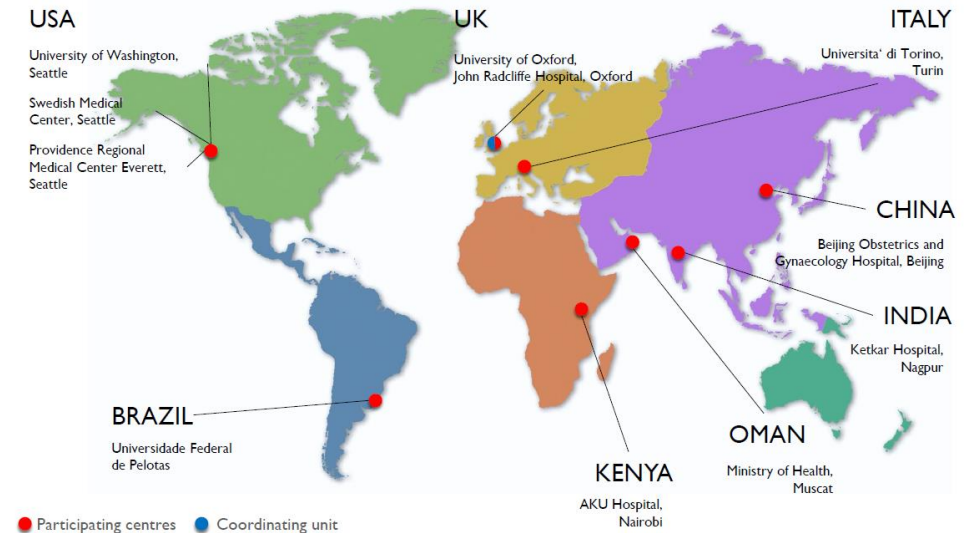
TIMELINE

2005-2006

2008-2009

2009-2014

- International, multi-centric and multiethnic study that created an international standard of GWG
- University of Oxford (2010-2011)



TIMELINE



RESEARCH

Gestational weight gain standards based on women enrolled in the Fetal Growth Longitudinal Study of the INTERGROWTH-21st Project: a prospective longitudinal cohort study

Leila Cheikh Ismail,¹ Deborah C Bishop,¹ Ruyan Pang,² Eric O Ohuma,^{1,3} Gilberto Kac,⁴ Barbara Abrams,⁵ Kathleen Rasmussen,⁶ Fernando C Barros,^{7,8} Jane E Hirst,¹ Ann Lambert,¹ Aris T Papageorgiou,¹ William Stones,^{9,10} Yasmin A Jaffer,¹¹ Douglas G Altman,³ J Alison Noble,¹² Maria Rosa Giolito,¹³ Michael G Gravett,¹⁴ Manorama Purwar,¹⁵ Stephen H Kennedy,¹ Zulfiqar A Bhutta,^{16,17} José Villar¹

- Only charts for normal weight
- Charts start at 14 weeks



TIMELINE



- Creation of the new Brazilian GWG charts

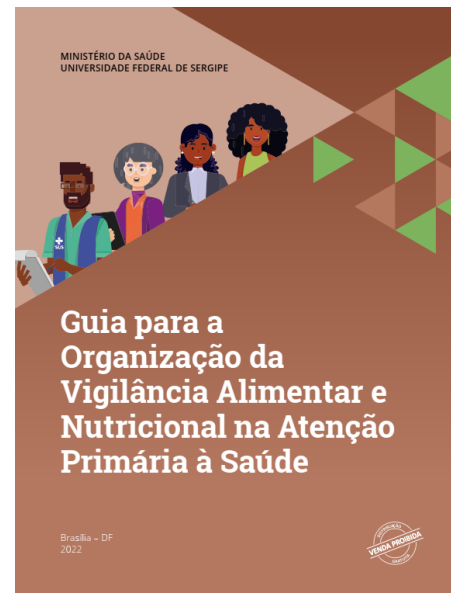
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TIMELINE

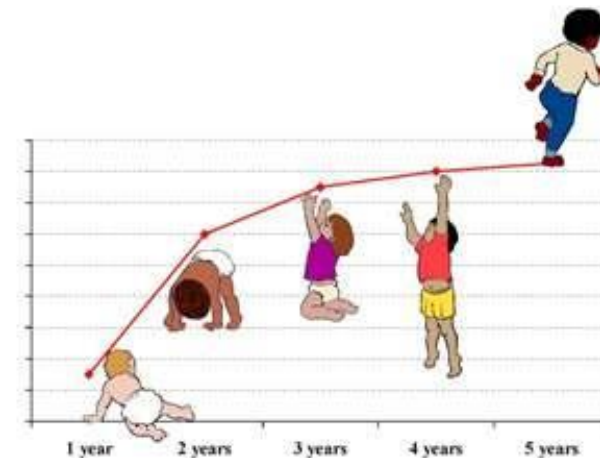


- Implementation of the new Brazilian GWG guideline



WHY CREATING GWG CHARTS?

- Charts allow for the **continuous** monitoring of GWG and are useful as a screening tool
- Charts are useful for healthcare professionals and patients
 - Easy to explain and understand
 - Common in other fields



THE NEW BRAZILIAN GWG CHARTS

Gestational weight gain charts: results from the Brazilian Maternal and Child Nutrition Consortium

Gilberto Kac,¹ Thaís RB Carrilho,¹ Kathleen M Rasmussen,² Michael E Reichenheim,³ Dayana R Farias,¹ and Jennifer A Hutcheon,⁴ on behalf of the Brazilian Maternal and Child Nutrition Consortium

Gestational weight gain according to the Brazilian charts and its association with maternal and infant adverse outcomes

Thais Rangel Bousquet Carrilho^{1,*}, Jennifer A. Hutcheon², Kathleen M. Rasmussen³, Michael E. Reichenheim⁴, Dayana Rodrigues Farias¹, Nathalia Cristina Freitas-Costa¹, Gilberto Kac^{1,*}, on behalf of the Brazilian Maternal and Child Nutrition Consortium†

Creation of the GWG charts and identification of thresholds associated to the lowest risk of neonatal and maternal adverse outcomes



DEVELOPMENT OF THE GWG CHARTS

- **Data source:** Brazilian Maternal and Child Nutrition Consortium (BMCNC)
 - 21 studies (1990-2018)
 - 7086 individuals and 29323 measurements
 - **Prescriptive approach**
 - Individuals without pre-existing conditions
 - Individuals without adverse outcomes during pregnancy
 - Individuals who gave birth to healthy children



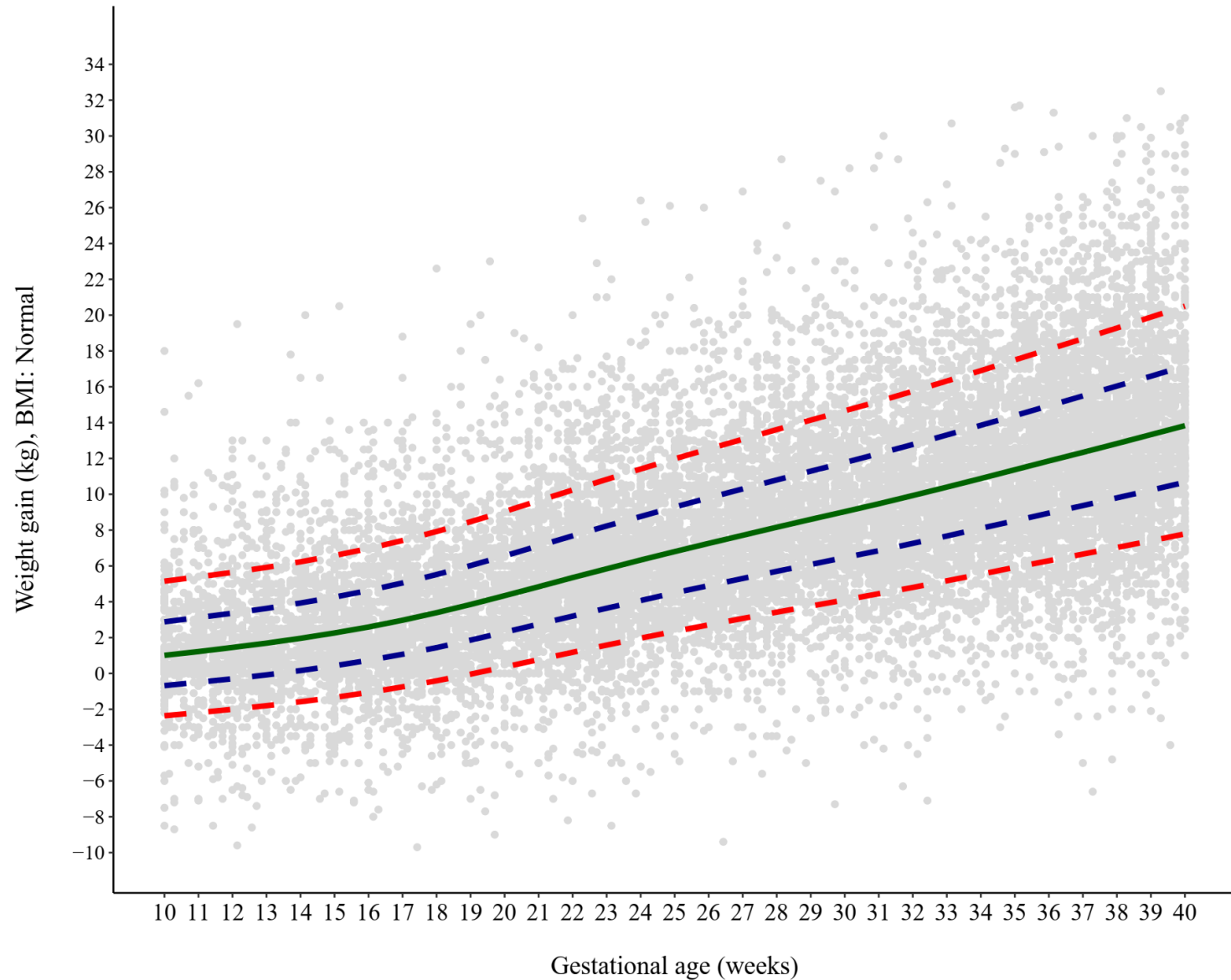
GWG CHARTS

- Construction of the centiles charts
 - From 10-40 weeks
 - Four pre-pregnancy BMI categories
 - Generalized Additive Models for Location Scale and Shape (GAMLSS)
 - Models were internally validated with excellent results
- External validation
 - Birth in Brazil (2011-2012): 4711 women and 31052 measurements



GWG CHARTS

Example of GWG chart
Normal weight



HOW TO USE THE CHARTS IN CLINICAL PRACTICE?

- Identify thresholds to classify GWG as **adequate/insufficient/excessive** throughout pregnancy
 - Statistical approach (P10/90)
 - Clinical approach
 - Values of GWG that minimize the risk of both maternal and infant outcomes



DEFINITION OF GWG RANGES

MATERNAL OUTCOMES

- Excess postpartum weight retention (≥ 5 or ≥ 10 kg) at 6 and 12 months
- **Source:** Brazilian Food and Nutrition Surveillance System
 - n = 2602 at 6 months postpartum
 - n = 7852 at 12 months postpartum

NEONATAL OUTCOMES

- SGA and LGA
- Preterm birth
- **Source:** BMCNC data and Birth in Brazil study
 - n = 9500 (22 studies)

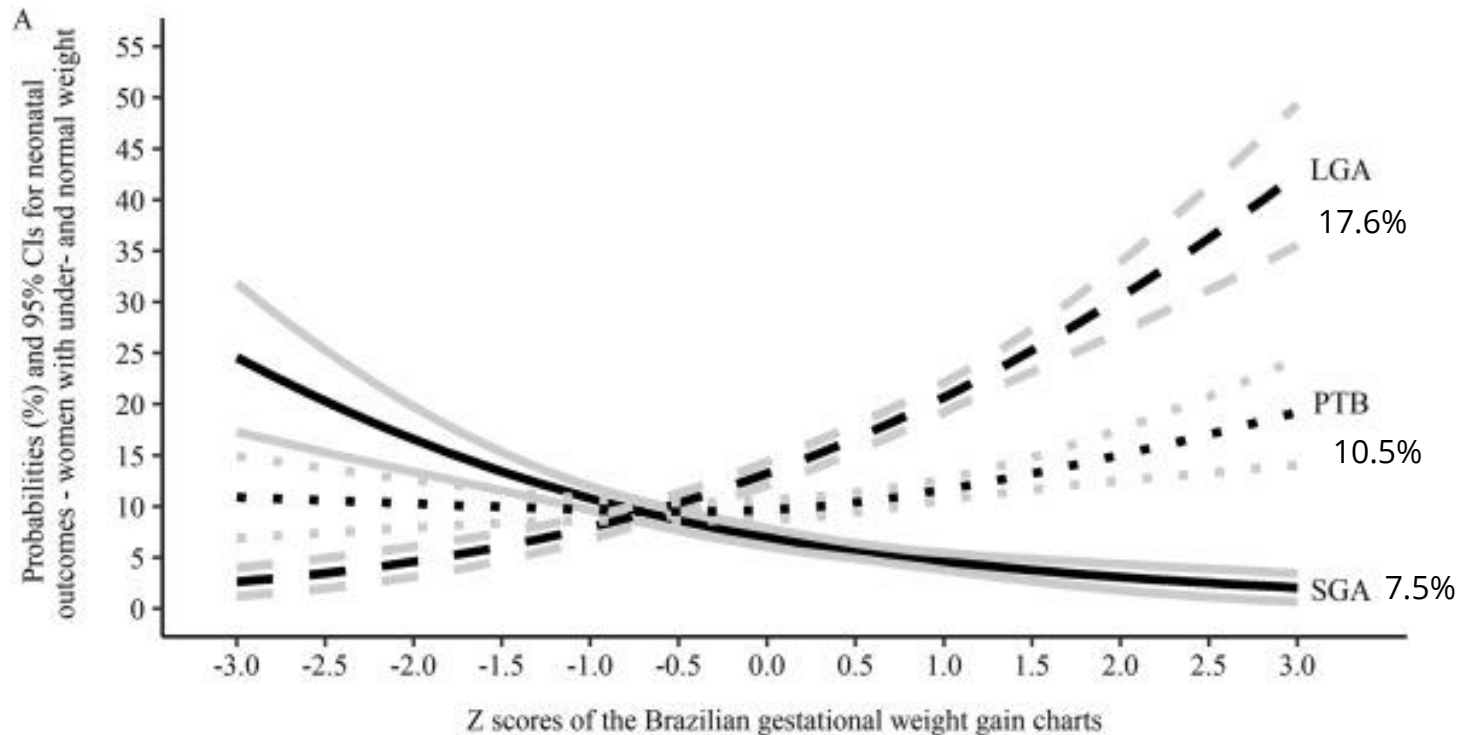


DEFINITION OF GWG RANGES

- Method proposed by Hutcheon & Bodnar (2014)
 - Analysis by pre-pregnancy BMI category (underweight + normal, overweight and obesity)
 - Analysis of total GWG in z scores of the Brazilian charts
 - Logistic regression: probabilities for each outcome separately
 - Poisson regression: risks for combined outcomes (equally- and severity-weighted)



GWG RANGES – NEONATAL OUTCOMES

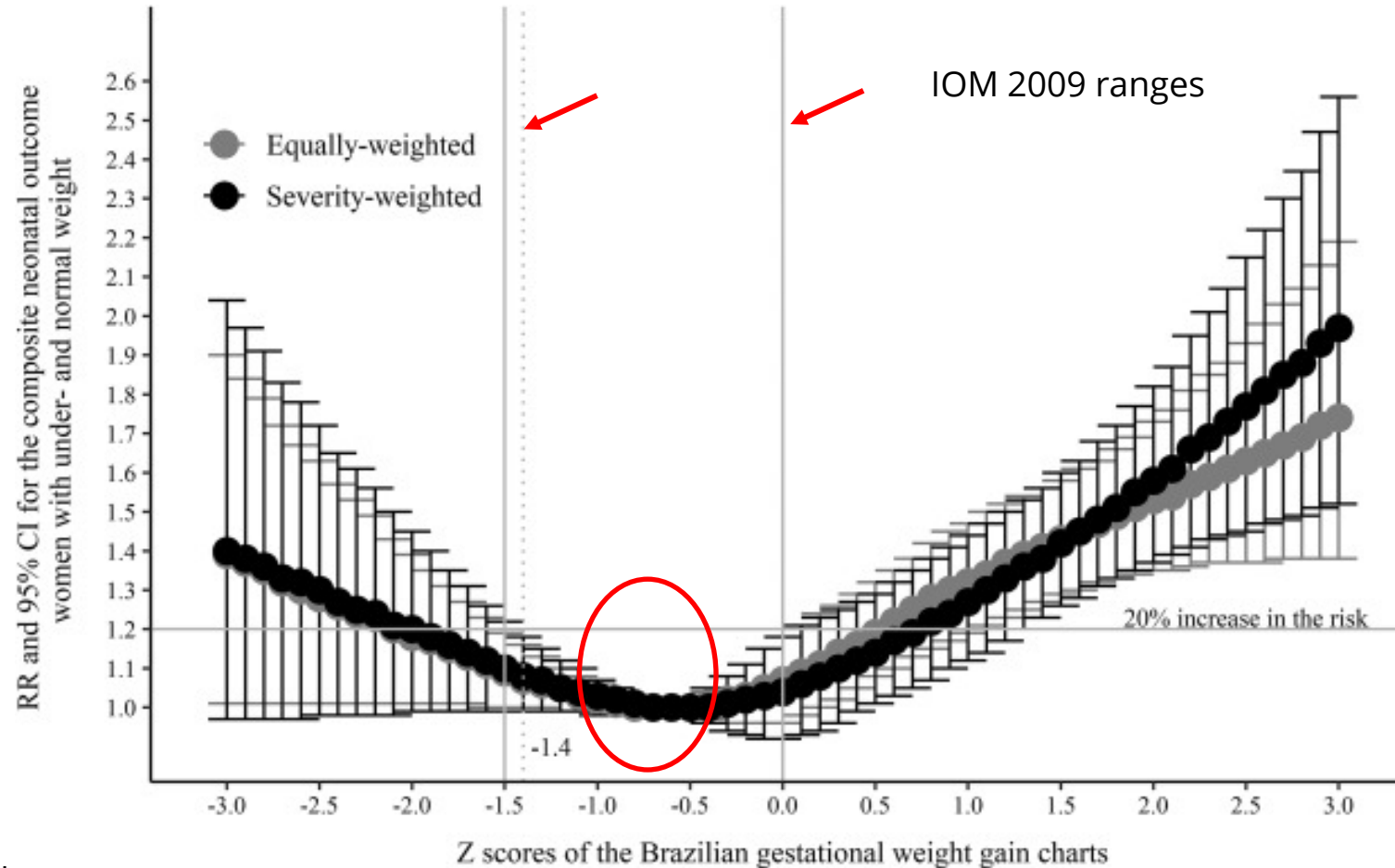


For all BMI categories

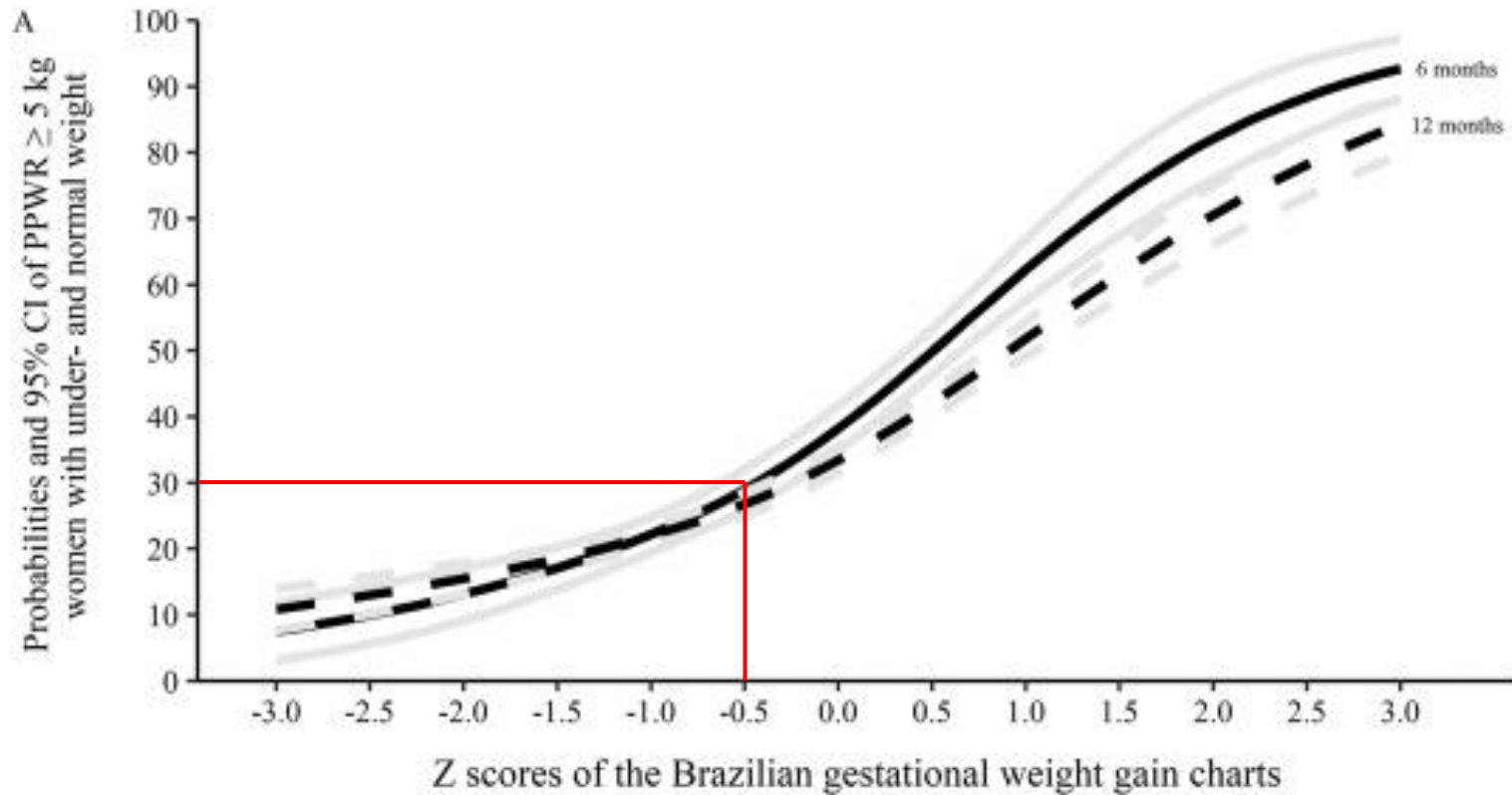
- ↑ GWG z scores ↑ probability of LGA
- ↓ GWG z scores ↓ probability of SGA



GWG RANGES – NEONATAL OUTCOMES



GWG RANGES – MATERNAL OUTCOMES



The GWG z scores that minimized the risk of neonatal outcomes (-0.5) corresponded to **higher probabilities** (20 - 30%) of **excess postpartum weight retention at 6 and 12 months**

*PPWR ≥ 5 kg at 6 months (33.2%) and at 12 months (31.4%)



GWG RANGES

- **2022:** Meeting with experts to define the thresholds to be adopted in the guideline

BMI category (kg/m ²)	Noninferiority margins	GWG z-scores	GWG percentiles	GWG in kg (exact values)	Probability of PPWR in the upper limit of the ranges			
					6 mo postpartum		12 mo postpartum	
					PPWR ≥ 5 kg	PPWR ≥ 10 kg	PPWR ≥ 5 kg	PPWR ≥ 10 kg
Under- and normal weight (< 25.0)	5%	−0.9 to −0.4	18.4 to 34.5	Underweight 9.7–12.2 Normal weight 9.6–11.9	30.6	6.4	27.9	7.6
	10%	−1.1 to −0.3	13.6–38.2	Underweight 8.8–12.6 Normal weight 8.7–12.4	32.4	6.9	29.2	8.1
	15%	−1.3 to −0.1	9.7–46.0	Underweight 7.8–13.6 Normal weight 7.7–13.4	36.2	8.1	31.9	9.3
	20%	−1.4 to 0.0	8.1–50.0	Underweight 7.2–14.1 Normal weight 7.2–13.8	38.3	8.9	33.4	10.0

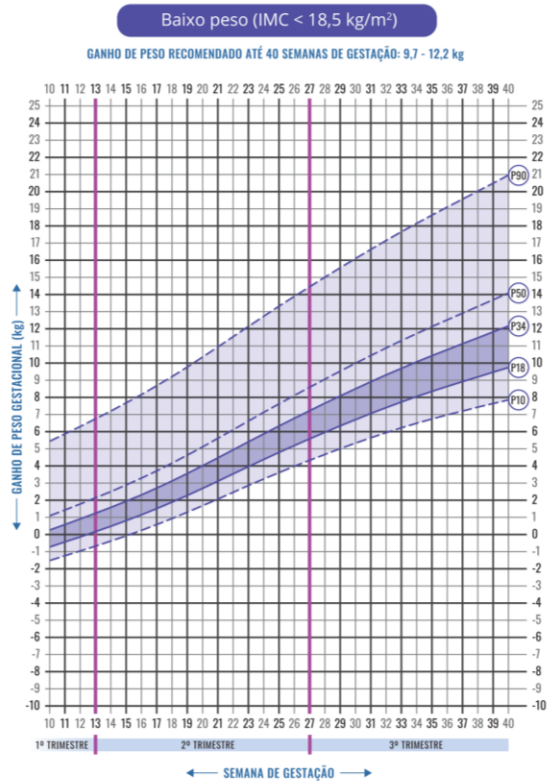


NEW BRAZILIAN GWG GUIDELINE (charts + ranges)

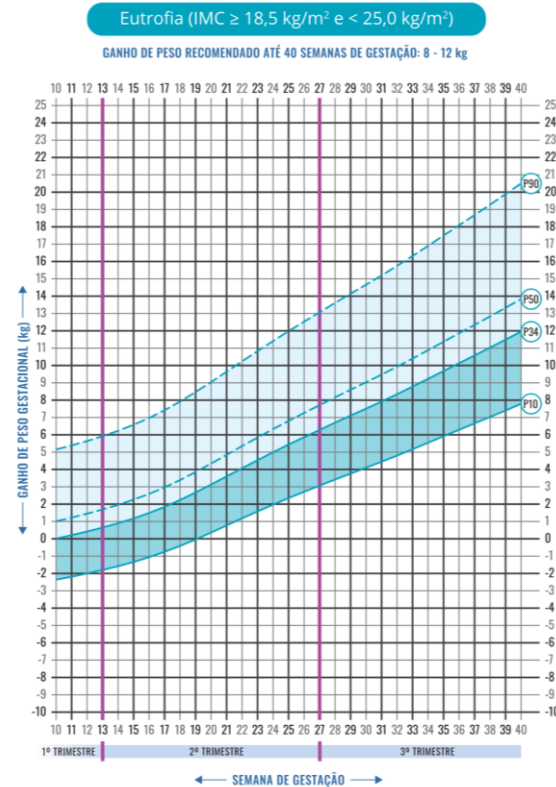
BMI category	Percentiles	Brazilian GWG ranges at 40 weeks (kg)	IOM 2009 (kg)
Underweight	P18 – P34	9.7 – 12.2	12.5 – 18.0
Normal weight	P10 – P34	8.0 – 12.0	11.5 – 16.0
Overweight	P18 – P27	7.0 – 9.0	7.0 – 11.5
Obesity	P27 – P38	5.0 – 7.2	5.0 – 9.0



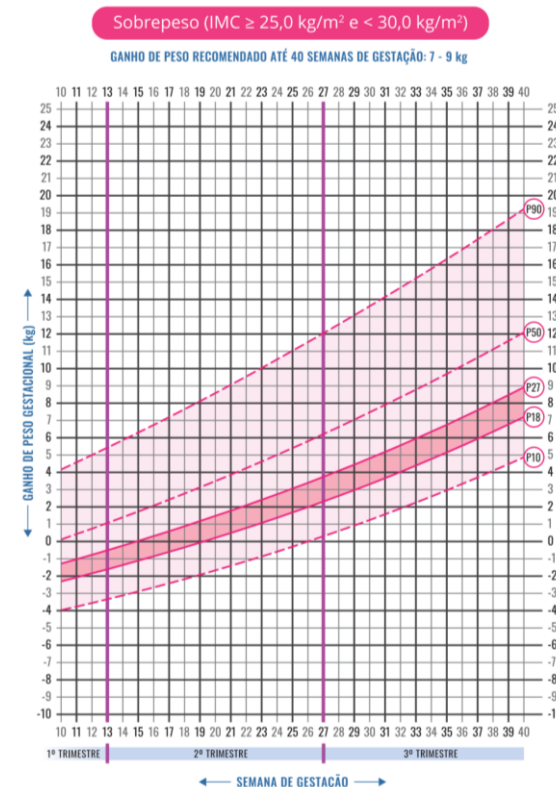
NEW BRAZILIAN GWG GUIDELINE (charts + ranges)



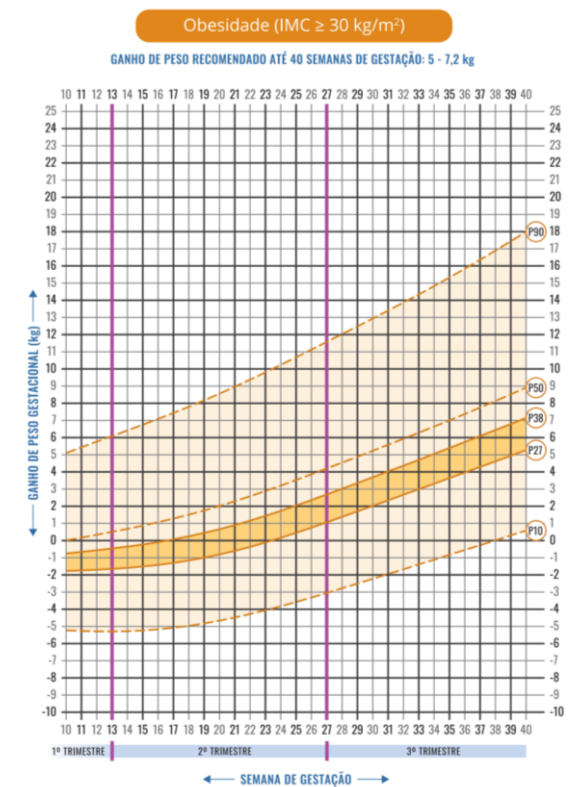
Underweight



Normal weight



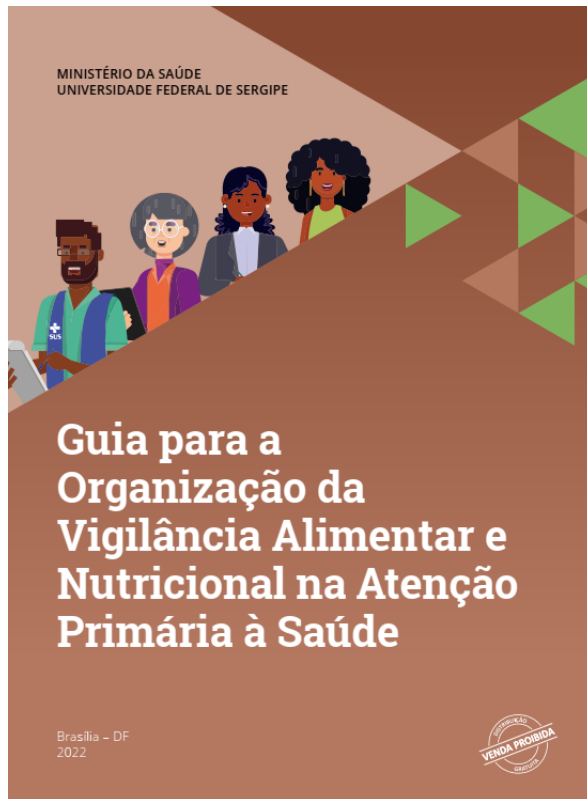
Overweight



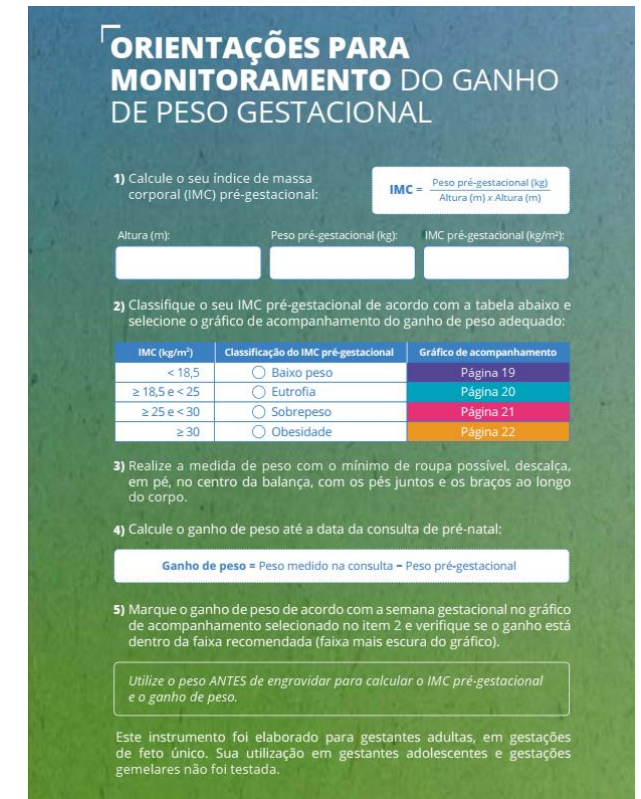
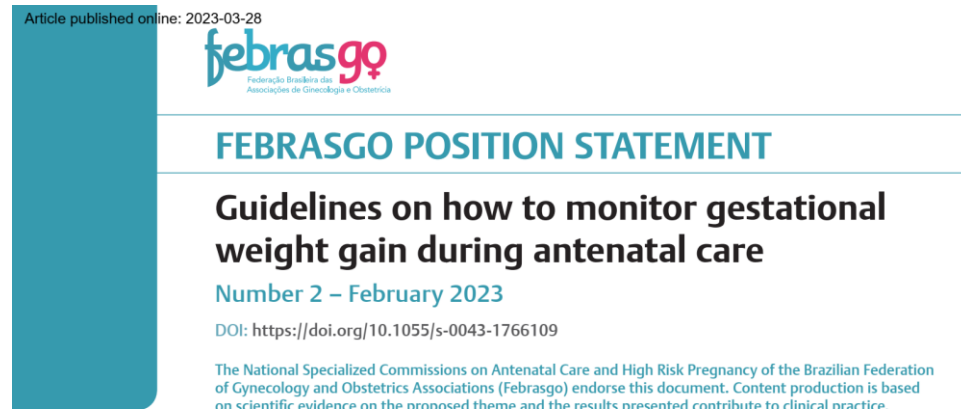
Obesity



BRAZILIAN GWG GUIDELINE AND TOOLS



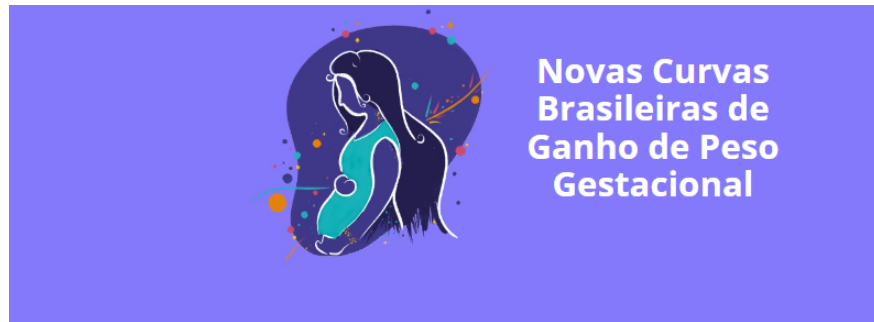
Food and Nutrition Surveillance data collection guide



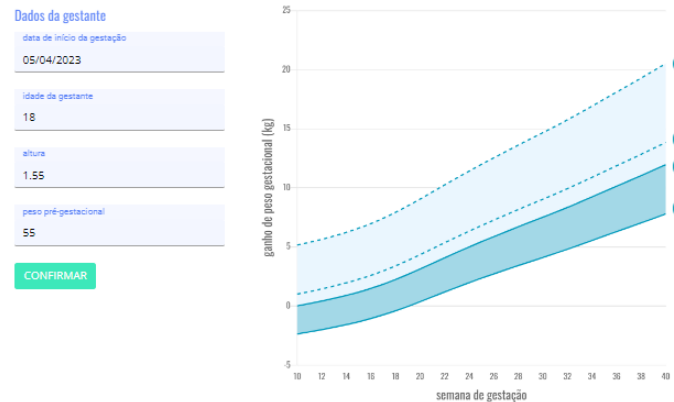
Antenatal care passport



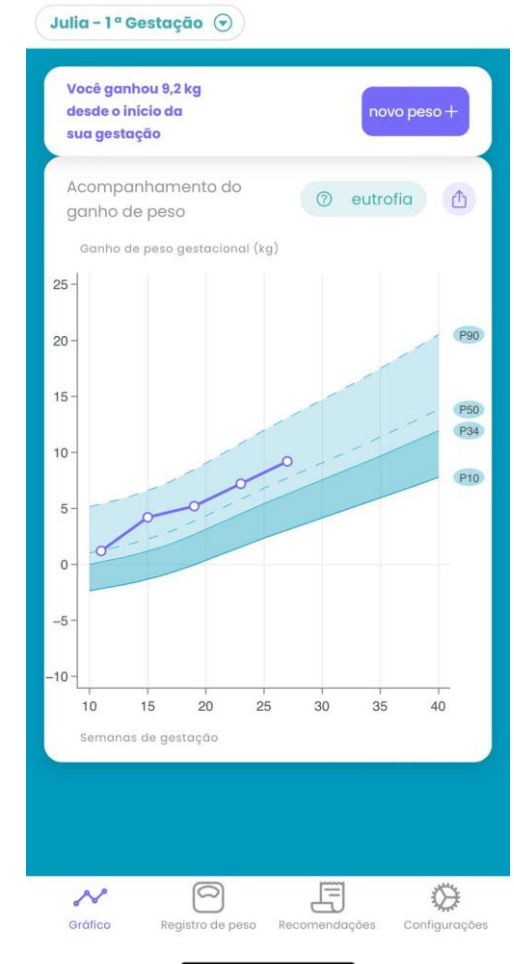
BRAZILIAN GWG GUIDELINE AND TOOLS



Abaixo, você pode inserir os dados antropométricos e ver a curva de ganho de peso de cada mulher ao longo da gestação



<https://observatorio.nutricao.ufrj.br/curvas>



Android/ iOS app



Final remarks



FINAL REMARKS

- Brazilian GWG guideline were an unprecedented initiative in a middle-income country
 - Methodological rigor and re-use of data
 - GWG charts are a valuable tool for monitoring maternal nutritional status during pregnancy and preventing adverse outcomes
 - Identification of thresholds linked to lower risk of maternal and infant outcomes



FINAL REMARKS

- Comparisons between the new Brazilian GWG guideline and the IOM 2009
 - Using the IOM in Brazil could be leading to an increased risk of outcomes
 - Prevalence of outcomes is relevant
 - Considering maternal outcomes is key



FINAL REMARKS

- Creating tools to facilitate the uptake of the charts is essential
 - Official documents and national system
 - Tools for pregnant people (app website)
 - Package for capacity building of healthcare professionals



GLOBAL MONITORING OF GWG

- Lack of an adequate tool
 - Local charts are not appropriate on a global scale
 - Most available GWG charts are from high-income countries
 - International charts constructed to data have limitations
- WHO-GWG project
 - **Goal:** To develop global GWG charts and to identify thresholds on the charts that define optimal weight gain ranges



THANK YOU!

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