The impact of gestational weight gain on fetal and neonatal outcomes: The Araraquara Cohort Study, Brazil

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BACKGROUND

Pregnancy is a critical window in maternal and child health, where gestational weight gain (GWG) emerges as a determinant factor for fetal well-being and development.

Excessive GWG is associated with an increased risk of metabolic complications, hypertension, gestational diabetes, cesarean section, postpartum weight retention, macrosomia, childhood obesity, and cardiometabolic outcomes in childhood. Conversely, GWG below is linked to an elevated risk of intrauterine growth restriction, low birth weight, preterm birth, perinatal mortality, and a higher incidence of newborns small for gestational age (SGA).

Given this context, the objective of this study is to evaluate the effect of GWG outside the recommendations of the Institute of Medicine (IOM) on fetal and neonatal outcomes.

METHOD

A prospective cohort study with 1642 pregnant women selected from 2017-2023, with gestational age ≤ 18 weeks and followed until delivery in the city of Araraquara, Southeast Brazil. The relationship between GWG on fetal and neonatal outcomes

The Kruskal-Wallis test was used for continuous variables and the chi-square or Fisher's exact test for categorical ones. Generalized Linear Models were applied to associate GWG with neonatal outcomes (Linear regression for continuous and logistic for binary).

For fetal outcomes, longitudinal analysis with Generalized Estimating Equation (GEE) was used, considering the correlation between repeated observations of each pregnant woman.
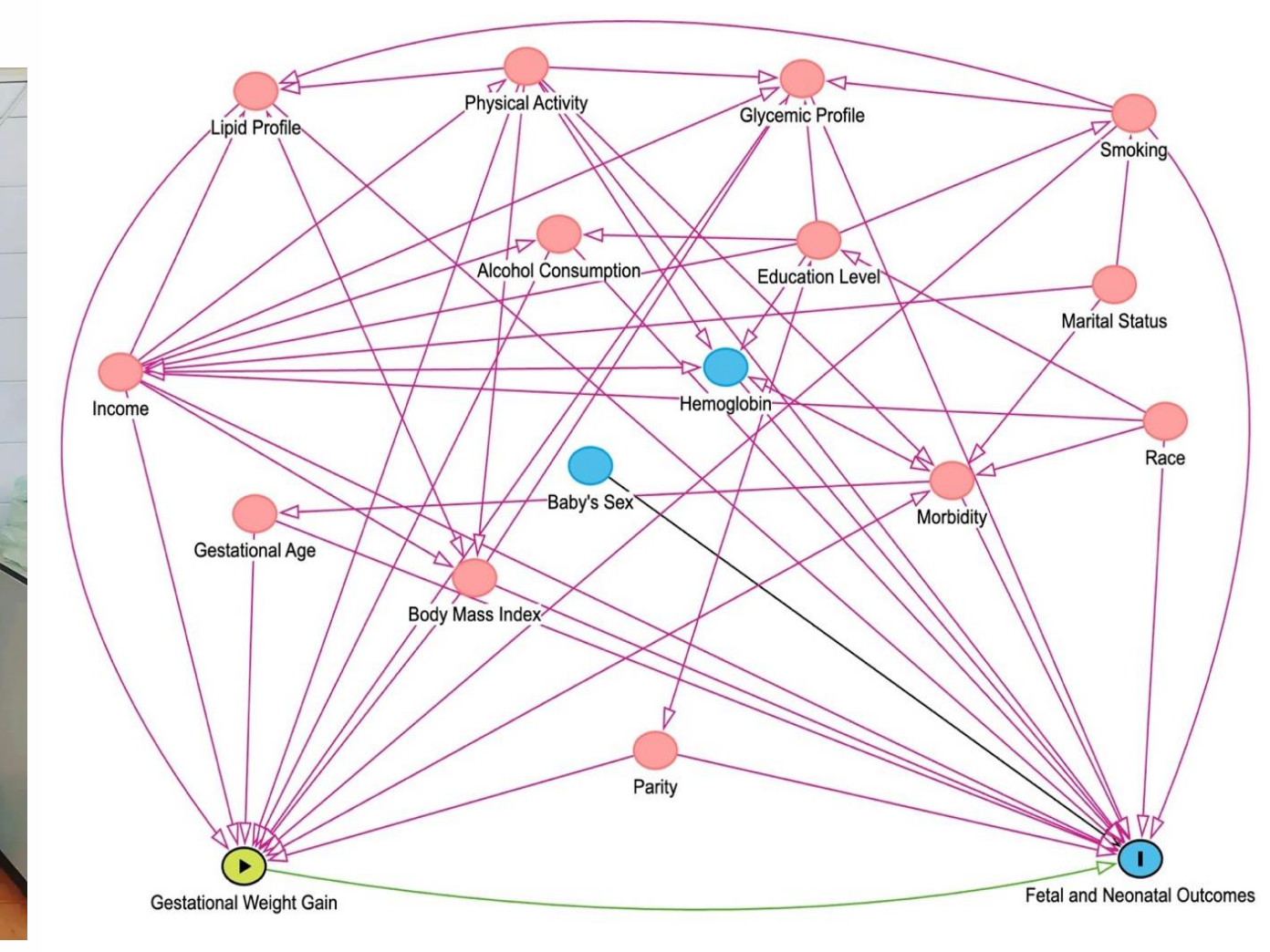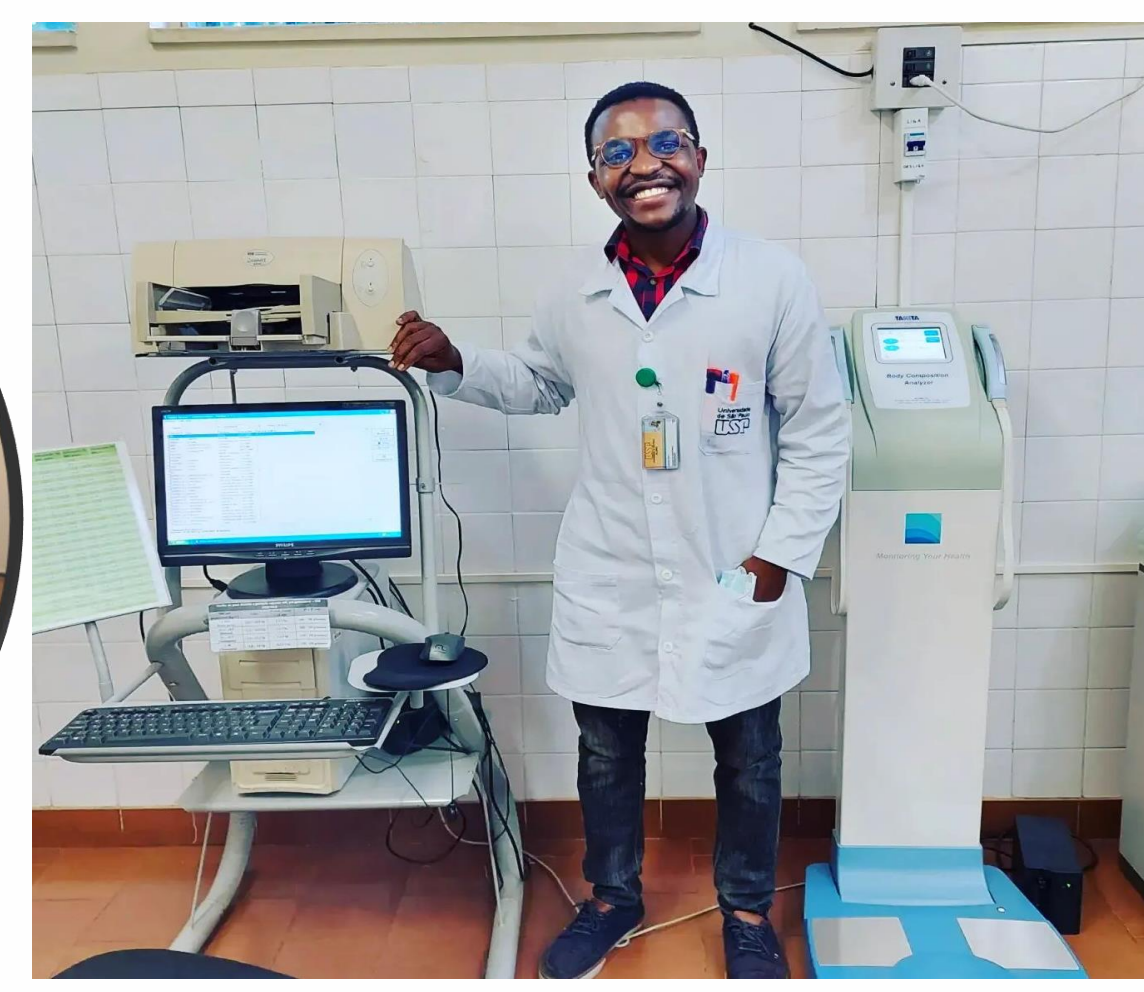
RESULTS

GWG below increases the risk of intrauterine growth restriction, low birth weight, and prematurity, while also reducing the chance of having a LGA baby. Also, It leads to smaller birth size and less neonatal fat. On the other hand, GWG above increases the likelihood of a LGA, lower Apgar scores, and higher birth weight.

Outcomes	Gestacional weight gain (IOM-2019)			
	Below	Above	Below	Above
	Crude OR (IC95%)	Crude OR (IC95%)	Adjusted OR (IC95%)	Adjusted OR (IC95%)
Intrauterine growth restriction (FGR)	**1.53 (1.11–2.10)**	1.27 (0.92–1.74)	**1.61 (1.14–2.27)**	1.26 (0.89–1.78)
Prematurity	**2.34 (1.81–3.02)**	1.19 (0.91–1.57)	**2.35 (1.81–3.05)**	1.24 (0.94–1.64)
Apgar score at 5 minutes	0.58 (0.26–1.28)	**0.34 (0.16–0.71)**	0.52 (0.24–1.16)	**0.42 (0.20–0.87)**
Small for gestational age (SGA)	1.18 (0.92–1.50)	0.78 (0.60–1.01)	1.18 (0.92–1.53)	0.77 (0.59–1.00)
Large for gestational age (LGA)	**0.43 (0.32–0.60)**	**1.54 (1.21–1.95)**	**0.38 (0.28–0.54)**	**1.53 (1.20–1.96)**
Low birth weight (LBW)	**2.32 (1.78–3.03)**	1.17 (0.88–1.55)	**2.44 (1.85–3.21)**	1.21 (0.91–1.62)

Outcomes	Gestacional weight gain (IOM-2019)			
	Below	Above	Below	Above
	β (IC95%)	β (IC95%)	β adj (IC95%)	β adj (IC95%)
Abdominal subcutaneous tissue thickness (TSA)	-0.02 (-0.10-0.06)	0.01 (-0.06-0.09)	-0.00 (-0.06-0.06)	0.05 (-0.00-0.11)
Arm subcutaneous tissue area (TSB)	-0.14 (-0.35-0.07)	0.06 (-0.15-0.27)	**-7.99 (-8.97-7.02)**	-0.08 (-0.17-0.01)
Thigh subcutaneous tissue área (TSC)	**-0.55 (-1.04 - -0.06)**	-0.16 (-0.62-0.31)	-0.25 (-0.45-0.05)	-0.01 (-0.20-0.19)
% Fat mass (%FM)	-0.28 (-0.76-0.20)	**2.52 (2.09–2.95)**	**-0.85 (-1.12-0.58)**	1.21 (0.94-1.48)
% Fat-free mass (%FFM)	1.51 (0.09–2.94)	0.87 (-0.41-2.15)	1.05 (-0.39-2.49)	0.52 (-0.86-1.91)
Birth length	**-0.79 (-1.07-0.51)**	-0.22 (-0.56-0.12)	**-0.76 (-1.03-0.49)**	-0.26 (-0.60-0.08)
Fetal weight	-62.9 (-136.4–10.6)	-39.8 (-112.1-32.5)	-17.73 (-38.07-2.61)	7.50 (-13.03-28.04)
Birth weight	**-175.2 (-214.2-136.3)**	**98.5 (61.5-135.4)**	**-189.30 (-227.9-150.7)**	**90.14 (53.3-127)**

CONCLUSIONS

This study underscores the imperative for targeted policies and interventions to manage GWG, which is critical for fetal and neonatal health. Effective weight monitoring and control strategies are essential to prevent insufficient or excessive gains, fostering a healthy pregnancy and averting neonatal complications.

ACKNOWLEDGEMENT

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