Gestational weight gain at the national, regional, and income group levels based on national surveys from low-income and middle-income countries

Janaína Calu Costa

Universidade de São Paulo, São Paulo, Brazil

Harvard T.H. Chan School of Public Health, Boston, USA

International Center for Equity in Health, Pelotas, Brazil

September 27, 2024

RESEARCH ARTICLE

Gestational weight gain at the national, regional, and income group levels based on 234 national household surveys from 70 low-income and middle-income countries

Janaína Calu Costa[1,2]*, Dongqing Wang[3], Molin Wang[4,5], Enju Liu[6,7], Uttara Partap[1], Ilana Cliffer[1], Wafaie W. Fawzi[1,6,8]

Background

- Gestational weight gain (GWG): the amount of weight a woman gains during pregnancy is important for woman's and offspring's health
    - **Insufficient GWG:** low birth weight, small- and short-for-gestational-age babies, and failure to initiate breastfeeding
    - **Excessive GWG:** obstetric complications, cesarean deliveries, and post-partum weight retention for the mother and prematurity, large-for-gestational-age newborns, macrosomia, and childhood overweight or obesity for the offspring

- Most of the available evidence on GWG is from high-income countries, while in low- and middle-income countries (LMICs), little information is available

- Limited representative longitudinal data is available for LMICs

- Efforts have been made to use cross-sectional data from specific coun... (e.g., India and sub-Saharan Africa)

Objective

We aimed to use data from nationally representative cross-sectional surveys to expand previous analyses by describing GWG distribution in LMICs in the year 2020 by country and its inequalities by income groups and geographic regions

Methods

- Demographic and Health Surveys (DHS) and other national surveys
    - 234 surveys from 70 countries (1991-2007); number of surveys per country from 1 to 16

- Sample of pregnant women aged 15-49 years (2nd and 3rd trimester)
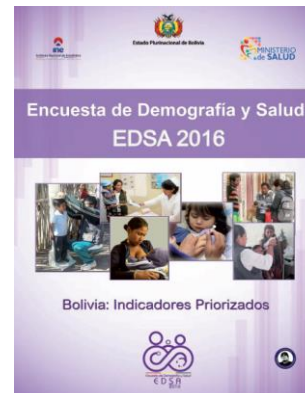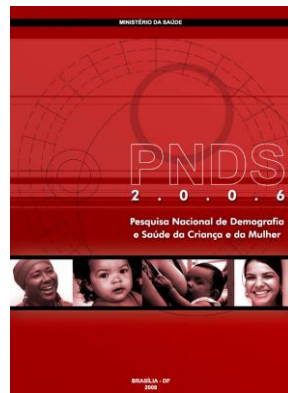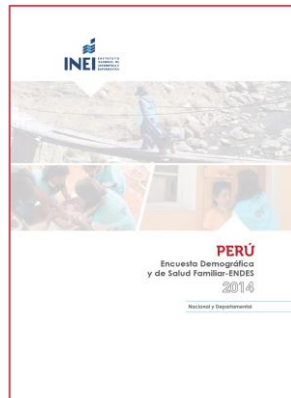
Methods

Statistical Analyses

1. Using survey data

1.1. Survey-specific average monthly GWG

- Regressing cross-sectional weight on the gestational age
- Covariates: women's age and education, the number of children ever born, urban/rural residence, and quintiles of household wealth
- Survey-specific beta coefficient represents the average monthly GWG

1.2. Total GWG

- Survey-specific GWG * average duration of the two last trimesters of a full-term pregnancy * relative weight gained in the third trimester compared to the second trimester.

Methods

Statistical Analyses

2. Hierarchical mixed-effects model

- <u>Dependent variable:</u> country-specific total GWG obtained from the surveys

- <u>Independent variables:</u> survey year and other country-level covariates

  - Final model: mean adult female BMI, GDP per capita, and total fertility rate

- The coefficients of the model were used to calculate the mean GWG for each LMIC in 2020

- Estimates were weighted by the number of births in 2020 to obtain regional and income group-level GWG estimates

- For descriptive purposes, observed GWG was compared to the IOM recommendations for women with normal weight and underweight

Results

Group	Number of Countries	GWG Estimate (kg)	95% UR
Region			
Central Europe, Eastern Europe, and Central Asia	21	13.0	9.0; 16.9
Latin America and the Caribbean	3	10.4	7.4; 13.4
Southeast Asia, East Asia, and Oceania	5	9.3	6.2; 12.3
East Asia	25	10.1	7.1; 13.0
Oceania	2	5.8	2.1; 9.5
Eastern Sub Saharan Africa	6	4.4	2.0; 6.9
Country Income Group			
Low-income	31	5.3	2.7; 7.9
Lower-middle-income	47	7.6	5.2; 10.1
Upper-middle-income	59	9.8	7.1; 12.5

Gestational weight gain (GWG) estimates for the year 2020 by regions and national income level derived from hierarchical modeling.
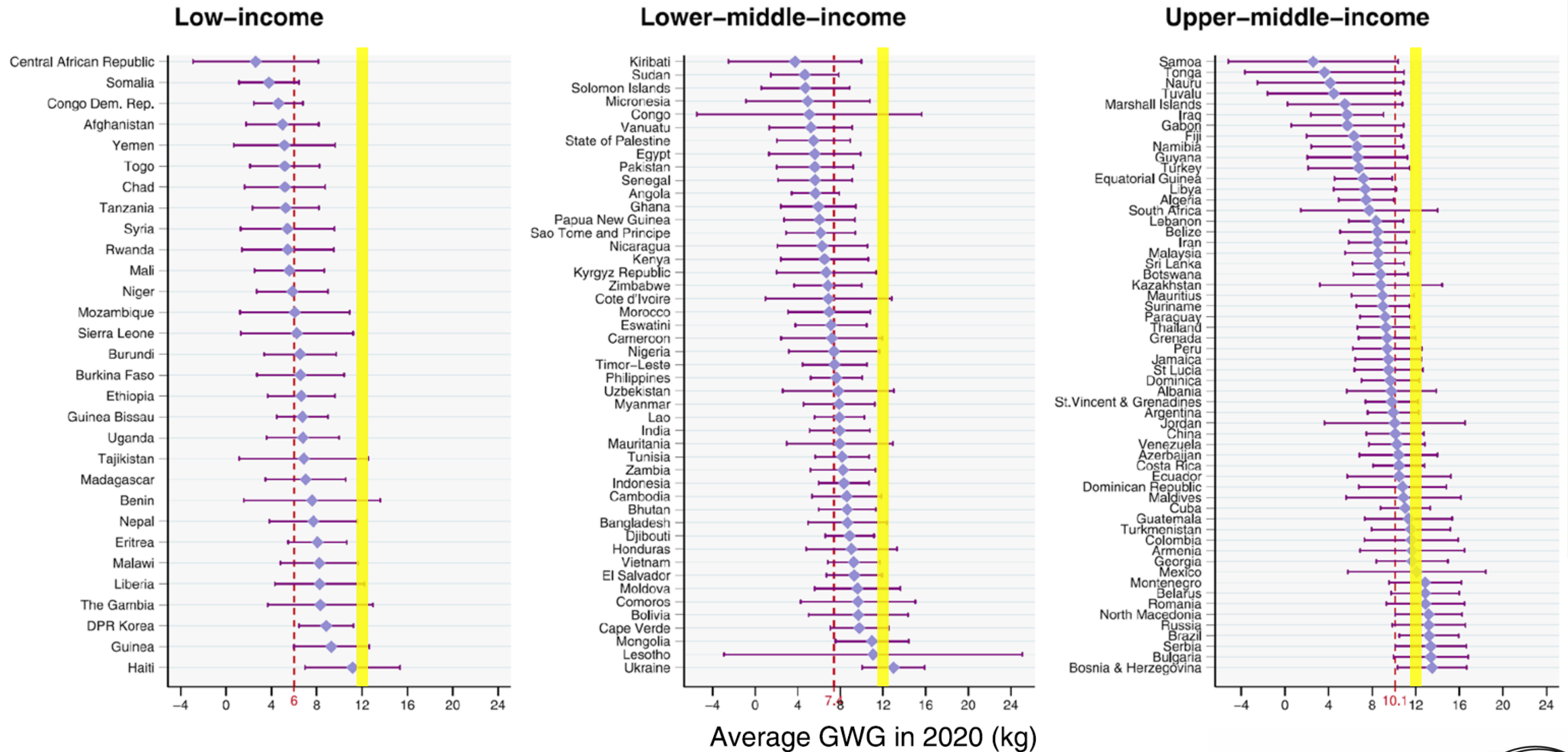
Average country-specific gestational weight gain (GWG) estimated for the year 2020 using hierarchical modeling and the corresponding 95% uncertainty range by income group

Discussion

- In most countries, the average GWG was below the recommendation
  - Central Europe, Eastern Europe, and Central Asia region within the expected range
  - sub-Saharan Africa, North Africa and the Middle East, and South Asia presented the lowest estimates
    - India and SSA: ~7 kg in a full-term pregnancy (Coffey 2005, Gebremedhin 2021)
    - Average GWG for HIC (Europe, North America, and Oceania) = 14 kg Santos (2018)
    - Using data from 55 longitudinal studies from LMICS: 53.9% inadequate GWG (16% to 88%) Darling (2022)
  - positive gradient in the average weight gain during pregnancy across country income groups
    - Highest prevalence of undernutrition among women in low-income countries and the poorest groups in middle-income countries (Victora 2021)

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Discussion

- Progress has been uneven across and within regions and countries

- Experience of inadequate GWG, may set the stage for a repeated pattern of malnutrition across generations

- Interventions and monitoring should always apply an equity lens as an integral component

Discussion

- Limitations
  - Cross-sectional nature of data and use of aggregated estimates
  - Lack of regional representativeness
  - Pregnancy status and duration based on women's recall
  - No pre-pregnancy information available
  - IOM recommendations based on data from North American women

- Strengths
  - Standardized analysis of multiple surveys
  - Use of nationally representative data, including DHS and non-DHS surveys
  - Overview of regional and income-group inequalities

  - Addition to efforts to properly monitor weight gain during pregnancy

Thank you!

Co-authors:
Dongqing Wang
Molin Wang
Enju Liu
Uttara Partap
Ilana Cliffer
Wafaie W. Fawzi

BILL & MELINDA GATES *foundation*

jcosta@hsph.harvard.edu

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024