

Data-Driven Frameworks for Personalized Low-Birth-Weight Assessment



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12:00 – 1:00 PM
BMI Classroom 4004
Woodruff Memorial Research Building

or

Join us on Zoom link:
<https://zoom.us/j/93242171184>



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Abstract: Birth weight (BW) is a critical measure of infant health and nutritional status. Among the factors influencing BW, maternal height is one of the strongest, as taller mothers tend to deliver heavier newborns. In the US, infants born to Caucasian mothers, who, on average, are taller than mothers of other ethnicities, are more likely to exceed the World Health Organization's (WHO) low birth weight (LBW) cutoff of 2,500 g. Since this threshold was originally established using predominantly Caucasian populations, its universal applicability across diverse ethnic groups is questionable. To address this, we investigated alternative methods for deriving LBW cutoffs that consider maternal differences. Using the 2022 CDC birth dataset, we conducted a two-stage analytical approach. First, we applied conditional inference trees and a fuzzy inference model to examine the relationship between maternal height, BW, and Apgar scores. Second, we used an ensemble of five machine learning regressors to estimate BW thresholds associated with normal Apgar outcomes. Our results indicate that under the fixed WHO standard, the likelihood of achieving a normal Apgar score decreases as maternal height increases. This suggests that some infants above the 2,500 g cutoff may still face health risks. We conclude that an adjustable LBW threshold incorporating maternal height is essential for more accurate newborn risk assessment and improved health outcomes.

Biography: Camilo Valderrama is an Assistant Professor in the Applied Computer Science department at the University of Winnipeg (Canada). His research program aims to develop methodologies integrating machine learning, statistics, and signal processing to extract patterns from different data types to improve patient safety, reduce risks, and promote well-being. His previous research includes applications to reduce perinatal deaths in vulnerable communities, reduce patient risks in ICUs by identifying redundant blood tests, monitor and reduce long-term consequences of unhealthy food ads on children, and detect emotions from EEG signals to support patients with emotional disorders.

Before joining the University of Winnipeg, he was a postdoctoral associate at the University of Calgary (Canada) for two years. He earned his Ph.D. in Computer Science with a Biomedical Informatics concentration from Emory University (Atlanta, GA, USA). Prior to his doctoral studies, Camilo received his Master of Science in Informatics and his Bachelor of Science in Software Systems Engineering from Universidad Icesi (Cali, Colombia).