GROWTH TRAJECTORIES OF BODY MASS INDEX IN EARLY CHILDHOOD AND THEIR ASSOCIATION WITH SOCIOECONOMIC STATUS: LONGITUDINAL STUDY FROM THE PEDIANET VENETO COHORT.

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Background:

The prevalence of childhood obesity has been steadily increasing worldwide, raising concerns about the long-term consequences for children's health and well-being. Understanding the factors contributing to these trends is crucial for developing effective interventions and policies. One important aspect is socioeconomic status (SES) disparities, since previous studies with available longitudinal data have indicated that children from lower socioeconomic backgrounds are at a higher risk of developing obesity compared to their higher socioeconomic counterparts[1,2]. Only a few studies have examined the development of BMI or BMI z-score trajectories in childhood using group-based trajectory modelling[1,3,4]; evidence from these studies revealed mixed results regarding the timing at which distinct BMI trajectories by socioeconomic status emerge. Therefore, there is a need for more studies that can provide further insights into the dynamic nature of children's body mass trajectories.

Aim:

To address this research gap, the primary objective of this paper is to identify BMI trajectories among children aged 2 to 10 years old assisted by Veneto family paediatricians (FPs) and included in the PEDIANET network. Furthermore, this study aimed to determine whether these trajectories are associated with SES.

Methods:

This study used geo-referenced data from the PEDIANET child cohort to determine their area deprivation index (ADI)—a social and material deprivation measure calculated at the census block level and consisting of 5 socioeconomic items. 10,167 children from Veneto were identified after excluding (1) children born before 2013 or after 2021; (2) children not having at least one BMI measurement for each selected time-frame ([24-60) months, [60-96) months, [96-120) months; (3) children with missing information on the ADI. BMI z-scores were calculated according to World Health Organization (WHO) growth standards before the analyses. Trajectories of BMI z-scores were calculated using latent growth mixture models (LCGA), a semi-parametric finite mixture approach able to identify underlying subgroups/classes of homogeneous individuals (having a similar trajectory). We estimated possible combinations of trajectory shapes (linear, quadratic), in 2,3,4,5 trajectory models. We considered several factors to determine trajectory shape and

number, including a model maximizing the Bayesian information criterion (BIC), the Akaike information criterion (AIC), and enabling the best repartition of subjects and interpretation.

Conducting a stratified analysis by sex showed no differences in the number of groups or trajectory shapes compared to the original aggregate estimate. This indicates that there were likely no substantial differences in development by sex. Thus, to increase power, males and females were analysed together. We subsequently tested their associations with the ADI categorized in quintiles based on the regional levels using a multinomial logistic model, adjusting for sex and including a random intercept on the FP. Membership in the atypically elevated trajectory group vs the other groups was also investigated. As sensitivity analyses, BMI trajectories were identified in children having at least one measurement in two of the selected time-frame (n=30,746 children). All the analyses will be updated on a national level.

Results:

We included in the analysis 5311 boys and 4856 girls followed by 69FPs having on average 4 measurements (IQR:3-7). Quadratic trajectory shapes with a 4-trajectory solution had the best-fitting maximizing BIC and AIC, and enabling an adequate repartition of subjects and interpretation. The identified trajectories were: “stable-low BMI” (26.0%), “normal BMI” (42.1%), “stable-high BMI” (24.9%), and “early-increase BMI” (7.0%), as shown in Figure 1. The probability of membership to the “early-increase BMI” trajectory was significantly higher for those with the highest deprivation quantile compared to the least deprived subjects (OR: 1.35; 95% CI: 1.02-1.69).

Conclusions:

This study shows heterogeneity in patterns of growth trajectories, emphasizing the need to investigate dynamic patterns of children's body mass changes. Our preliminary findings also suggest that SES inequalities may play a role in developing e specific pattern over time. By considering multiple time points, this work can assess the potential impact of socioeconomic factors on both short-term and long-term body mass changes, shedding light on the underlying social determinants and informing targeted interventions to reduce health disparities.

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Figure 1. BMI z-scores trajectories from 2 to 10 years. Group trajectories, class 2: “early-increase BMI” (7.0%, n=715), class 1: “stable-high BMI” (24.9%, n=2526), class 4: “normal BMI” (42.1%, n=4285), class 3: “stable-low BMI” (26.0%, n=2641).