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ObesityShield AI-Powered Prenatal-to-Childhood Health System

ObesityShield addresses the rising global burden of childhood obesity by integrating AI-driven prenatal prediction with personalized early-childhood health management, grounded in the DOHaD framework and WHO's life-course approach.

I. Unmatched Longitudinal Data Foundation

As China's leading specialized maternity hospital, we hold a structural data advantage that general hospitals cannot replicate: fully linked electronic health records spanning preconception, pregnancy, delivery, and childhood within a single institution. This has generated 34,631 parent-child triads — one of the largest longitudinal maternal-child cohorts in China — providing an irreplaceable evidence base for AI-driven research into the developmental origins of obesity.

II. High-Performance Prenatal Prediction Model

Leveraging this cohort, we built an XGBoost-based prediction model for macrosomia and downstream childhood obesity risk, achieving AUC = 0.91. The top five clinically actionable predictors — pre-pregnancy BMI, gestational weight gain, gestational age at delivery, late-pregnancy triglycerides, and late-pregnancy alkaline phosphatase — are all measurable during pregnancy, enabling accurate risk stratification months before birth.

III. Closed-Loop Integrated Intervention System

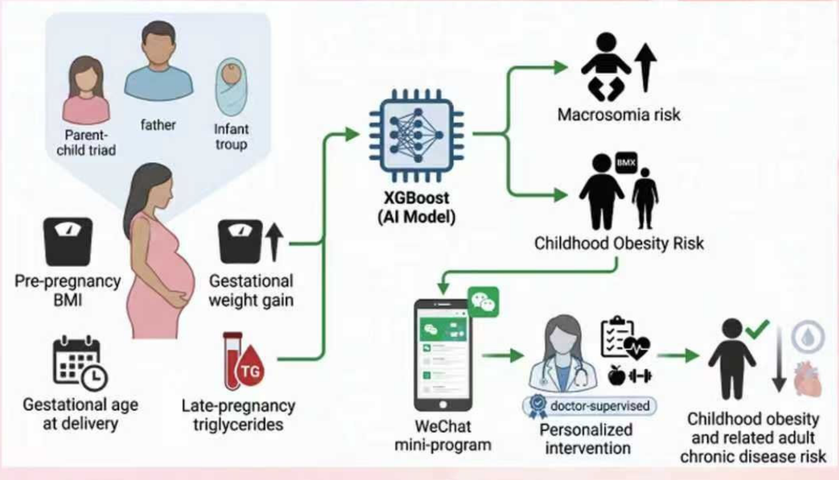
Risk predictions are directly translated into personalized care plans, consistent with WHO recommendations for comprehensive, family-centered interventions. An intelligent clinical decision support plugin, seamlessly integrable into hospital HIS systems, delivers tailored guidance on nutrition, physical activity, and sleep, with all AI-generated plans reviewed and supervised by child healthcare doctors. This system eliminate fragmentation between maternity and childhood healthcare services, creating a continuous care pathway from prenatal risk detection to childhood follow-up.

IV. Global Impact and Collaboration

ObesityShield directly responds to WHO's call to end childhood obesity by 2030. By intervening at the earliest developmental origins of disease, it reduces lifelong risks of type 2 diabetes, cardiovascular disease, and other non-communicable diseases, easing health system burdens worldwide. Its scalable, low-cost model is readily adaptable across diverse healthcare contexts, particularly in low- and middle-income countries facing the double burden of malnutrition.

基于数据驱动的巨大儿预测模型构建个性化儿童肥胖防治体系

Data-Driven Macrosomia Prediction Model for Building a Personalized Childhood Obesity Prevention and Control System



Grounded in the Developmental Origins of Health and Disease (DOHaD) theory, this project develops a data-driven AI prenatal model to predict macrosomia and subsequent childhood obesity, specifically targeting high-risk populations. Leveraging China's leading maternity hospital's unique linked prenatal-pediatric follow-up cohort, we trained an XGBoost model on 34,124 parent-child triads, achieving a test AUC of 0.91. Top predictors include gestational age at delivery, pre-pregnancy BMI, late-pregnancy weight gain, triglycerides, and alkaline phosphatase. A WeChat mini-program delivers pediatrician-supervised personalized interventions, advancing people-centered maternal and child health care and shifting from reactive treatment to proactive early prevention.

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