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Title: Ethnic and nutritional determinants of respiratory function in East London children

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Body: Background Poor lung health in childhood is an important problem in deprived multicultural UK inner cities and there are no normative standards for lung function in South East Asians, Black Africans or mixed ethnicity. Aim To explore the relationship between ethnicity and nutritional status on lung function in an area of marked ethnic diversity and child poverty. Methods Lung function was measured in 1000 children from 23 east London schools (2008-11). Mixed effects models were constructed allowing for random effect of school, adjusted for age, sex, height, deprivation score (IMD) and study year adding either BMI or reported ethnicity. Children were typed for 27 randomly spaced DNA markers. Results 358 (36.9%) children reported Asian ethnicity, 270 (27.1%) White, 249 (25.0%) Black and 128 (11.7%) mixed. Twenty (2.0%) were very underweight ($\leq 2^{\text{nd}}$ centile), 30 (3.0%) underweight ($\leq 5^{\text{th}}$ centile). Ten of 20 very underweight children (50%) were Asian. FEV₁ and FVC were higher in Whites compared with all other groups (FEV₁ 0.129 L, 95% CI: 0.098 0.160, FVC 0.169 L, 95% CI: 0.134 to 0.205). Lung function was lower in very underweight compared to other weight categories (FEV₁, -0.129; 95% CI -0.214, -0.433 L. FVC, -0.190, 95% CI -0.297 -0.084 L). Genetic markers (GM) identified three population components correlated with FEV₁ and FVC ($p < 0.001$). Reported ethnicity predicted higher FEV₁ and FVC than GM in the mixed group. Conclusions BMI and ethnicity strongly determine childhood respiratory function. Random GM and reported ethnicity equally predicted FEV₁ and FVC. In children of mixed background, GM may predict lung function better than reported ethnicity and may be an important tool for future research.