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**Title: Reassessing patterns of childhood body mass index, overweight and obesity in South Asian and Black participants in the English National Child Measurement Programme: use of ethnicity-specific BMI adjustments**

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**Abstract**

**Background:** The National Child Measurement Programme (NCMP) assesses patterns of overweight-obesity in English children. It uses body mass index (BMI), which overestimates body fatness (BF) in South Asian children and underestimates BF in Black children of presumed African ethnicity. Using previously derived BMI adjustments, ensuring that adjusted BMI was similarly related to BF in South Asian, Black and White children, we reassessed population BF, overweight and obesity patterns in these ethnic groups in NCMP.

**Methods:** Analyses were based on 2012-2013 NCMP data in 582,899 children aged 4-5 years and 485,362 children aged 10-11 years. Standard centile-based approaches defined weight status in each age-group before and after applying BMI adjustments, derived previously using the deuterium dilution method, for South Asian and Black children.

**Findings:** Among White children, overweight-obesity prevalences (boys, girls) were 23% (45,508/197,691) and 21% (39,411/188,663) respectively in 4-5 year-olds and 33% (52,635/160,278) and 30% (45,978/151,146) respectively in 10-11 year-olds. Before adjustment, South Asian children had lower overweight-obesity prevalences at 4-5 years (19% [4,485/23,191], 19% [4,176/22,109] ; both p<0.0001) and higher prevalences at 10-11 years (42% [8,105/19,406] , 34% [6,379/18,636]; both p<0.0001), while Black children had higher overweight-obesity prevalence both at 4-5 years (31% [4,459/14,468], 29% [4,041/13,970] ; both p<0.0001) and 10-11 years (42% [4,788/11,347], 45% [5,048/11,319] ; both p<0.0001). Following adjustment, overweight-obesity prevalences, compared to White children, were markedly higher in South Asians both at 4-5 years (39% [9,125/23,191] , 35% [7,711/22,109] ; both p<0.0001) and at 10-11 years (52% [10,120/19,406], 44% [8,125/18,636] ; both p<0.0001), while Black children had lower prevalences at 4-5 years (11% [1,526/14,468], 12% [1,700/13,970] ; both p<0.0001); at 10-11 years, boys had a slightly lower prevalence (32% [3,619/11,347] ; p=0.04) but girls a higher prevalence (35% [3,937/11,319] ; p<0.0001) compared to Whites.

**Interpretation:** Adjusted BMI data reveal a substantial excess of overweight-obesity among English South Asian children (both at 4-5 years and especially at 10-11 years) and among Black girls (aged 10-11 years), with important implications for prevention. These patterns are not apparent using unadjusted BMI data, which systematically underestimated overweight-obesity prevalences in South Asian children and overestimated them in Black children.

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**Competing interests:**

We declare that we have no conflicts of interest.