



## Intake of energy and macronutrients in the diets of 11–13-year-old schoolchildren living in Delhi India

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National surveys in India, through measures of anthropometry and biomarkers, have identified a triple burden of malnutrition (undernutrition, micronutrient deficiencies and overnutrition) in adolescents<sup>(1)</sup>. However, there is a dearth of high-quality data on individual dietary behaviour of this population<sup>(2)</sup> and the importance of sub-national dietary surveys in filling this gap has been identified<sup>(3)</sup>. The objective of this study was to assess the intake of energy (E) and macronutrients and the contribution of macronutrients to E in a random sample of 11–13-year-old schoolchildren in Delhi, India. Method: The study was approved by The University of Adelaide Human Research Ethics Committee and the Independent Ethics Committee of the Centre for Chronic Disease Control, New Delhi. The target sample size of 360 was based on a  $\pm 5\%$  margin of error in estimated sugars intakes. Using the list of private schools in Delhi (n = 1374), a statistician external to the research team generated a random sample of 150 schools stratified by districts (n = 11). Using this list, schools were invited to participate, and recruitment continued until 10 schools consented. Teachers shared study information with parents; interested parents filled in the online consent form. Assent was obtained from schoolchildren. Participants recorded all food and drink consumed over three consecutive days, including one weekend day, in a food diary. Information recorded was entered into an online dietary assessment tool, Intake24 Southeast Asia version, during an interview with each participant. The Intake24 database of over 2400 food photographs of more than 100 foods was used to ascertain portion size. The Intake24 database converts food and drink reported into the intake of nutrients through integrated food compositional tables. Of 514 pupils providing consent, 393 participants (76.4%) (169 girls, 224 boys) completed the study. The median daily E intake was 10.8 (IQR 9.0–12.5) MJ for girls, and 12.3 (IQR 10.3–15.2) MJ for boys. For the 97 girls and 144 boys providing body weight data, Physical Activity Level ratios were 2.0 and 2.1 respectively. The median daily intakes for girls were: protein 64.6 (IQR 54.8–79.3) g; carbohydrate 336.5 (IQR 285.3–393.6) g; and saturated fat 45.6 (IQR 34.8–58.3) g. The respective values in boys were: protein 74.4 (IQR 61.4; 89.4) g; carbohydrate 379.6 (IQR 317.8; 461.8) g; and saturated fat 54.6 (IQR 41.9–69.5) g. There were no significant between-gender differences in percent E from protein (10.2 (IQR 9.2; 11.4)), or carbohydrate (52.4 (IQR 48.7; 56.7)). Girls obtained less E from saturated fat (16.1 (IQR 11.0–18.2) compared with boys 16.3 (IQR 14.2–19.1) (P<0.05). In conclusion, in this sample of adolescents from private schools in Delhi, E intake was above FAO recommended levels and median total fat intake exceeded the recommended threshold of 35%<sup>(4)</sup>.

**Keywords:** energy intake; nutrients; adolescents; India

### Ethics Declaration

Yes

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