# Lifestyle and socioeconomic correlates of breakfast skipping in Hong Kong primary 4 schoolchildren

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## ARTICLE INFO

## ABSTRACT

*Objective.* Although breakfast is associated with different benefits, breakfast skipping is increasingly common among children. This study aimed to identify lifestyle and socioeconomic correlates of breakfast skipping in Hong Kong schoolchildren.

*Methods.* 68 606 primary 4 participants of the Department of Health Student Health Service in 1998–2000 reported breakfast habit and other lifestyle characteristics using a standardized questionnaire. Height and weight were measured by trained SHS nurses. Socioeconomic data were reported by parents. In cross-sectional analysis, multivariate logistic regression was used to identify lifestyle and socioeconomic correlates of breakfast skipping.

*Results.* 3 598 subjects (5.2%) usually skipped breakfast. Breakfast skipping was associated with being overweight (Odds ratio = 1.59, 95% CI: 1.46 to 1.73) and obese (2.06, 1.80 to 2.36), and unhealthy dietary habits including more frequent junk food (1.23, 1.14 to 1.33) but less frequent fruit/vegetable (1.23, 1.13 to 1.34) and milk (1.98, 1.80 to 2.16) intake. Breakfast skippers tended to skip lunch, do less extra-curricular physical activity, watch more television and have less educated parents.

*Conclusions.* Breakfast skipping was significantly related to various health-compromising lifestyle characteristics and lower parental education. Breakfast habit can be a potential lifestyle indicator. Education programmes aimed at specific target groups should encourage regular breakfast consumption.

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## Introduction

Breakfast has favourable effects on cognition and learning (Gajre et al., 2008), diet quality (Dubois et al., 2009) and the prevention of chronic diseases (Timlin and Pereira, 2007). However, breakfast skipping is increasingly common among children and has been linked to high plasma total cholesterol (Resnicow, 1991), overweight (Croezen et al., 2009) and other unhealthy lifestyle characteristics (Keski-Rahkonen et al., 2003).

Patterns of breakfast consumption vary between countries (Pearson et al., 2009). Breakfast is important in the Chinese dietary pattern (Chen and Xu, 1996). Even so, the problem of breakfast skipping may be particularly serious in Hong Kong, partly attributed to the distinctively fast-paced local lifestyle. However, breakfast skipping in Chinese populations is understudied, particularly among children who require an ample supply of energy and nutrients for growth. We therefore investigated the socioeconomic and lifestyle correlates of breakfast skipping in Hong Kong primary 4 (P4, grade 4) schoolchildren.

## Methods

### Study sample

The Student Health Service (SHS)[1], Department of Health, Hong Kong SAR[2] provided data for analysis. The SHS is a health assessment programme for all primary and secondary school students in Hong Kong. 68 606 Chinese P4 SHS participants in academic years 1998/1999 and 1999/2000 were analyzed.

### Procedures and measures

A standardized health assessment questionnaire in Chinese was completed by primary school students at annual appointments. It comprised 20 close-ended lifestyle-related questions, each with four responses that were dichotomized due to small numbers of subjects in several sub-categories. Breakfast habit was assessed using the question "I usually have breakfast at…" Since we were interested in breakfast skipping behaviour, those who chose "home", "fast food stall/cafeteria/restaurant" or "some other places"

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[1] SHS: Student Health Service.
[2] SAR: Special Administrative Region.

were classified as "breakfast eaters" and those who chose "no breakfast at all" as "breakfast skippers".

Age, sex, weight status (defined according to International Obesity Task Force standards (Cole et al., 2000)), pubertal development, socioeconomic status (SES) and six lifestyle characteristics of subjects were assessed as potential correlates of breakfast habit. P4 weight (to the nearest 0.1 kg) and height (to the nearest 0.1 cm) were measured by trained nurses during appointments using calibrated equipment. Highest parental education and occupation status (recorded when subjects first joined the SHS, usually primary 1 (grade 1)) were used as SES proxies.

The test–retest reliability of the questionnaire was previously examined. The intra-class correlation coefficient for the breakfast assessment question was moderately high (0.575, 95% CI: 0.411 to 0.704, $p<0.001$) and were moderate for the six lifestyle-related questions (0.431 to 0.580, all $p<0.001$).

The study protocol was approved by the Department of Health Ethics Committee and the Institutional Review Board of the University of Hong Kong/Hospital Authority Hong Kong West Cluster.

*Statistical analysis*

Data analysis was performed using SPSS (version 17.0; SPSS Inc., Chicago, IL, USA). The significance of association between breakfast habit and potential correlates was assessed using chi-square ($\chi^2$) test and Student's t-test. Further analysis used significant ($p<0.05$) correlates and breakfast habit as independent and dependent variables, respectively, in multivariate logistic regression, yielding crude and mutually adjusted odds ratios for breakfast skipping.

## Results

Of 68 606 subjects (mean age: 9.85 years, SD = 0.61), 49.2% were male. Our subjects were similar to the corresponding Hong Kong population group in sex ratio, housing type and residential district with small Cohen effect size of 0.05, 0.07 and 0.07, respectively.

Breakfast skippers (5.2%) differed from eaters (94.8%) in age, weight status, SES and physical activity (all $p<0.001$), but not sex or pubertal development (Table 1). Breakfast skippers ate more junk food but less fruits/vegetables and drank less milk (all $p<0.001$).

After mutual adjustment, each year increase in age was associated with 10% (95% CI: 4% to 16%) greater odds of skipping breakfast (Table 2). Being overweight/obese was related to breakfast skipping ($p$ for trend $<0.001$). Having less educated parents increased the risk of skipping breakfast ($p$ for trend = 0.017). However, having parents with manual (vs. managerial/professional) jobs decreased the risk of skipping breakfast (0.78 (0.70 to 0.86)). Subjects who skipped lunch, consumed less fruits/vegetables and milk but more junk food, watched more television or engaged in less physical activity were also more likely to skip breakfast.

## Discussion

Only 5.2% of our subjects skipped breakfast, while a separate local study found 30.5% primary 6 schoolchildren skipped breakfast at least once in the previous week (Cheng et al., 2008). The word 'usually' in our breakfast assessment question should have captured habitual (unlikely affected by breakfast consumption on assessment day) and excluded occasional breakfast skipping, contributing to a lower prevalence. Although few children were habitual breakfast skippers (precise data on breakfast frequency were not collected), promotion of breakfast consumption among these children may be particularly important.

Our finding that breakfast skippers were older is consistent with published reports (Utter et al., 2007). Sleeping and waking up late due to increased autonomy may minimize breakfast time.

As with our results, some studies show a cross-sectional relation between breakfast skipping and being heavier (Keski-Rahkonen et al., 2003; Utter et al., 2007). Meal composition (Barton et al., 2005), timing (Dubois et al., 2009) and frequency (Toschke et al., 2009), and the clustering of health-compromising lifestyle characteristics (Timlin and

**Table 1**
Characteristics of 68 606 primary 4 subjects by breakfast eating habit (1998–2000, Hong Kong).

| Characteristic | Breakfast eaters (%) | Breakfast skippers (%) | p-value |
|---|---|---|---|
| Total[a] | 94.8 | 5.2 | |
| Sex | | | |
| *Male* | 49.2 | 50.2 | 0.25[b] |
| *Female* | 50.8 | 49.8 | |
| Age | | | |
| *Mean age (SD)* | 9.85 (0.61) | 9.91 (0.62) | <0.001[c] |
| Weight status | | | |
| *Underweight* | 3.0 | 2.5 | <0.001[b] |
| *Normal* | 76.9 | 66.8 | |
| *Overweight* | 16.2 | 23.2 | |
| *Obese* | 3.9 | 7.5 | |
| Pubertal development[d] | | | |
| *Preadolescent (Tanner stage 1)* | 81.0 | 80.6 | 0.509[b] |
| *Onset of puberty (Tanner stages 2 to 5)* | 19.0 | 19.4 | |
| Highest parental education | | | |
| *No Schooling/kindergarten/ primary (1–6)* | 17.6 | 19.5 | <0.001[b] |
| *Secondary/matriculation* | 72.4 | 72.5 | |
| *Tertiary (non-degree/degree)* | 10.0 | 8.0 | |
| Highest parental occupation | | | |
| *Unemployed* | 3.3 | 4.2 | <0.001[b] |
| *Manual job* | 43.7 | 39.5 | |
| *Clerical job/service industry* | 30.7 | 35.1 | |
| *Managerial/professional* | 22.3 | 21.2 | |
| Junk food consumption | | | |
| *Everyday/occasionally* | 70.7 | 76.0 | <0.001[b] |
| *Rarely/never* | 29.3 | 24.0 | |
| Fruit/vegetable consumption | | | |
| *≥3 times/day* | 23.7 | 18.9 | <0.001[b] |
| *<3 times/day* | 76.3 | 81.1 | |
| Milk consumption | | | |
| *≥1 time/day* | 30.3 | 16.1 | <0.001[b] |
| *<1 time/day* | 69.7 | 83.9 | |
| Frequency of physical activity | | | |
| *≥3 times/week* | 20.2 | 16.7 | <0.001[b] |
| *<3 times/week* | 79.8 | 83.3 | |
| Average daily hours of TV watching | | | |
| *≤2 h* | 62.9 | 44.7 | <0.001[b] |
| *>2 h* | 37.1 | 55.3 | |
| Lunch habit | | | |
| *Eat* | 96.6 | 96.0 | 0.030[b] |
| *Skip* | 3.4 | 4.0 | |

[a] Given as row percentage.
[b] Differences between breakfast eaters and skippers analyzed using chi-square test.
[c] Differences between breakfast eaters and skippers analyzed using T-test.
[d] Pubertal development was assessed by SHS doctors using Tanner stages I to V in primary 5 (grade 5). Pubic hair development was used as a marker for pubertal development in this study. As most subjects belonged to stage I, pubertal development was dichotomized as "preadolescent" (stage I) and "onset of puberty" (stages II to V).

Pereira, 2007) may explain the link. Also, lower levels of physical activity among skippers (Keski-Rahkonen et al., 2003) may affect energy balance (Rampersaud et al., 2005) and lead to weight gain. However, cross-sectional observations are subject to reverse causality (Rampersaud, 2009). Prospective studies are therefore needed to examine the temporal sequence and mechanisms linking breakfast skipping and body weight, particularly in understudied Chinese populations.

Similar to our findings, a clustering of health-compromising behaviours with breakfast skipping has been reported (Keski-Rahkonen et al., 2003). Breakfast skippers were more likely to skip lunch (Utter et al., 2007), consumed less milk products (Dubois et al., 2009) and fruits/vegetables per day (Utter et al., 2007) than eaters. Breakfast skippers also snacked more frequently than eaters (Utter et al., 2007). Late-night snacking (popular in Hong Kong) may cause loss of appetite during breakfast time. Further studies should investigate meal patterning of breakfast skippers in Chinese populations. Although the significance of results may partly be attributable to our large sample