

RESEARCH ARTICLE

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# Feeding of preschool children in Vietnam: a study of parents' practices and associated factors

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## Abstract

**Background:** Understanding parents' feeding control practices and their associations with various factors is useful for prevention of childhood obesity, an emerging problem in low- and middle-income countries. The aim of this paper is to describe the control practices used by parents of preschool children in Vietnam and factors associated with these.

**Methods:** Two cross-sectional studies were conducted in urban DodaLab ( $n = 1364$ ) and rural FilaBavi ( $n = 1313$ ), Health and Demographic Surveillance Sites (HDSS), Hanoi, Vietnam. For 94.9 % of the children, both parents answered the Child Feeding Questionnaire and additional questions about nutritional practices. Children's and parents' weight and height were measured. Simple Pearson correlation coefficients, multiple regression and exploratory factor analysis were used for the statistical analysis.

**Results:** Mothers reported the use of more restriction, pressure to eat and monitoring than the fathers. The measured child's body mass index (BMI) and the mother's perception of the child's weight were negatively associated with pressure to eat and positively associated with monitoring. A positive association was found between restriction and the mother's perception of the child's weight. In the rural area, high consumption of fatty food, sweets and snacks was associated with high use of restriction and monitoring. The amount of food consumed was negatively associated with the use of pressure to eat. In the urban area, consumption of fatty food and sweets was positively correlated both with restriction and pressure to eat. Monitoring was negatively associated with consumption of fatty food and snacks and positively with the amount of food. Higher education of the mothers was associated with higher use of monitoring, restriction (in the urban area) and pressure to eat (in the rural area).

**Conclusions:** While feeding practices in Vietnam differed between mothers and fathers and between urban and rural areas, the associations with children's BMI and socioeconomic factors were weak. This implies that parental roles as well as sociodemographic factors should be considered when designing programs for prevention of childhood overweight and obesity.

## Background

Childhood overweight is an emerging public health problem in many low- and middle-income countries; in fact it is often described as an epidemic [1–3]. Parents are important for creating food and eating environments, as models for eating at home and through their feeding practices. The influence of parents on children's

eating behavior and children's resulting weight status have been explored in several studies [4–6]. Parental attitudes, feeding style and feeding practices have been found to be associated with children's diet and weight.

Parents use different practices to control the eating habits of their offspring. The effectiveness of these practices varies depending on the way they are executed [7–9]. In this paper we shall study three commonly used feeding practices. Parents can apply *restriction* in order to limit nutrient intake and to avoid negative dietary components, especially unhealthy food. *Pressure to eat* is to some extent the opposite strategy to restriction. Here, for different reasons, parents attempt to encourage children to eat more. *Monitoring* is used to supervise the child's eating behavior

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and to help control the food intake. Some research has revealed that parental restriction can be positively associated with BMI in children whereas pressure to eat can be negatively associated [10, 11]. Other studies did not find such relations [4, 12].

Feeding control might be used as a response to concerns about children’s weight and food intake. It can, however, also be that control affects children’s weight status and children’s food consumption. The question about cause and effect must be carefully discussed. Excessive control is hypothesized to promote child overweight as it can affect the child’s ability to self-regulate food intake [13]. Fisher et al. found in a 2 year follow up study that children whose parents restricted access to food at the age of 5 had a higher degree of unnecessary eating at the age of 7 [14, 15].

Parental feeding practices have been studied in a limited number of countries, mostly English speaking. To our knowledge, the only study on Asian elementary school children was performed in Japan [16].

In the past 10 years, the Vietnamese economy has grown rather quickly [17] leading to changes in diet pattern and lifestyles among the young generation. During this transitional period, the prevalence of overweight and obesity among children under 5 years of age has increased from 0.7 % in 1998 [18] to 5.6 % in 2010 [19]. In a study from 2013 in two Health and Demographic Surveillance Sites (HDSS) one urban and one rural, we found an overall estimate of 14.5 % and an even higher estimate in the urban site (Loan Minh Do et al: Preschool overweight and obesity in urban and rural Vietnam: Differences in prevalence and associated factors). Knowledge about and understanding of parents’ use of feeding control practices and their associations with children’s weight status in different contexts can be useful for developing interventions aimed to prevent overweight and obesity.

The aims of this paper are (1) to describe the use of the three feeding practices, restriction, pressure to eat and monitoring, as reported by mothers and fathers and how these practices compare between boys and girls as well as between the urban and rural site and (2) to

identify associations between the parental feeding practices and children’s diet and BMI, parents’ perceptions of children’s weight as well as socio-economic factors in one urban and one rural setting in Vietnam.

**Methods**

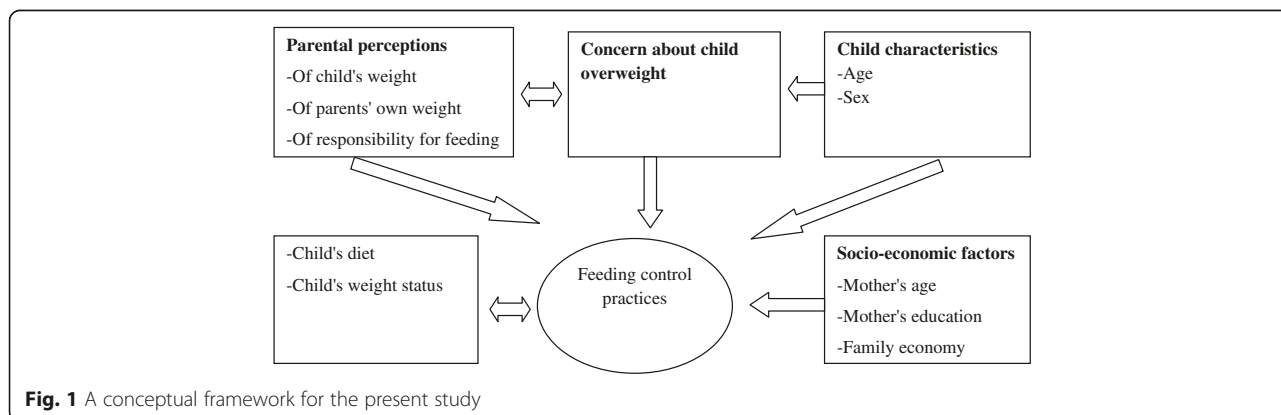
A conceptual framework for the study is given in Fig. 1 illustrating hypothetical associations between feeding control practices and factors such as parental perceptions, children’s characteristics and socio-economic factors.

**Study sites and participants**

In 2013, two cross-sectional studies were conducted in two Health and Demographic Surveillance Sites, one in DodaLab in Dong Da district in central urban Hanoi, and one in rural FilaBavi in the Ba Vi district (later incorporated into Hanoi). In total, there are approximately 352,000 inhabitants living in Dong Da and the socio-economic characteristics are typical for large urban cities of Vietnam [20]. Ba Vi with a population of 250,000 inhabitants, mainly farmers, is situated about 60 km from the Hanoi city center and is representative of rural districts. In all, 1364 urban children, 725 boys (53.2 %) and 639 girls (46.8 %), and 1313 rural children, 705 boys (53.7 %) and 608 girls (46.3 %), aged from 3 to 6 years participated in the studies. The mothers and fathers were separately interviewed to obtain information about or related to the feeding of the children. In the urban area, 1346 mothers and 1303 fathers completed the interview. For 1299 (95.2 %) of the children, answers from both parents were available. In the rural area, the number of mothers and fathers were 1292 and 1248, and 1242 (94.6 %) children had answers from both parents.

**Data collection**

Two sources of information about the children and their parents were used; the specific interviews using the CFQ questionnaire (see below) and the information routinely collected in the HDSS, also obtained through interviews. The interview procedure and quality control was the



**Fig. 1** A conceptual framework for the present study

same in both cases. The interviewers were trained to ensure that interviewees understood the questions exactly and to use a suitable language in the interview without changing the meaning. Supervisors in each of the two areas were responsible for supervising the work of the interviewers and for the data quality control. They checked randomly about 3 % of the anthropometric measurements and records. In the case of large differences, the household was revisited by a third person and the information was adjusted accordingly.

The following information was collected:

#### **Perception of responsibility and parental feeding practices**

The Child Feeding Questionnaire (CFQ) developed by Birch et al. [10] contains 7 subscales assessing parental attitudes, beliefs and practices related to child feeding. It has been validated in a number of studies involving parents of 2 to 11-year-old children [16, 21, 22]. The questionnaire was translated from English into Vietnamese and piloted to make sure that it was understandable. Four subscales of the CFQ were used to obtain the following information: (i) perceived responsibility (3 items), assessing parental responsibility for feeding the child; (ii) restriction (6 items), measuring the extent to which parents limit children's access to unhealthy food (e.g. sweets, high-fat food, junk food). Two questions about using food as reward were omitted from the original restriction subscale for logical reasons; (iii) pressure to eat (4 items), measuring the extent to which parents press their children to eat large portions of food at mealtime; and (iv) monitoring (3 items), measuring the degree of parents' supervision of their children's food intake. All items were measured using 5-point Likert scales ranging from "disagree" to "agree" or "never" to "always". High scores indicated more responsibility or greater restriction, pressure to eat and monitoring.

#### **Perception of children's weight and mothers' weight**

Two questions taken from the CFQ were used: "How would you describe your weight at present" and "How would you describe your child's weight at present". The possible answers were "Markedly underweight", "Underweight", "Normal", "Overweight" and "Obesity".

#### **Children's diet**

Information about diet or children's level of food consumption was obtained during the same interviews using questions specifically designed for this study. Two variables were defined:

**Amount of food** Food intake at each main meal was compared to other children in the same age group and was classified by the parents at one of 3 levels: "less than", "the same" and "more than".

**Fatty food, sweets and snacks consumption** "Fatty food" includes fatty meat and butter. "Sweets" in the study means candy, chocolate, ice cream. "Snacks" refers to potato chips, popcorn, twisties. Frequencies of fatty food, sweets and snacks intake were categorized by the parents into 6 levels: (1) never or less than once a week, (2) 1–3 times/week, (3) 4–6 times/week, (4) 1 time/day, (5) 2 times/day and (6) 3 times or more/day.

#### **Socio-economic factors**

Information about demographic and socio-economic status of the mothers and fathers was obtained from the HDSS databases in 2012. Mothers' age, level of education and the family economic status were the factors used in the present study.

*Mothers' education* was categorized into three levels (1) secondary school or less, (2) high school and (3) higher than high school.

*Family economic status:* The number of assets in the household was used as an indicator of family economic status. A list of assets included a refrigerator, television, videocassette recorder, gas cooking plate, telephone, mobile phone, personal computer, air conditioner, water heaters, bicycle, motorbike and car.

#### **Anthropometric measurements**

Weight (kg) and height (cm) of the children and their parents were measured in their homes by well-trained staff working in pairs. Digital Tanita scales and mobile measurement instruments were used.

*BMI (body mass index)* ( $\text{kg}/\text{m}^2$ ) was calculated as weight (in kg) divided by squared height (in m).

#### **Statistical analysis**

Conventional statistical methods were used to summarize and describe data in tables and graphs. The key dependent variables were the mean scores over the subscales for restriction, pressure and monitoring. Simple Pearson correlation coefficients were used to describe associations. Correlations between obviously skewed variables were checked using Spearman rank correlations. To compare the questionnaire responses between mothers and fathers taking education differences into account we used a stratification approach.

To address psychometric considerations about reliability and construct validity of the questions we used the Cronbach's alpha coefficient which measures the correlations between variables within a subscale and can take values between 0 and 1. To demonstrate reliability it shall be reasonably high. Alpha values above 0.70 are conventionally considered acceptable.

A complete assessment of construct validity of the Birch questionnaire would require a confirmatory factor analysis (Structural Equations Modelling). We restricted

the validity considerations to the study of the correlation matrices and the results of an exploratory factor analysis with oblique Promax rotation.

Most analyses were carried out separately for the urban and rural sites using the computer software Stata version 12.

### Ethical considerations

The field sites in FilaBavi and DodaLab have received ethical approvals from the Ministry of Health of Vietnam as well as from the Scientific and Ethical Committee of Hanoi Medical University. There has been a written approval from authorities of the Dong Da and Ba Vi districts allowing research to be carried out in the sites. People living in the sites have also given their consent to routinely provide background information such as demographic information and household' socioeconomic information as well as to participate in specific studies implemented in the sites. Our study was an observational study so the Scientific and Ethical Committee of Hanoi Medical University have approved us to work with oral consent from participants.

## Results

### Characteristics of the study population

Table 1 shows characteristics of the children and socioeconomic status of the families in the study. Urban families had more assets and reported a higher income than the rural families. The distribution of the mothers' level of education differed drastically. The mean BMI of children as well as parents was statistically significantly higher in the urban area.

### Reliability and validation of the questionnaire

Table 2 shows the estimated Cronbach's alpha values together with two examples from other studies using the same questionnaire.

The most notable result was the low alpha value for "Pressure to eat", which was also substantially lower than

in the two other studies shown in the table. All other Vietnamese estimates were above 0.70 (We consider 0.69 sufficiently close). There were no systematic differences between the Vietnamese urban and rural coefficients. Also the results for Vietnamese fathers did not differ much from those for the mothers.

Table 3 shows the eigenvalues and rotated factor loadings for seven factors after oblique Promax rotation. The table also shows the uniqueness for each variable, that is the fractions of variable variation not explained through the relations to the identified factors. Factors loading absolutely smaller than 0.4 are not shown. The 27 variable names are those used in the original article [10] and the abbreviations of subscale names are found in Table 2.

Seven factors could be identified. The eigenvalues thereafter were negative (Heywood cases). The first factor had the eigenvalue indicating that one third, 34 %, of the total variance was explained by that factor. However, variables from two of the subscales loaded comparatively high on this factor, all monitoring and some restriction variables. This poses a question about discriminant validity. The correlation between the variables in these subscales was fairly high. The subscales PR, PPW, PCW and CN loaded quite distinctively on one and only one factor but the uniqueness could vary considerably between the variables in a subscale, e.g. the PR variables, and the corresponding eigenvalues were not very high.

Three of the four variables in the PE subscale did not present a loading above 0.40 for any factor and the fourth was below 0.50. This was also the subscale with variables having the largest uniqueness and, as mentioned above, a low Cronbach's alpha value.

For the RST scale there were loadings above 0.40 in three factors indicating that the questions in this scale might focus different issues, raising concern about the convergence validity.

Oblique factor rotation implied that the estimated factors may have non-zero correlations.

**Table 1** Characteristics of children, parents and families in the study

Variables	Urban	Rural
Mother's age, years (mean)	28.1***	25.5
Father's age, years (mean)	32.0***	29.2
Child's BMI (mean and range)	15.9*** (7.2;27.6)	15.3 (9.0;35.9)
Mother's BMI (mean and range)	21.5*** (16.1;47.4)	20.3 (15.1;37.5)
Father's BMI (mean and range)	22.5*** (15.9;33.0)	21.1 (16.1;33.2)
Mothers with secondary school or less (%)	6.8***	57.6
Mothers with high school education (%)	32.3***	28.6
Mothers with education higher than high school (%)	60.9***	13.8
Number of family assets (mean)	10.3***	5.4

\*\*\*Urban versus rural:  $p < 0.001$



Generally these were not very strong. The least weak were between Factor 1 and Factor 2 (0.395) and Factor 1 and Factor 6 (-0.396).

The factor analysis shown above included information from all mothers. Analysis of the fathers gave similar results and separate analyses for the urban and the rural sites showed only rather insignificant differences.

### Descriptive and analysis results

Table 4 shows the means and standard deviations of the subscale mean scores for self-reported parental feeding practices. There were statistically significant differences between mothers and fathers, both in the urban and rural areas, in the level of use of all three types of practices. These differences remained statistically significant when taking differences in education between fathers and mothers into account in a stratified analysis.

The only statistically significant difference in feeding control between boys and girls was that fathers of rural boys used more restriction than fathers of rural girls (data not shown).

The estimated correlations between maternal feeding practices and associated factors are shown in Tables 5, 6 and 7. All estimated correlations are rather weak. In multiple regressions with the three control practices as dependent variables and all possible explanatory variables, the collectively explained fraction of the total variance of the dependent variable (squared multiple correlation,  $R^2$ ) was between 2 and 7 %, highest for restriction and similar for the urban and rural areas. If an urban-rural variable was included in the regression model,  $R^2$  increased to about 15 % for restriction and monitoring but remained low for pressure to eat.

In both sites, children's BMI and mothers' perceptions of the children's weight were negatively associated with pressure to eat and positively associated with monitoring. For restriction, positive association was found for the mothers' perceptions of the children's weight but there was no statistically significant association with the measured children's BMI (Table 5). Mothers' perceptions of own weight showed a similar pattern of associations as the perception of children's weight. Mothers who were more responsible for child feeding used more pressure to eat in both sites, more restriction in the urban area and more monitoring in the rural area.

The estimated correlations between maternal feeding practices and some children's characteristics are presented in Table 6. Children's age was negatively related to the practice of pressure (in urban) and monitoring (in rural) but there was no statistically significant association for restriction. There were statistically significant positive associations between the restriction and consumption of fatty food and sweets in both urban and rural areas and for snacks in the rural area. In the urban area, a positive association between pressure to eat and the intake of fatty food and sweets was found while no significant association was seen in the rural area. The amount of food was negatively associated with pressure to eat in the rural site. Larger amounts of food were associated with higher level of monitoring in the urban area. The association between monitoring and consumption of fatty food and snacks was negative in the urban sample while it was positive in the rural.

Maternal education was positively associated with the three types of maternal feeding practices. In the urban area, mothers' age was negatively related to monitoring and family economic status was negatively associated with pressure to eat (Table 7).

### Discussion

The results of this study describe how mothers and fathers reported their use of feeding control practices to influence the eating habits of their children. Mothers are most often the parent responsible for feeding and use all three types of practices (restriction, pressure and monitoring) to a higher extent than fathers. The use of parental feeding practices did not differ for girls and boys. Considering mothers, their reported use of control practices was associated with the children's BMI and diet, the mothers' perceptions of the children's weight as well as socio-economic factors.

### Maternal and paternal feeding practices

Mothers in both urban and rural areas reported more frequent use of restriction, pressure to eat and monitoring than fathers. The differences between mothers and fathers may relate to differences in perception of responsibility for child feeding. Compared to fathers, mothers much more often reported themselves as primarily responsible for feeding the child, for the choice of food

**Table 4** Means of subscale scores for child feeding practices by site

	Number of observations	Restriction (Mean $\pm$ SD)	Pressure to eat (Mean $\pm$ SD)	Monitoring (Mean $\pm$ SD)
Urban Mothers	1346	3.73 $\pm$ 0.57***	3.70 $\pm$ 0.46***	3.60 $\pm$ 1.09***
Urban Fathers	1303	3.60 $\pm$ 0.53	3.55 $\pm$ 0.48	2.55 $\pm$ 0.92
Rural mothers	1292	3.28 $\pm$ 0.73***	3.69 $\pm$ 0.45***	2.73 $\pm$ 1.04***
Rural Fathers	1247	3.14 $\pm$ 0.69	3.52 $\pm$ 0.53	1.74 $\pm$ 0.74

\*\*\*Mothers versus fathers:  $p < 0.001$

**Table 5** Estimated correlation coefficients between maternal feeding practices and child's BMI and mothers' perceptions

	Restriction (Correlation Coef.)		Pressure to eat (Correlation Coef.)		Monitoring (Correlation Coef.)	
	Urban	Rural	Urban	Rural	Urban	Rural
Child BMI	0.013	0.040	-0.123***	-0.054*	0.076**	0.092**
Mother's perception of child's weight (underweight to overweight)	0.111***	0.148***	-0.104***	-0.132***	0.069*	0.093***
Mother's perception of own weight (lower to higher)	-0.031	0.106***	-0.062*	-0.062*	-0.013	0.105***
Responsibility for feeding the child (low to high)	0.141***	0.006	0.131***	0.116***	-0.029	0.180***

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

and for the amount to be consumed. Given this difference in perceived responsibility, the mothers could be expected to show more interest in controlling the child's feeding as they better understand the needs of the child. Higher level of maternal monitoring compared to fathers corresponds with results of studies from the UK and USA. The results about restriction and pressure to eat, however, were inconsistent [23, 24]. The discrepancies might be explained by the differences in fathers' feeding responsibility between countries. In the Vietnamese tradition, making money is the main task of fathers and caring for children is the duty of mothers. In high-income countries, it may be more common that the feeding responsibility is shared more equally between the parents. The findings of our study also indicate that the use of pressure to eat reported by Vietnamese parents was more common than in some high-income countries, such as Japan, Sweden, UK and Australia but that use of monitoring was at a lower level [16, 22, 24, 25].

#### Parents' feeding practices and sex of the child

More boys than expected are born in Vietnam. Boys are considered more important for several traditional and cultural reasons and are expected to be given particular concern. Child sex differences in reported feeding practice could therefore have been expected but only one finding of this kind was observed for the rural area. Globally, most studies follow this trend [6, 24, 26]. Other studies in high-income countries, though, indicate that girls can be more controlled regarding overfeeding than boys [27, 28]. Awareness of and social pressure to achieve body image ideals,

especially for women, could influence parental control of their daughter's food consumption in some parts of the world and might be seen in Vietnam in the future.

The older children were less pressured to eat in the urban and less monitored in the rural site. However, the latter conclusion is based on a very weak correlation, although statistically significant. The differences in child's age were not very large in this study and no large differences should be expected.

In the analysis and discussion of associations between reported use of feeding control practices and children's weight status, children's characteristics and socio-economic factors, we focused on the mothers as they were mainly responsible.

#### Maternal feeding practices and perceptions of weight and children's BMI

The weak negative association found in our study between children's BMI and the use of pressure to eat was in line with results of other cross-sectional studies [10, 29]. When a child is considered too lean, the mothers could be expected to pressure them to eat more to increase their weight. Vietnam has experienced a long history of war. Many died from starvation during wartime and children were particularly vulnerable. The memories of food shortages may well be passed on from the previous generation to today's parents and influence the beliefs about feeding children. The fear of not having enough food can still be in a mother's mind. Historically, food shortage hit urban and rural areas equally and, interestingly, pressure to eat was the only control

**Table 6** Estimated correlation coefficients between maternal feeding control practices and child characteristics

	Restriction (Correlation Coef.)		Pressure to eat (Correlation Coef.)		Monitoring (Correlation Coef.)	
	Urban	Rural	Urban	Rural	Urban	Rural
Child's age (3 to 6)	0.019	-0.041	-0.063*	-0.009	0.013	-0.057*
Amount of food (small to large)	0.033	0.042	-0.027	-0.200***	0.071**	0.029
Fatty food consumption (less to more)	0.200***	0.134***	0.289***	-0.034	-0.325***	0.221***
Sweets consumption (less to more)	0.073**	0.144***	0.156***	-0.004	-0.019	0.191***
Snacks consumption (less to more)	-0.037	0.300***	0.036	-0.021	-0.078**	0.207***

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

**Table 7** Estimated correlation coefficients between maternal feeding practices and socio-economic factors

	Restriction (Correlation Coef.)		Pressure to eat (Correlation Coef.)		Monitoring (Correlation Coef.)	
	Urban	Rural	Urban	Rural	Urban	Rural
Mother's age	0.028	0.047	0.002	-0.019	-0.063*	-0.002
Mother's education (low to high)	0.117***	0.050	-0.041	0.062*	0.065*	0.056*
Family economic status (low to high)	0.035	-0.019	-0.062*	0.046	0.033	0.009

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

practice for which no difference was found between the urban and rural areas.

More extensive use of restrictive and monitoring practices was associated with higher BMI in children and when mothers perceived that the children were heavy. It is possible that awareness of a child's weight status motivates parents to develop strategies for promoting healthy weight for the child. Some official attention to childhood obesity has been given by the Vietnamese society since this has emerged as a problem. Improving knowledge and practices regarding nutrition in the general population is one of the aims of the Vietnamese National Nutrition Strategy for 2011–2020 in order to control the problem [30]. This orientation helps people, especially mothers, to improve their ability to establish healthy food habits for their children. The reported results of associations between restriction and monitoring and children's weight in earlier cross-sectional studies have been inconsistent [5, 27, 29, 31–33]. The reasons may be cultural and other contextual differences as well as differences in methodological approaches.

#### Maternal feeding practices and children's diet

Restrictive and monitoring practices were associated with the intake of food such as fatty food, sweets and snacks in the rural area, while the amount of food appeared to be more important for pressure to eat. In the urban area, the association with restrictive practice was similar to that of rural mothers. For pressure to eat, urban mothers seemed to focus on the types of food rather than amount of food. For example, intake of fatty food and sweets were associated with pressure to eat more. Such practice could be a risk for overweight in the future. High monitoring was associated both with large amounts of food and high intake of fatty food and snacks. This probably means that although the same types of practices were used, the strategies could vary. Eating habits and food environment could also be influential factors. For example, the major food concern for urban families was reported to be type of food while quantity of food appeared more important for rural families. Rice is the staple food for all Vietnamese people and contributes significantly to the total energy intake. A survey in 2010 showed that the mean consumption of rice per capita on a daily basis was higher in rural areas

(388.3 vs. 330.3 g). In contrast, consumption of meat is higher in urban areas (107.7 vs. 75.7 g) [19].

#### Maternal feeding practices and socio-economic factors

Mothers' education was positively associated with all three types of feeding control practices. It is possible that higher education makes mothers more aware of unhealthy food as well as more concerned about children's weight and therefore motivates mothers to control a child's eating. A statistically significant association between mothers' education and restriction was observed only in the urban sample with its higher prevalence of overweight and obesity. Interestingly, in the rural area with higher prevalence of malnutrition, higher education of mothers was associated with more pressure to eat. A study of Gubbels et al. also indicated that higher maternal education was associated with higher stimulation of healthy intake [34].

A strength of the present study is that it was conducted in two HDSS established to provide health information for planning and policy making which is updated every 2 years. There will be an opportunity for continued follow up of the children and families over time. The sample size was comparatively large. There are established systems for fieldwork and supervision with well-trained and experienced staff. The interviewers had previously been involved in several research studies, live in the same place as the participants and thus share their culture and language.

Like any study where respondents are supposed to answer questions, there are certain validity issues. In this study, the original questionnaire was translated from English into Vietnamese and changes in nuances and meanings were inevitable. English and Vietnamese are drastically different.

The Birch questionnaire has earlier been validated for construct validity in the psychometric tradition using confirmatory factor analysis (Structural Linear Modelling) several times mainly in English language applications. In the exploratory factor analysis we were partly able to identify the Birch factor structure but observed also some deviations, particularly for the questions about restriction and pressure to eat. Hence we refrained from proceeding to a confirmatory analysis. However, we still consider the content validity of the questionnaire good



and that use of individual questions is relevant. The preliminary results of the field tests of individual translated questions for understanding and feasibility were satisfactory. A general problem for studies involving interviews, face to face or otherwise is that we can't be sure that respondents report what they actually know, think and do. Many reasons for such deviations have been proposed and studied [35]. The information validity problem is likely to be very different in different cultures. Using formal questionnaires can give some useful information but for a deeper understanding in-depth, qualitative studies are needed.

## Conclusion

The results from the present study show that child feeding strategies differed between the urban and the rural settings. The identified associations support the findings from some earlier studies showing associations between maternal feeding practices and background characteristics of mothers and children as well as mothers' perceptions of children's weight. The implication is that the roles of mothers and fathers as well as demographic factors should be considered when designing programs for prevention of childhood overweight and obesity.

## Competing interests

The authors declare that they have no competing interests.

## Authors' contributions

LMD contributed to all aspects of the study and writing of the paper. BE contributed to the study design, all statistical analyses, interpretation of the result and revision of the manuscript. TKT was involved in sampling and statistical analyses, coordination and acquisition of the data. HA assisted in the study design, supervised the study and contributed to the analysis, the manuscript work and the discussion. MP was involved in drafting and revising the manuscript. All authors have read and approved the final manuscript.

## Acknowledgements

This research was the result of a collaboration between University of Gothenburg, Hanoi Medical University and National Hospital of Pediatrics in Hanoi. We would like to thank all partners for supporting the research and all field workers, parents and their children in the two HDSS for their contributions to data collection.

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Received: 9 December 2014 Accepted: 31 July 2015

Published online: 12 August 2015

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