Short Communication

Gender differences in "luxury food intake" owing to temporal distribution of eating occasions among adults of Hindu communities in lowland Nepal

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Our previous studies in developing countries have indicated that gender differences in intake of luxury foods incur risk of micronutrient deficiencies among women. As the next step, we examined the causes of gender differences in food intake by comparing eating patterns, including meal frequency (skipping) and temporal distribution of food consumption throughout the day among adults of Hindu communities in lowland Nepal. A total of 321 adults (126 men and 195 women) aged 20 years and above were randomly selected from 94 households in three rural communities. A face-to-face questionnaire-based 24-hour dietary recall interview was conducted whereby foods eaten throughout the six eating occasions (morning snack, breakfast, lunch, daytime snack, dinner, and evening snack) were recorded and analyzed. Results shows that men frequently skipped lunch (p <0.001), they also frequently consume daytime snack (p <0.001), and consumed purchased luxury foods such as tea with sugar and milk (p = 0.008) and samosa (p = 0.049) as daytime snack. The six-eating occasion analysis revealed that gender differences in food intake of rural Nepalese adults occurred during lunch and daytime snack, attributing to gender differences in daily activity patterns.

Key Words: women, luxury food intake, feeding behaviour, Nepal, 24-hour dietary recall interview

INTRODUCTION

Our previous study in rural communities of the Terai region in lowland Nepal revealed that consumption frequencies of less-frequently consumed foods, such as meat curry, fish curry, banana, tea with sugar only, tea with sugar and milk, and soft drinks, were significantly higher in men than in women.[1] Gender differences in intake of these luxury foods were considered to incur risk of micronutrient deficiencies among women.[2-4] To elucidate causes of the gender difference in food intake, we compared meal frequency (or meal skipping) and the temporal distribution of food consumption throughout the day.

For this purpose, a 24-hr recall questionnaire was developed based on weighed food record (WFR) data. In WFR, investigators weighed the raw ingredients, cooked food, and leftover. It did not require recall ability and literacy of the participants but it took a whole day and included cost for measurement tools (weighing scales and kitchen utensils) and personnel expenses. On the other hand, 24-hr recall could save time and money and was less burdensome for both investigators and participants. It was thus suitable for larger studies though it contained recall bias.

In this study, face-to-face questionnaire-based 24-hr recall interviews (hereafter, structured interviews) were administered to 321 Nepalese men and women of the Terai region. The Terai region is located in a tropical and subtropical belt in the northern extension of the Gangetic Plain stretching along the Nepal-India border. There are 20 districts in this region. Nawalparasi district, the target area of this study, comprises of 73 Village Development Committees and one municipality named Parasi as its headquarters. All villagers are Hindus and have maintained their traditional cultural norms. Most households depend on farming, although some villagers work in the nearby towns or remote areas, including other countries. These communities lack basic hygienic facilities such as piped water and latrines. Meat, fish, and cooked foods such as samosa (minced meat and vegetables wrapped with dough and deeply fried) and tea with sugar and milk are available to the villagers at the market located about

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2.5–3.5 km away from each community. Due to economic reasons, marketed foods were not frequently purchased by the villagers. We regarded these food items as luxury foods and their consumption was the interest of this study.

The main aim of this study is to elucidate, by gender, meal and snack's consumptions throughout the day. The identification of women's eating patterns related to their inadequate consumption of certain foods may help us develop effective intervention strategies for improving their dietary intake in the future.

MATERIAL AND METHODS

Study Site

The field survey was conducted in three communities of Nawalparasi district: Kunwar-Thulo (KT), Kunwar-Sano (KS), and Goini (G). The distance from the three villages to the nearest town, Parasi, is 2.1 km from KT and KS and 4.1 km from G. In each community, there are one or two small canteens, which sell a limited number of foods such as candies, salt, sugar, and tinned fish.

Participants

This study was designed to target men and women aged 20 years and over from 94 households, which were randomly selected from the three communities. Although all the members of the 94 households agreed to participate in the survey, most men did not participate due to work commitment. A total of 346 adults (126 men and 220 women) participated in the study. Twenty-five women were excluded from the analysis due to their biological conditions either pregnant or lactating.

This study protocol was reviewed and approved by the Ethics Committee of the National Institute of Public Health (Japan) and the local authorities of the Nawalparasi District Headquarters in Nepal. Participation was voluntary and a written informed consent was obtained from each participant prior to the investigations.

Data Collection

The study began in August 2003 whereby WFR and anthropometric measurements were conducted and continued in April 2004 whereby the use of a structured interview and additional WFR were implemented. Intake data collections in 2003 and 2004 were randomly assigned on weekdays and weekends in order to include day-to-day variation.

Anthropometric measurements

The interviews and anthropometric measurements were conducted in the participants' own home using the standard methods.[5] Height was measured to the nearest 1 mm when participants stood erectly against a calibrated wall. Weight with minimum clothing was recorded to the nearest 0.1 kg, using a portable digital scale (Tanita model 1597, Tokyo, Japan). Body mass index (BMI, kg/m^2) was calculated as the indicator for nutritional status and BMI <18.5 was classified as chronic energy deficiency (CED).[6]

WFR

A subset of the total participants (25 men and 31 women) were selected for a one-day WFR whereby investigators weighed and recorded their day's food intakes. The sampling was done at the household level but intake data was collected from each household member individually. A Japanese research group reported that a sample size of 75 would be valid and practical for constructing a dish-based component table.[7] Since rural Nepalese diets are much simpler than Japanese diets,[1,8] a smaller sample of 56 was considered to be appropriate.

The investigators were stationed at the participant's home from morning to evening and all raw foods and other ingredients were weighed before cooking and a portion of cooked foods was also weighed before consumption. Only foods consumed outside home was recorded retrospectively by recall. Newly developed food record forms were used to record the type and quantity of foods. Following the same instructions, investigators weighed any raw ingredient and a portion of the cooked dish. A small digital scale was used to weigh condiments and leafy vegetables and a large analogue scale was used to weigh rice and other items consumed in large quantities. The food records were carefully reviewed by trained nutritionists in order to ensure adequate levels of accuracy in describing foods and recipe. The WFR provided information on food items consumed as meals and snacks which revealed that meals consisted of rice or chapatti as a staple, curry, and dal (lentil) soup. Based on these results, a structured 24-hr recall questionnaire was developed.

Structured interview

The structured interview included the six eating occasions: morning snack, breakfast, lunch, daytime snack, dinner, and evening snack.

Each participant was first asked whether any food was consumed before breakfast (as morning snack) and when the response was yes, the participant was asked to choose the food consumed from the list provided (i.e., tea with milk, tea without milk, and curds with cane sugar) as well as record other foods not in the list. The three foods listed were those observed to be taken as morning snack during WFR.

Next, each participant was asked whether any food was consumed as breakfast and when the response was yes, the participant was asked to choose one from three alternatives for a staple food: rice, chapatti, or rice and chapatti. He/she was also asked whether curry was consumed for breakfast and when the response was yes, he/she was asked how many types of curry he/she ate, using three alternatives: one, two, and three. These questions were asked since staple food and curry were consumed as breakfast during WFR. Then, the participant was asked to choose the main ingredient included in the curry from the list (included potato, snake gourd, etc. which were observed in our WFR survey) as well as record other foods not in the list. Then, he/she was asked whether dal soup was consumed or not. This question was asked since dal soup was consumed as breakfast during WFR. Finally, the participant was asked whether anything else was consumed for breakfast and when the response was yes, the participant was asked to choose the food consumed from the list that included buffalo milk, mixture of salt and chillies, green chillies only, and mango pickles as well as record other foods not in the list. These

food items listed were consumed at breakfast during our WFR survey.

Similar patterns of questions that were asked for the other snack periods and similar meal time questions were asked for lunch and dinner although food listed differed according to the types of eating occasions. All foods listed in the questionnaire came from the database of WFR. Number of food items listed from the database of WFR was three for morning snack, 12 for breakfast, 10 for lunch, three for daytime snack, nine for dinner, and two for evening snack.

Information on the place where food was consumed was not collected during the interview. Luxury foods, which were of our interest, were marketed foods and we knew they were available only at market in the study communities. Some luxury foods like tea with sugar and milk was consumed away from home. Others like meat curry and fish curry were cooked and eaten at home though meat and fish were bought from a market. Thus, eating place did not always indicate whether the food was considered a luxury food or not.

Statistic analysis

Associations between genders and percent of CED, as well as percent of the participants who ate meals/snacks and specific food items were examined by Pearson's chi-square test. When the number in a cell in the tabulation was less than 5, we carried out the exact test. The level of significance was set at $p < 0.05$. All statistical analyses were conducted using the SPSS® (version 12.0J, 2003, Chicago) statistical package.

RESULTS

Characteristics of the participants

Percentage of participants in their 20's, 30's, 40's, and 50's and over were 28.7%, 26.5%, 21.2%, and 23.7%, respectively. There was no significant gender difference in the percentage of the participants by age group (Pearson's chi-square test, $p = 0.296$). In any age group, no significant gender difference was found for BMI and percent CED (Table 1).

Table 1. Anthropometric measurements by gender and age group (mean ± SD)

| | 20-29 years | | 30-39 years | | 40-49 years | | 50+ years | | Total[†] | |
	Men (N = 21)	Women (N = 41)	Men (N = 21)	Women (N = 28)	Men (N = 18)	Women (N = 26)	Men (N = 23)	Women (N = 22)	Men (N = 83)	Women (N = 117)
Height (cm)	163±5.0	149±5.8	162±5.9	148±6.0	162±5.7	147±4.8	158±4.7	148±5.7	161±5.6	148±5.6
Weight (kg)	52.5±5.6	43.4±6.3	52.5±6.3	44.9±6.3	51.2±7.0	43.0±8.2	46.7±8.4	38.5±10.6	50.5±7.2	42.8±8.7
BMI (kg/m^2)	19.7±2.0	19.5±2.2	20.0±2.1	20.4±3.5	19.5±2.5	19.9±3.7	18.6±3.1	17.4±3.8	19.4±2.5	19.4±3.3
CED (%)	33.3	29.3	23.8	32.1	33.3	42.3	47.8	63.6	34.9	39.3

[†]Anthropometric data was not collected for 43 men and 78 women
BMI, body mass index. CED, chronic energy deficiency (BMI<18.5).
In all age groups, mean BMI and % of CED did not significantly differ between genders.

Table 2. Percentage (number) of participants who ate meals and specific food items

| | Breakfast | | Lunch | | Dinner | |
	Men	Women	Men	Women	Men	Women
How many people ate the meal	99.2 (125/126)	100 (195/195)	39.7 (50/126)	60.5[*] (118/195)	98.4 (124/126)	97.9 (191/195)
What was eaten						
Staple food						
Rice	99.2 (124/125)	97.4 (190/195)	60.0 (30/50)	76.3 (90/118)	96.8 (120/124)	96.3 (184/191)
Chapatti	0.0 (0/125)	1.5 (3/195)	4.0 (2/50)	5.1 (6/118)	0.8 (1/124)	1.6 (3/191)
Rice & chapatti	0.8 (1/125)	0.0 (0/195)	0.0 (0/50)	0.0 (0/118)	0.0 (0/121)	1.0 (2/191)
No answer[†]	0.0 (0/125)	1.0 (2/195)	36.0 (18/50)	18.6 (22/118)	2.4 (3/124)	1.0 (2/191)
Curry	96.8 (121/125)	96.9 (189/195)	80.0 (40/50)	79.7 (94/118)	95.2 (118/124)	95.8 (183/191)
How many types of curry eaten						
One	91.7 (111/121)	90.5 (171/189)	97.5 (39/40)	97.9 (92/94)	94.9 (112/118)	92.3 (169/183)
Two	5.0 (6/121)	8.5 (16/189)	0.0 (0/40)	1.1 (1/94)	5.1 (6/118)	7.7 (14/183)
Three	0.8 (1/121)	0.5 (1/189)	2.5 (1/40)	1.1 (1/94)	0.0 (0/118)	0.0 (0/183)
No answer[‡]	2.5 (3/121)	0.5 (1/189)	0.0 (0/40)	0.0 (0/94)	0.0 (0/118)	0.0 (0/183)
Dal soup	54.4 (68/125)	45.6 (89/195)	14.0 (7/50)	13.6 (16/118)	25.0 (31/124)	23.0 (44/191)
Else	32.0 (40/125)	34.9 (68/195)	46.0 (23/50)	34.7 (41/118)	21.8 (27/124)	22.0 (42/191)

126 men and 195 women.
[*] Pearson's chi-square test, $p < 0.001$.
[†]"No answer" may include participants who did not eat any staple food since the questionnaire did not have this alternative.
[‡]"No answer" may include participants who ate more than four types of curry since the questionnaire did not have this alternative.

Table 3. Percentage of participants who ate snacks and specific food items

	Morning		Daytime		Evening	
	Men	Women	Men	Women	Men	Women
How many people ate the snack	29.4	22.6	22.2	7.2[*]	1.6	1.0
What was eaten						
Tea with sugar and milk	10.3	6.2	8.7	1.5[**]	0.0	0.0
Tea with sugar only	15.9	11.8	1.6	0.5	0.0	0.0
Buffalo milk	0.0	2.1	0.0	0.5	1.6	1.0
Buffalo milk curd	0.8	0.0	1.6	0.0	0.0	0.0
Beaten rice	1.6	1.5	4.8	0.5	0.0	0.0
Muri (puffed rice)	0.0	0.0	2.4	0.0	0.0	0.0
Chapatti	1.6	0.0	0.0	0.0	0.0	0.0
Mixture of salt and chilli	0.0	0.0	0.0	1.5	0.0	0.0
Mutton	0.0	0.0	1.6	0.0	0.0	0.0
Soybean	0.0	0.0	1.6	0.0	0.0	0.0
Samosa (minced meat and vegetables wrapped by dough and deeply fried)	0.0	0.0	4.0	0.0[***]	0.0	0.0

126 men and 195 women.
Pearson's chi-square test, [*]$p <0.001$, [**]$p = 0.008$, [***]$p = 0.049$.
Only food items that were eaten by two or more men or women at one of the three snack occasions are shown.

Meals
Table 2 shows the proportion of participants that had breakfast, lunch, and dinner. Foods consumed in those meals included rice, chappati, or rice and chappati as staples as well as combination of different types of curry, dal soup, and others. All or most men and women consumed breakfast and dinner, although lunch was consumed by 39.7% of men and 60.5% of women ($p <0.001$). Three types of staple food consumed did not significantly differ between genders at any eating occasion. The proportion of the participants who consumed curry, dal, or any other foods did not significantly differ between genders at any eating occasion. As for the type (main ingredient) of the curry, there were no significant gender differences in the intake of curry with any luxury foods, such as meat curry, fish curry, or egg curry (data not shown).

Snacks
Table 3 shows the proportion of participants that ate morning, daytime, and evening snacks as well as other specific food items. Since the total number of food items consumed during the three snack occasions was 42 (16 for morning, 25 for daytime, and 1 for evening), only those consumed by two or more participants at any one of the three snack occasions are presented. The percentage of men and women who ate daytime snack was 22.2% and 7.2%, respectively (Pearson's χ^2 = 15.2, $p <0.001$). As for the foods consumed as daytime snack, two items were consumed by more men than women: tea with sugar and milk (8.7% vs 1.5%, $p = 0.008$) and samosa (4.0% vs 0%, $p = 0.049$).

DISCUSSION
WFR and structured interview were randomly assigned on weekdays and weekends. The magnitude of the influence by day-of-week is largely determined by cultural and ecologic factors.[9] Most of our participants were farmers and worked similarly on weekday and weekend. Similar activity pattern was observed in other Asian rural communities. Bangladeshi villagers' activities did not markedly differ among days in a week throughout a year.[10] Compared to families in industrialized countries who tend to have large family meals at weekend dinner,[11] variation between weekday and weekend seemed small among our participants although actual variation within the individual could not be assessed since WFR or structured interview was carried out only once for each person.

Compared to the WFR, the 24-h recall was more convenient for both the participants and the investigators. Our 24-h recall required less than 10 minutes per subject while the WFR for one household required the investigator(s) to stay in the participant's house for a whole day. Therefore only a subset of the total number of participants was selected for the additional WFR. This was done in order to develop the structured 24-hr recall questionnaires for all participants.

The findings of the 24-h recall survey highlighted three matters. Firstly, there was no gender difference in consumption of staple foods (rice and chapatti), curry, and dal soup. This result was consistent with that of our FFQ survey carried out on the same participants, which demonstrated that intake of energy or macronutrients per unit of body weight did not significantly differ between genders.[1] It is also noted that these results were in agreement with no significant gender differences in BMI and percent CED.

Secondly, the analysis of food consumption at different eating occasions revealed that lunch was more frequently skipped by men (60.3%) than women (39.5%) and that daytime snack was also taken more frequently by men (22.2%) than women (7.2%). Skipping lunch is not rare among poor rural communities in developing countries.[1,12] This study revealed that the number of meals in a day was flexibly two or three but cooking for meals was usually done only twice, in the morning for breakfast and lunch and in the afternoon for dinner. In other words, cooked dishes in the morning were consumed either at breakfast only or at breakfast and lunch, depending on the activity schedule of the day.

Thirdly, luxury foods, represented by marketed foods such as meat and milk, were consumed mostly as daytime snack, and significant gender differences were found in the proportion of participants consuming a daytime snack and the proportion consuming samosa and tea with milk. The current study reveals that men were absent from home mostly during the day compared to women. Women usually spent time either at home or in their garden closer to the village.[13] Shopping in the marketplace is a men's role and this activity is in association with their dominance of household cash economy. It is thus judged that men' larger intake of marketed luxury foods outside their home is a significant factor of triggering gender inequality in nutrient intakes. Similar activity patterns were observed in a rural Indian community, where women were more likely to farm than men. They tend to carry the burden of all household chores, and ate less food away from home than men.[14] As reported from various poor rural populations, less consumption of luxury foods such as meat, fish, and tea with milk triggers micronutrient deficiencies.[1-4,15]

Gender discrimination in dietary pattern due to the traditional socio-cultural norm of male dominating rural societies in Nepal and its adjacent countries has been pointed out.[16-18] Our eating occasion analysis has revealed that one of the major causes of gender discrimination comes from women spending less time out of the village despite spending more time in unpaid work for housekeeping and food production. These activities are common with many developing countries.[19-22] As pointed out by Gillespie,[23] empowerment of women has remarkably improved their nutritional status in some developing countries. Mwadime et al emphasized the significance of women's nutritional conditions and their care for children in terms of nutrition and health at the household and community levels.[24] It is thus concluded that nutritional intervention programmes in male dominating societies of developing countries should focus on women, especially their eating behaviour at the six eating occasions.

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Gender differences in "luxury food intake" owing to temporal distribution of eating occasions among adults of Hindu communities in lowland Nepal

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尼泊爾低地印度教社區成年人「奢侈食物攝取」因進餐時機與場合不同而有性別差異

之前研究指出，發展中國家，因婦女較少攝取奢侈食物，而有微量營養素缺乏之風險。因此本篇研究進一步探討，食物攝取的性別差異原因何在。比較尼泊爾低地印度教社區成年人不同性別的進食模式，包括每日用餐頻率（省略某一餐）及時間分佈。三個農村社區 94 戶經隨機挑選後，共有 321 位 20 歲以上成人（男性 126 位；女性 195 位）參與研究。使用 24 小時飲食回憶問卷，面對面訪談詢問受試者，記錄六餐（早點、早餐、午餐、午點、晚餐及晚點）食物及攝食時機，納入分析。結果顯示，男性常常省略午餐(p<0.001)，而午點攝取較頻繁(p<0.001)，午點較常購買奢侈食物，如加糖及牛奶的茶(p=0.008)以及印度三角餃(p=0.049)。從六餐進食時機的分析而得知，尼泊爾低地印度教社區成年人食物攝取，在午餐及午點有性別差異，此差異可歸因於不同性別的每日活動型態不同。

關鍵字：婦女、奢侈食物攝取、飲食行為、尼泊爾、24 小時飲食回憶面訪