

## Background

- Nepali women of child bearing age are recommended to consume an energy and nutrient dense diet with particular emphasis on high quality protein, calcium, iron and folic acid (DFTQC, 2012).
- A typical traditional Nepali diet that includes foods such as gundruk (fermented vegetables), yogurt, millet, daal (lentil soup), and maseura (sun-dried lentil paste) that are naturally rich in protein, iron, and calcium
- However 41% of women 15-49 are anemic while 17% are underweight and 22% are overweight and/or obese implying that a significant proportion have improper and/or inadequate dietary patterns, making them nutritionally vulnerable during pregnancy and lactation (MOH 2016)

## Objectives and Methods

- The objective was to conduct a dietary pattern analysis of rural Nepali women of child-bearing age
- The study used data from 2994 non-pregnant women between 15 to 49 years of age. Data were extracted from an ongoing nationally representative, multi-year annual household panel (POSHAN study) performed in 21 Nepali districts in years 2013 and 2014.
- Using a food frequency questionnaire (FFQ), women were asked how often they consumed an individual food list in the last 24 hours and in the past 7 days.
- A descriptive analysis of change in consumption was conducted
- Principal Component Analysis (PCA) was performed on the reported food frequencies of consumption of the 49 food and food groups using both panels.
- A total of 6 components loaded with an eigenvalue > 1.
- The top four components/patterns explained 20% of the variation in the dietary data. Components 1 and 2 each explained 6 % of variation each while components 3 and 4 each explained 3% of variation respectively.

## Results

- Mean age of the subjects was 27.15± 6.77 years
- Table 1 provides a frequency of consumption by foods and food groups in 2013 and 2014 and Figure 1 depicts a typical diet which is high in carbohydrates
- Component/Pattern 1 included diverse animal source foods (ASF), legumes, Vitamin A rich vegetables with fruits being primarily apples and bananas. Interestingly this pattern was low in carbohydrates
- Component/Pattern 2 included carbohydrates (rice, potato, noodles and snack foods such as puffed rice, beaten rice, biscuits, popcorn), vegetable oil as a source of fat and lentils as a source of plant based protein. Vegetables included okra and gourd, and fruits included apples and mangoes
- Component/Pattern 3 was predominantly vegetarian and composed of grains (rice, corn, wheat, millet), legumes milk, yogurt, fruits and vegetables
- Component/Pattern 4 included grains, legumes ASFs and vegetables like cauliflower and cabbage.

## Results

**Table 1: Frequency of weekly consumption of foods & food groups (n= 2994)**

Food and Food Groups	Panel 1 (2013)	Panel 2 (2014)	Diff
<b>Cereals</b>			
Rice	14.55	14.34	0.21*
Corn	0.6	0.45	0.15*
Wheat	4.72	4.87	-0.15*
Millet	0.73	0.65	0.08
Noodles	1.24	1.26	-0.02
<b>Legumes</b>			
Daal (Lentil Soup)	8.39	8.59	-0.19
Maseura (sun dried lentil paste)	0.4	0.22	0.19*
Other Legumes	1.45	1.23	0.22
Peanuts	0.25	0.21	0.04
<b>Animal Source Foods</b>			
Milk	2.91	2.54	0.37
Yogurt	1.85	1.64	0.21*
Eggs	0.82	0.71	0.11*
Chicken	0.85	0.65	0.20*
Goat	0.56	0.49	0.08*
Buffalo	0.2	0.17	0.03
Pork	0.06	0.06	0.01
Large Fish	0.24	0.25	-0.01
Small Fish	0.09	0.07	0.01
Dried Fish	0.08	0.07	0.01
<b>Vegetables</b>			
Dark Green Leafy Vegetables	3.11	3.04	0.07
Carrots	0.25	0.12	0.14*
Pumpkin	0.3	0.2	0.09*
Green beans	1.65	1.31	0.33*
Green peas	0.09	0.06	0.03*
Gourd	2.48	2.58	-0.1
Okra	1.18	1.07	0.12*
Egg Plant	0.39	0.39	0.01
Potato	11.21	11	0.21
Tomato	3.21	3.53	-0.32*
Cauliflower	0.24	0.21	0.03
Cabbage	0.33	0.19	0.14
Drumstick	0.1	0.08	0.01
Jackfruit (green)	0.51	0.39	0.12
Gundruk	0.36	0.33	0.03
<b>Fruits</b>			
Mango	2.17	2.06	0.11
Jackfruit (ripe)	0.05	0.06	-0.01
Guava	0.3	0.18	0.12*
Orange	0.05	0	0.04
Papaya (ripe)	0.19	0.16	0.03
Apple	0.53	0.38	0.14
Pineapple	0.01	0.01	0.01*
Banana	0.4	0.51	-0.12*
<b>Fats, Sweets and Snacks</b>			
Snacks	2.58	2.6	-0.02
Other Snacks	0.05	0.02	0.03*
Vegetable Oil	17.59	18.71	-1.12*
Ghee	1.3	1.18	0.13
Hydrogenated Oil	0.07	0.08	-0.01

## Results

**Table 2: Four dietary patterns in rural Nepali women**

Component	Dietary pattern 1	Dietary pattern 2	Dietary Pattern 3	Dietary pattern 4
<b>Eigen value</b>	3.32	3.07	1.77	1.71
<b>Cereals</b>	-	+	+	+
<b>Legumes</b>	+	+	+	+
<b>Animal Source Foods</b>	+	+	+ (primarily fish)	+
<b>Vegetables</b>	+ Vitamin A Rich	+	+	+ (Other veg)
<b>Fruits</b>	+ Apples and Bananas	+	+	-
<b>Fats, Sweets and Snacks</b>	-	+	+	+ (Snacks only)

## Conclusions

- We derived four major dietary patterns using PCA which explained 20% variation only, findings similar to other studies (Crozier et al, 2009)
- The two patterns that explained the most variation were both nutrient and energy dense (Component/Pattern 1 and 2)
- Component Pattern 2 mimics a traditional Nepali diet
- The next two patterns (3 and 4) were primarily energy dense
- Interestingly three of the two patterns did not include rice despite rice being consumed by most (Table 1)
- Study participants who followed the dietary pattern 1 were more likely to meet the dietary requirements than those in pattern 2.
- However the top four patterns accounted for only 20% variation in the population
- Future research will focus on assessing the discrepancy in frequency reporting and dietary pattern loading as well as quantitatively assessing diets to ascertain true dietary intake.



Figure 1: A typical Nepali diet of rice, lentil soup, vegetable curry and occasional ASFs

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