Prevalence of Overweight among adult women in Sri Lanka: can we control it?

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Abstract

This study aims at providing information on the overweight and obesity among non pregnant women aged 15 to 49 years and associated factors. A household survey was carried out in nine districts, one randomly selected from each province. A multistage cluster sampling method was used to identify 30 clusters per district each consisting 21 randomly selected households. Data collection was done using an interviewer administered questionnaire. Non pregnant, non-lactating women between 15-49 years were selected in this assessment. Nutritional status was assessed using anthropometric indicators. Total of the 6071 households included in the study. Of the 27,862 residents in the selected households, 27.3 percent were women aged between 15 and 49 years. Of them, 18.2% had BMI < 18.5, 22.8% were between 25 and 29 and 6.6% were BMI 30 or above. A higher level of husband's education and higher wealth quintiles were associated with a higher risk of overweight or obesity**.** Programmes on healthy eating and physical activity are to be launched to control the high prevalence of overweight and obesity in women.

Introduction

Nutritional status of women is one of the determinant factors for the maternal under-nutrition and low birth weight. Though a remarkable improvement in nutrition indicators occurred between 1993 and 2000, advances in nutrition status of women between the years 2000 to 2007 have been slower[1-2].

Income, poverty and related factors are important underlying causes of under nutrition through many pathways. One of the key ways in which income poverty could influence nutritional status is through its impact on household food security which in turn is strongly influenced by food prices.

In view of the wide range of factors that influence nutritional status, conducting a comprehensive study where information on basic, underlying and immediate causes are available can be considered a need at the present time. Such a study is likely to provide evidence that will assist the policy makers to make decisions regarding the actions which should be taken in order to have a positive impact on the current nutrition situation. Observations regarding the inter district, inter sectoral differences and the influence of income on nutritional status that have been reported need to be studied in depth to assess the changes that are likely to have an effect due to recent global economic scenario.

In response to these challenges, this study was conducted to provide data from a household survey, supplemented by information from in-depth interview data, to assess the nutrition and food security situation in 9 districts in the country, one district from each of the 9 provinces. The survey will provide urgently needed information that will help the Ministry of Health, other ministries and all other stakeholders, to map the most vulnerable populations and identify interventions , targeting mechanisms, and serve as a baseline which can be compared with subsequent data collection.

Objectives of the study were,

1. To determine the nutritional status among adult women (15-49years).
2. To determine the factors related to their current nutritional status especially regards to food security dynamics and back ground characteristics.

Materials and Methods

A cross sectional household survey was carried out in nine districts of Sri Lanka, one district randomly selected from each province. Each district constituted one study area, except the Colombo district which had two study areas: the Colombo Municipal Council area and the Colombo RDHS area. The selected study areas are Jaffna, Trincomalee, Colombo Municipal Council (MC) area, and other areas in Colombo district, Kurunegala, Anuradhapura, Nuwara Eliya, Badulla, Ratnapura and Hambantota.

The probability proportional to size technique was used to identify the clusters which are defined at the Grama Niladhari (GN) division level. The first cluster was identified randomly, followed by identification of a total of 30 clusters per district, using the sampling interval. A systematic random sampling technique was used within each cluster to identify 21 households.A household was defined as persons routinely sharing food from the same cooking pot and living in the same compound or physical location. The estimated sample size per district was 617 households totaling to 6170 households in 10 study areas.

Nutritional status of non-pregnant women in the age group 15 – 49 years from the households included in the study was described using BMI and haemoglobin levels as indicators of thinness, overweight and anaemia respectively. The household survey included the administration of a pre-tested questionnaire, assessment of the nutritional status of women using anthropometric indicators which was done using standardized procedures for measuring the height/length, weight[3]. Food consumption was assessed by 24 hour and 7-day recall for specific foods. Measurement of haemoglobin levels was carried out using hemocue method, using capillary blood.

Data analysis was conducted in Anthro (WHO Anthro, version 3) and SPSS software packages. Three categories of women were identified based on BMI– thin (<18.5), normal (18.5-24.9) and overweight/obese (≥25)[4]. Multiple logistic regression analysis was used to identify the associated factors.

Two indicators of economic status were used in this study, the first being the average household income per month and the second, the Household Wealth Index. Household income was categorized into 6 classes considering the class limits of the income deciles described in the Household Income and Expenditure Survey, 2007[5] and adequacy of the number of observations in each class-interval.

The 'household wealth index' was developed using 3 sources of information: housing characteristics, household possessions and availability of water and sanitation facilities. Principal component analysis was performed by using information on the ownership of household goods and amenities (assets) to assign weights to each household asset, and obtain wealth scores for each household in the sample.

The assets or variables used in these calculations were as follows: housing characteristics (type of floor; type of roof; type of wall) availability of household assets (electricity supply, solar power, radio, television, mobile phone, static phone, refrigerator, watch, bicycle,

motorcycle, three wheeler, tractor/land master, car and motorized boat) and available water and sanitation facilities (source of drinking water, type of sanitary facility).

The sample was then divided into five groups of equal size, from the poorest quintile to the richest quintile, based on the wealth scores of households they were living in. The wealth index is assumed to capture the underlying long-term wealth through information on the household assets, and is intended to produce a ranking of households by wealth, from poorest to richest. A single index was developed for the whole sample and indices were not prepared for each district separately.

The study was carried out during the period, January to April 2009.

Results

A total of 6071 households were included in the survey. Out of the total, 69.4 percent of the households were in the rural sector, 25.0 percent in the urban sector and 5.6 percent in the estate sector. Of the total 27,862 individuals who were usually resident in the selected households, 7604 (27.3 percent) were women aged between 15.0 and 49.9 years.

Thirty nine percent of the households had a monthly income less than Rs.9000. Percentage of households classified as belonging to the lowest wealth quintile varied from 4.6 percent in the Colombo district to 40 percent in Jaffna district. Conversely, households belonging to the highest wealth quintile ranged from 5.1 percent in Jaffna to 46.6 percent in Colombo district.

Of the total sample of non-pregnant women, 18.2 percent had BMI less than 18.5(thin), 22.5 percent with values between 25 and 29 (overweight) and 6.7 percent, with BMI values 30 or above (obese). The overall prevalence of anaemia among this group was 22.2 percent.

As shown in Table 3, increasing age of women was associated with a lower risk for thinness. Women in the estate sector had almost 5 times (OR=4.9) risk of being thin, compared to those in the urban sector. Thinness in women was less likely with better socio-economic factors such as husband's education (O/Level and above OR=0.48), higher family income (Income 14000-19999 OR=0.64), and higher wealth index (richest OR=0.39).

In contrast to thinness, women in the estate sector had lower (OR=0.21) risk of being overweight/obese compared to urban sector (Table 3). Compared to the Colombo MC, risk of overweight/obesity was low in certain districts: Ratnapura (OR=0.46), Jafffna (OR=0.50), Colombo (OR=0.53), Hambantota (OR=0.57), and Badulla (OR=0.56). Increasing level of husband's education and wealth quintiles were strong correlates for the risk of having overweight/obesity in women.

Risk of anaemia is almost 2.5 times higher (OR=2.48) among women in the estate sector than those in the urban sector. Compared to the Colombo MC, risk of anaemia was low in the

districts of districts: Nuwara Eliya (OR=0.41), Hambantota (OR=0.52), Trincomalee OR=0.49), Kurunegala (OR=0.49) and Badulla (OR=0.46). The risk of anaemia was significantly higher (OR=1.86) when the expenditure on food as a percentage of household income was above 90 percent.

There was an increasing trend in the mean scores of Household Dietary Diversity Score (HDDS), months of adequate household food provisioning (MAHFP), household food consumption adequacy score (HFCAS) and number of days of food stock last, increased from those households with thin, normal and overweight/obese mothers in that order, indicating that households with poor food availability are at risk of under nutrition. Non-anaemic women had marginally higher scores than anaemic women, but these differences were non-significant.

Discussion

This study was carried out with the objective of identifying the most vulnerable populations in relation to their nutritional status. This enabled the assessment of the prevalence of BMI and anaemia among women.

Sri Lanka Demographic and Health Survey (DHS) 2006/07 has also studied the nutritional status of women. Due to methodological differences between the two surveys, there are limitations in making direct comparisons between the findings from the present study with those of DHS 2006/7. However, it was considered useful to compare the main findings as both studies were based on large household samples, used the same indicators and methods in the assessment of nutritional status and were carried out within a three year period.

Nutritional status of mothers of under five children, who were not pregnant and in the age group 15 – 49 years was assessed using BMI as an indicator of thinness and overweight. The percentages of women identified as 'thin' were 18.2 with that of overweight and obese women were 22.5 percent and 6.7 percent respectively. Comparable data from DHS 2006/07 indicate the prevalence of thinness to be16.2 with that for overweight and obesity being 24.0 and 7.2 percent, respectively.

Associated factors for thinness among this group of women when compared between this study and the DHS 2006/07 showed similarities except for the inter district differences. Both studies show that the percentage of 'thin' women was significantly higher among those aged less than 30 years, especially among the teenagers, in the estate sector and in the lowest income group, and the poorest wealth quintile. In the present study, the districts of that showed high prevalence of thinness were: Ratnapura, Badulla and Nuwara Eliya. In the DHS 2006/07, high prevalence of thinness was reported from the districts of Moneragala and Matale which were not included in this study.

Prevalence of 'thin' mothers was significantly higher among those who had only one child, which may be possibly due to the confounding effect of age. In contrast, overweight and/or obese women were significantly higher after 30 years of age, in the urban sector, Colombo

MC and Colombo district, and in the groups belonging to higher income levels and wealth quintiles. Prevalence of anaemia was significantly higher among women aged 40 years and above, lived in the estate sector, in Jaffna district, and who had no schooling.

It was found that 45% of non-pregnant women suffered from anaemia. According to that, women 18-45 years old seem to be the most affected and significant inter-provincial variations in the prevalence of anaemia were observed in this group[6]. Study done in 2003 including 4730 women in the 15-49 year age group found that overall prevalence rate was 32% with the rates ranging from 29% in the age group less than 19 years to 43 % in those 45+ years[7]. The inter sectoral comparisons showed a different pattern in that thee highest prevalence was seen among the estate women (37%) with the rates for rural and urban women being 31% and 30% respectively. According to this study prevalence had been declined but the inter sectoral differences remained the same.

Food related indicators were important factors that influenced the nutritional status of the women studied. Even though not statistically significant, the percentage of 'thin' women was higher in households that spent 90 percent or more of household expenditure on food. The households which adopted a coping strategy or belonged to moderate-to-severe food insecure category reported a significantly higher percentage of 'thin' women. It was also shown that prevalence of overweight/ obese women were significantly higher in households that spent less than 50 percent on food.

Mean scores of Household Dietary Diversity Score (HDDS), number of months of adequate household food provisioning (MAHFP), household food consumption adequacy score (HFCAS) and number of days of food stock last , all indicate different aspects of food availability at the household level. Comparison of the mean scores of these indicators across 3 BMI categories shows an increase from 'thin' to 'overweight/obese'. This indicates that mothers belonging to households with 'improved' food availability are less vulnerable to thinness.

Though at the planning stage of the study, a multi stage randomized cluster sampling technique was used to identify the sample, there were a few limitations posed during the implementation phase. They included "absentee bias": when the survey teams were not able to return to households in which no one was home when first visited. In some districts, the non-response rate was higher than 5%, weakening the representativeness of the data. In a few districts, modifications had to be made in the process of selecting clusters which may have enabled smaller villages to be more likely to be included in the sample.

Conclusions

- Of the women aged 15-49 years who had a child under 5 years and not pregnant at the time of the survey, 17.0 percent had BMI less than 18.5 (thin), 22.8 percent with

values between 25 and 29 (overweight) and 6.6 percent with BMI values of 30 or above (obese). The prevalence of anaemia was 16.2 percent among pregnant women, 19.6 percent among lactating women, and 21.7 percent among non-pregnant and non-lactating women.

- Higher prevalence of thinness common among younger women, being in the estate sector, lower level of husband's education, lower family income, and poorest wealth quintiles.
- Overweight or obesity was associated with increasing level of husband's education and higher wealth quintiles.
- Higher prevalence of anaemia was seen in the estate sector, and when the expenditure on food as a percentage of household expenditure was above 90 percent.

Recommendations

1. Enhance the awareness among public through mass media and strengthen the behavior modification changes to improve the dietary diversity.
2. Implement community empowerment programmes to enhance physical activity and healthy diet to reduce the prevalence of Overweight and obesity among women.

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Table 1: Prevalence of thin, normal, overweight/obese and anaemia in non-pregnant women by background characteristics and food security characters.

Characters	Thin	Normal	Overweight /Obese	anaemic
	%	%	%	%
Women's age in yrs				
<20	40.5	45.2	14.3	23.5
20-29	22.5	54.7	22.9	20.6
30-39	12.9	51.8	35.3	21.3
40-49	14.2	50.7	35.1	32.2
Sector				
Urban	11.2	45.5	43.3	21.3
Rural	18.7	55.4	25.9	21.5
Estate	42.6	50.0	7.4	33.6
District				
Anuradhapura	16.9	53.7	29.4	22.4
Badulla	24.0	51.5	24.5	16.6
Colombo	12.1	52.8	35.0	21.7
Colombo MC	9.5	39.0	51.5	24.1
Hambantota	20.4	52.6	27.0	21.4
Jaffna	20.4	57.5	22.2	35.3
Karunegala	19.2	49.5	31.3	14.9
Nuwara Eliya	22.5	59.9	17.6	23.9
Ratnapura	25.3	56.5	18.1	24.2
Trincomalee	12.0	54.3	33.8	16.2
Level of education				
No schooling	19.6	57.1	23.2	30.4
Primary	23.1	52.5	24.4	26.9
Secondary	18.1	49.4	32.4	23.8
Passed O' Level	18.5	54.2	27.3	23.1
Higher	15.2	54.1	30.7	15.9
Household Income				
< 9,000	21.9	52.4	25.7	25.0
9,000 – 13,999	15.9	55.4	28.8	22.7
14,000 – 19,999	12.2	56.8	31.0	20.2
20,000 – 31,999	16.0	49.0	35.0	20.2
≥ 32,000	9.6	51.4	39.0	19.2
Wealth Index				
Poorest	26.2	57.4	16.4	26.7
Lower	22.1	53.1	24.8	27.0
Middle	19.4	50.0	30.6	22.4
Upper	13.1	52.1	34.8	17.0
Highest	11.0	50.6	38.3	18.3
Percent expenditure on food				
<50 percent	14.9	47.9	37.2	15.4
50-74 percent	13.9	50.6	35.5	20.2
75-90 percent	17.4	54.2	28.4	22.8
≥ 90 percent	19.9	55.1	25.0	22.6
Food insecurity category				
Food Secure	15.7	52.3	32.0	21.1
Moderately food insecure + Severely food insecure(combined)	24.4	50.2	25.3	26.0
Overall	**18.2**	**52.6**	**29.2**	**22.2**

Table 2. Associated Food Security Related Factors

Comparison of Scores	Thin	Normal	overweight/obese	aneamic	non-anaemic
	mean (95 CI)	mean (95 CI)	mean (95 CI)	mean (95 CI)	
Household Dietary Diversity Score (HDDS)	7.76 (7.59, 7.94)	7.95 (7.85, 8.05)	8.23 (8.10, 8.36)	7.87 (7.71, 8.02)	8.04 (7.96, 8.12)
Months of adequate household food provisioning (MAHFP)	10.00 (9.61, 10.39)	10.50 (10.31, 10.69)	10.83 (10.60, 11.05)	10.19 (9.85, 10.76)	10.60 (10.45, 10.76)
No of days of food stock last	5.39 (4.76, 6.01)	5.96 (5.50, 6.43)	6.10 (5.50, 6.63)	5.60 (4.96, 6.25)	5.98 (5.61, 6.35)
Household food consumption adequacy score (HFCAS)	66.85 (65.09, 68.61)	68.42 (67.49, 69.35)	71.30 (70.02, 72.57)	5.60 (4.96, 6.25)	5.98 (5.61, 6.35)

Table 3 Factors associated with thinness, overweight/obesity and anaemia in non-pregnant women (n=1974)

Characteristic	Thinness (BMI <18.5)				Overweight / Obese (BMI ≥)				Anaemia			
	OR	95% CI		p value	OR	95% CI		p value	OR	95% CI		p value
Women's age in yrs												
<20	1.00				1.00				1.00			
20-29	0.58	0.29	1.17	0.129	1.12	0.50	2.55	0.779	0.71	0.46	1.49	0.109
30-39	0.31	0.15	0.63	0.001	2.08	0.92	4.70	0.080	0.80	0.40	1.61	0.531
40-49	0.32	0.14	0.69	0.004	1.90	0.80	4.47	0.143	1.54	0.74	3.21	0.251
No. of children less than 5 years												
1	1.00				1.00				1.00			
2	0.71	0.49	1.01	0.059	0.86	0.65	1.14	0.304	0.93	0.70	1.25	0.641
≥3	0.72	0.54	0.97	0.030	1.02	0.80	1.30	0.870	1.06	0.84	1.35	0.609
Sector												
Urban	1.00				1.00				1.00			
Rural	1.21	0.67	2.18	0.525	0.72	0.50	1.03	0.072	1.26	0.84	1.87	0.260
Estate	4.92	2.11	11.50	0.000	0.21	0.09	0.49	0.000	2.48	1.30	4.74	0.006
District												
Colombo MC	1.00				1.00				1.00			
Anuradhapura	1.36	0.58	3.21	0.481	0.67	0.38	1.17	0.157	0.66	0.36	1.21	0.177
Badulla	1.45	0.65	3.26	0.366	0.56	0.33	0.97	0.039	0.46	0.25	0.83	0.010
Colombo	1.14	0.55	2.35	0.719	0.53	0.34	0.82	0.004	0.81	0.50	1.30	0.381
Hambantota	1.92	0.81	4.58	0.139	0.57	0.32	1.00	0.048	0.52	0.28	0.95	0.034
Jaffna	1.18	0.51	2.72	0.703	0.50	0.28	0.89	0.019	1.33	0.74	2.37	0.337
Karunegala	1.87	0.81	4.35	0.144	0.69	0.39	1.21	0.197	0.49	0.27	0.91	0.023
Nuwara Eliya	0.65	0.24	1.74	0.394	0.63	0.35	1.15	0.132	0.41	0.21	0.80	0.009
Ratnapura	1.66	0.71	3.86	0.241	0.46	0.26	0.82	0.008	0.59	0.32	1.07	0.085
Trincomalee	0.58	0.23	1.46	0.251	0.95	0.56	1.61	0.842	0.49	0.27	0.89	0.019
Mother's education												
No schooling	1.00				1.00				1.00			
Primary	2.38	0.94	6.05	0.067	0.72	0.28	1.86	0.498	0.73	0.35	1.54	0.408
Secondary	2.07	0.85	5.06	0.112	1.02	0.42	2.51	0.964	0.77	0.38	1.56	0.472
Passed O' Level	2.30	0.93	5.68	0.072	0.80	0.32	1.99	0.633	0.83	0.40	1.72	0.624
Higher	2.19	0.84	5.66	0.107	0.73	0.29	1.84	0.503	0.67	0.31	1.44	0.308
Husbands' education												
No schooling	1.00				1.00				1.00			
Primary	0.52	0.25	1.10	0.086	2.78	1.07	7.20	0.035	1.21	0.63	2.32	0.568
Secondary	0.72	0.35	1.48	0.372	3.37	1.34	8.50	0.010	0.98	0.52	1.85	0.950
Passed O' Level	0.48	0.23	0.99	0.048	3.46	1.38	8.72	0.008	0.97	0.50	1.86	0.916
Higher	0.47	0.13	1.72	0.252	3.79	1.25	11.43	0.018	1.40	0.55	3.53	0.481
Household Income												
< 9,000	1.00				1.00				1.00			
9,000 – 13,999	0.71	0.50	1.03	0.070	0.95	0.70	1.28	0.714	1.07	0.79	1.45	0.649
14,000 – 19,999	0.64	0.42	0.99	0.045	0.83	0.59	1.17	0.283	1.05	0.75	1.47	0.785
20,000 – 31,999	1.16	0.76	1.76	0.491	0.78	0.56	1.09	0.147	1.28	0.90	1.81	0.167
≥ 32,000	0.68	0.35	1.33	0.257	0.88	0.56	1.40	0.593	1.38	0.85	2.24	0.188
Wealth Index												
Poorest	1.00				1.00				1.00			
Lower	0.88	0.61	1.28	0.514	1.40	0.96	2.04	0.080	1.17	0.84	1.63	0.349
Middle	0.72	0.49	1.07	0.105	1.58	1.07	2.33	0.020	1.17	0.82	1.66	0.380
Upper	0.46	0.29	0.72	0.001	1.98	1.34	2.93	0.001	0.89	0.61	1.31	0.560
Highest	0.39	0.23	0.67	0.001	2.07	1.35	3.19	0.001	0.79	0.52	1.22	0.291
Percent expenditure on food												
<50 percent	1.00				1.00				1.00			
50-74 percent	0.98	0.55	1.76	0.958	1.18	0.76	1.82	0.464	1.20	0.75	1.91	0.450
75-90 percent	0.87	0.48	1.58	0.652	1.12	0.71	1.77	0.615	1.13	0.71	1.82	0.604
≥ 90 percent	0.97	0.50	1.86	0.918	0.86	0.50	1.47	0.582	1.86	1.11	3.13	0.019
HDDS (Household Dietary Diversity Score)												
<4	1.00				1.00				1.00			
≥4	0.99	0.59	1.67	0.977	0.82	0.51	1.33	0.421	0.91	0.60	1.39	0.667
	1.01	0.60	1.70	0.960	1.09	0.68	1.75	0.709	0.92	0.61	1.39	0.684
MAHFP (months of adequate household food provisioning)												
<5	1.00				1.00				1.00			

Characteristic	Thinness (BMI <18.5)				Overweight / Obese (BMI ≥)				Anaemia			
	OR	95% CI		p value	OR	95% CI		p value	OR	95% CI		p value
5-7.9	1.32	0.70	2.49	0.396	0.89	0.48	1.67	0.719	0.74	0.42	1.29	0.285
8-12	0.96	0.59	1.55	0.861	1.16	0.73	1.85	0.533	0.74	0.37	1.08	0.406

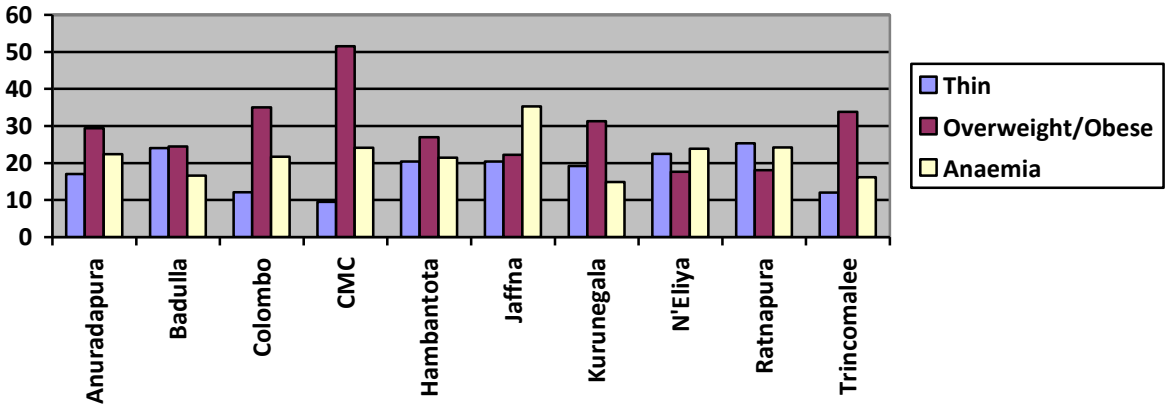

Figure 1. Prevalence of Thinness, Overweight/obesity and Anaemia by district.