

5.2 BIOLOGICAL MARKERS OR RISK FACTORS

The common biological markers or risk factors are obesity, hypertension, proteinuria, impaired glucose tolerance and stress response (**Figure 1-3**). In 1995, the normal range for a body mass index (BMI) of an adult that was recommended by the WHO is from 18.5 to 24.9. Any value above 24.9 is considered to be overweight while if it exceeds 30 then it would be termed as obese.

5.2.1 GEOGRAPHICAL DISTRIBUTION OF OBESITY

A. ACROSS DISTRICTS, AMONG PRIMARY SCHOOL CHILDREN

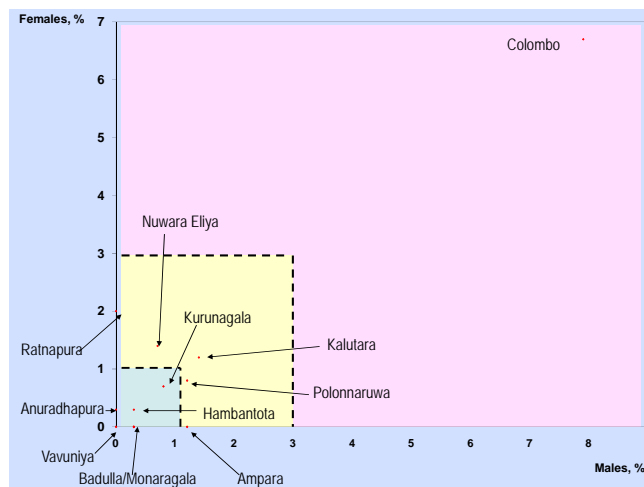


FIGURE 5- 11: OVERWEIGHT AMONG PRIMARY SCHOOL CHILDREN BY DISTRICTS & SEX, 2002-2003 N=6675

In the year 2002-2003 a survey was conducted by the MRI to assess the 'overweight percentage' among the **primary school children, under the age of 10**, by district and sex. The overweight percentages of males were plotted against those of females in **Figure 5- 11**. Colombo district is an outlier. The overweight percentage of the boys in this district was about 8% while it was less in the girls, a figure of 6.6%. In Nuwara Eliya, Kalutara and Polonnaruwa the overweight percentages for both boys and girls are between 1% and 3%. Ratnapura and Ampara are unusual because there were no overweight boys in the former and no overweight girls in the latter. Vavuniya was also quite unique– it had no overweight primary school children.

In the same study as above that was conducted from 2002 to 2003, the severity of overweight was analyzed among schoolchildren between 5 and 14.9 years of age. The 12 study districts were classified into four according to the degree of severity - severe, moderate, mild and 'not a problem' (**Figure 5- 12**). There were no districts that had severe or moderate levels. Only the Colombo district had overweight at a mild degree. The rest of the study districts had the overweight problem under control.

B. ACROSS DISTRICTS, AMONG ADOLESCENCE

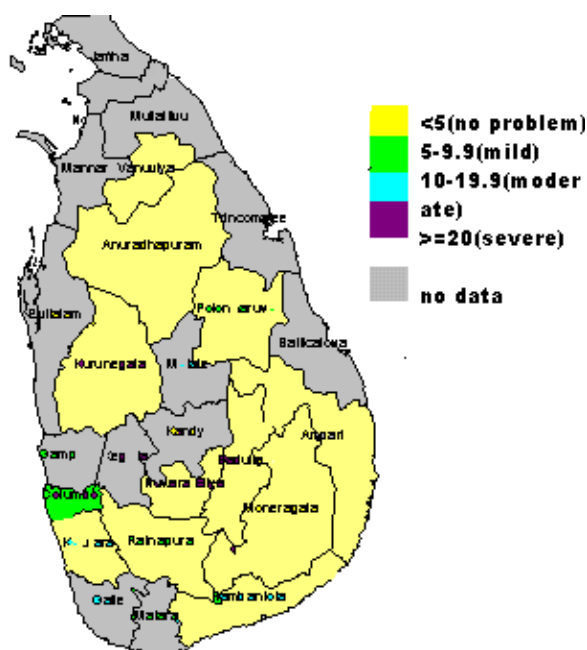


FIGURE 5- 12: SEVERITY OF OVERWEIGHT AMONG SCHOOLCHILDREN (N=9727)¹

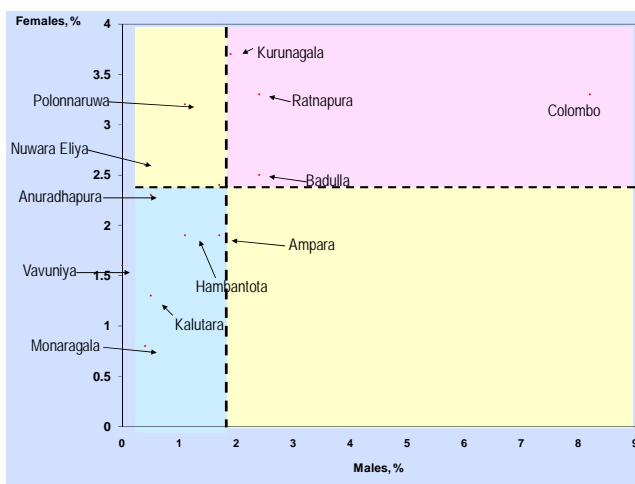


FIGURE 5- 13: OVERWEIGHT AMONG ADOLESCENTS IN 12 DISTRICTS, 2002-2003, N=6675²

Figure 5-12 is a distribution of the percentages of overweight adolescent males and females in another MRI study conducted in 12 districts from 2002-2003. Colombo, Kurunagala, Ratnapura and Badulla were the worst off because these districts had values for both males and females that were above the overall value.

¹ MRI, 2003, Nutritional Status of School Children

² Ibid

Furthermore, the boys in Colombo and the girls in Kurunegala are the most likely to be overweight (**Figure 5-13**). The least likely to be overweight among the boys and the girls are those in living in Monaragala, Kalutara, Vavuniya, Hambantota and Anuradhapura. Overall, the adolescent girls are more likely to be overweight than the boys.

c. ACROSS PROVINCES, AMONG ADOLESCENTS

The results of an earlier study conducted by the MRI analyzing provincial statistics on adolescents are partly consistent with the above mentioned trends at the district level. Overweight and obesity were most prevalent in the Western Province (of which Colombo is one of the 3 districts) then in the Central Province, where Nuwara Eliya districts is located (**Figure 5- 14**). Kurunegala district which is in the North West province, had its obese percentage higher than 1. However, the Uva province, of which Badulla is a part of, did not have study participants who were obese (**Figure 5-13**). The obesity rates in the

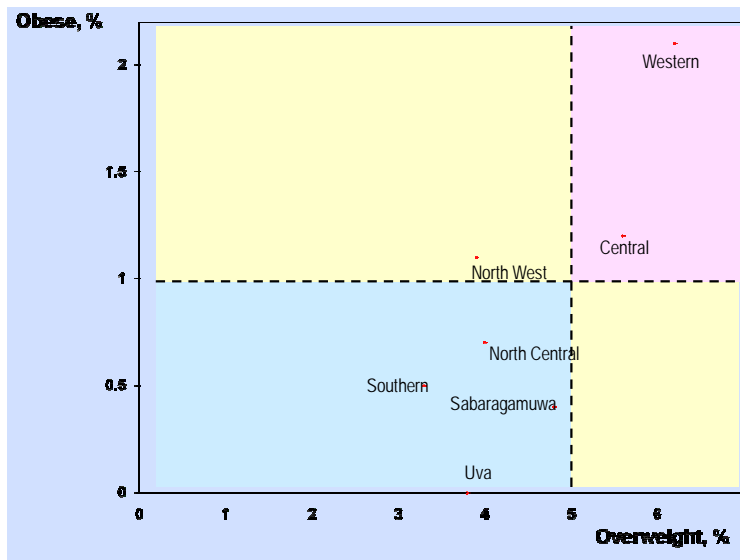


FIGURE 5- 14: OVERWEIGHT AND OBESITY AMONG ADOLESCENTS IN 7 PROVINCES, 2001 (N=3052)¹

rest of the provinces were less than one per cent.

d. ACROSS PROVINCES, AMONG FEMALES

Overweight and obesity among females were observed in all the 7 provinces where a study was conducted by the Medical Research Institute in 2001 (**Figure 5-15**). The overall rate for overweight was 16.4% and for obesity was 3.5%. In the Western and Sabaragamuwa provinces, in particular, about 1 of five women had BMI above the normal. In Uva, there were fewer cases with only 1 of 10 women. The severity of overweight among adult females unlike in the adolescents is a more serious problem. If a scale is made in a way which considered rates less than 5% as “no problem” and more than 20% as “severe”, then Western province can be categorized into the

¹MRI 2003, Assessment of Anemia Status, 2001

latter group. Moderate amount of severity of overweight was observed in all the other provinces except in the Uva which had a mild form of severity of 5-9.9%. The survey was not conducted in the Northern

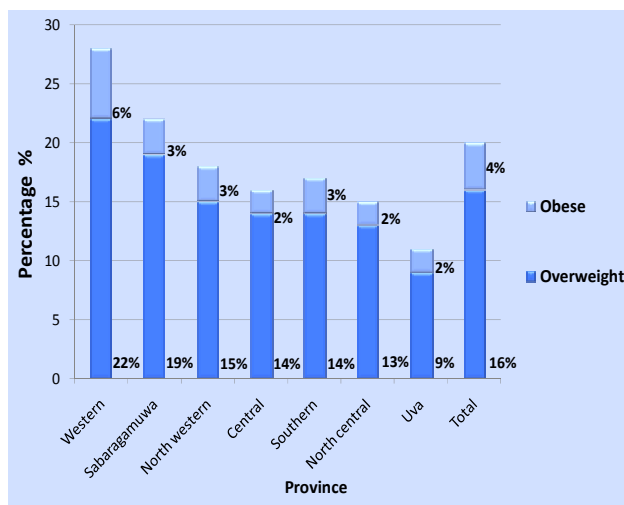


FIGURE 5-15: PROVINCIAL DISTRIBUTION OF OVERWEIGHT AND OBESITY AMONG FEMALES, 2001 (N=4560)¹

Province.

5.2.2 SECTORAL DISTRIBUTION OF OBESITY

Overweight is a problem that cuts across all sectors (Figure 5-16). Among the adolescents and adult women, it is most common among urban residents.

It is least common among adult women in the estates. Surprisingly, adolescents in rural areas are not as overweight as their counterparts in the other sectors. The intra-sectoral differences among adolescents

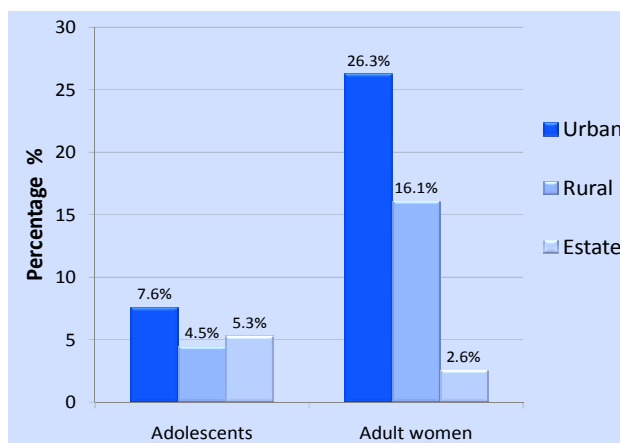


FIGURE 5-16: SECTORAL DISTRIBUTION OF OVERWEIGHT CHILDREN AND ADULT WOMEN²

5.2.3 OBESITY ACROSS OTHER AGE GROUPS

Several studies have been conducted by the MRI and other agencies to analyze overweight and obesity among different age groups.

¹ MRI 2003, Assessment of Anemia Status, 2001

² Jayatissa, 2007

A. AMONG ADOLESCENTS

The highest percent of overweight (4.1%) was seen among the 16 year olds while obesity was highest in the 17 years age group, a value of

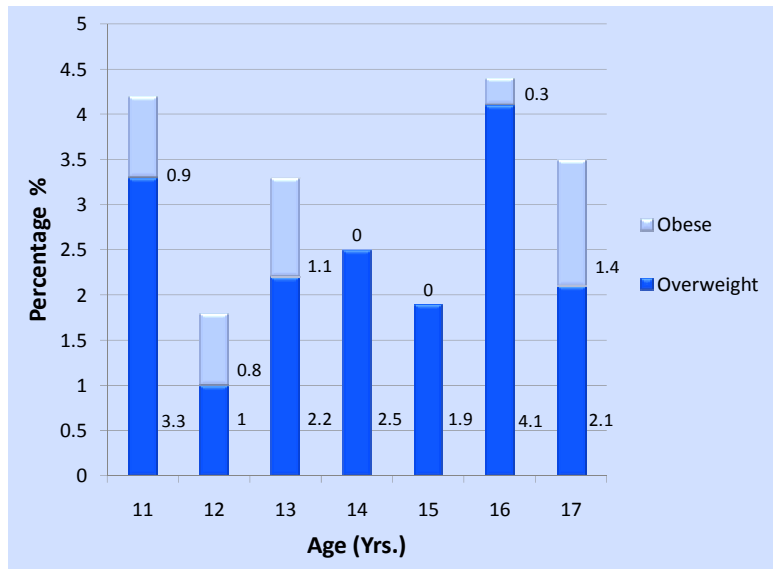


FIGURE 5- 17: OVERWEIGHT AND OBESITY AMONG ADOLESCENTS BY AGE, 2001 (N=3052)¹

2.4% (Figure 5-17). A total of 4.8% of the adolescents, who participated in the survey, were seen to be overweight while about 1.2% were obese. In the 14 and 15 year age group, no obesity was seen though about 2% were seen to be overweight.

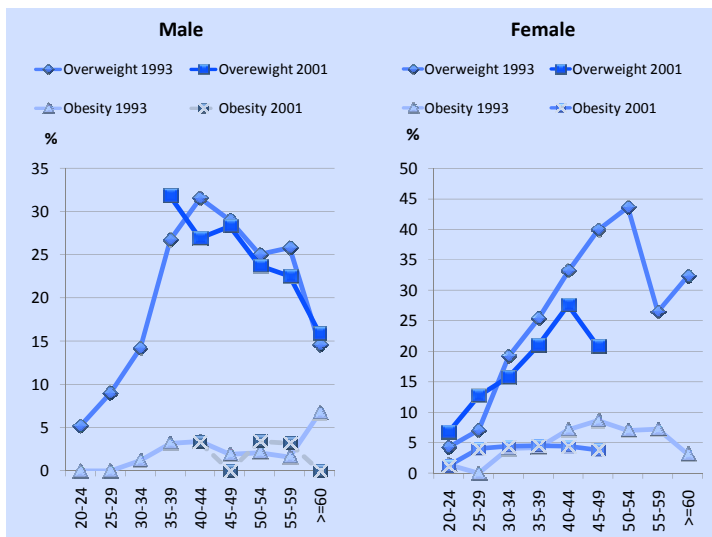


FIGURE 5- 18: PREVALENCE OF OVERWEIGHT AND OBESITY AMONG MALES AND FEMALES, 1993-2001²

B. AMONG THE MIDDLE-AGED MALES AND FEMALES

Although they were observed across age groups, overweight and obesity are major problems among the middle-aged male Sri Lankans (Figure 5- 18). While an improvement among females between the year 1993 and 2001 was noted, there was no significant reduction in the relative number of overweight middle-aged males during the

¹MRI 2003, Assessment of Anemia Status, 2001

²MRI, 200 Lipid profile Study 1993

same period. The same trend was observed on obesity. The 45-49 year age group and senior citizen males, however, were better off in 2001 when it came to obesity.

5.2.4 OTHER PHYSICAL MEASUREMENTS OF OBESITY

The waist circumference and the waist hip ratio gives an index of the intra abdominal fat mass and total body fat, the increase in both is associated with an increased risk for metabolic complications. In 2001, a study was conducted on screening for diabetes mellitus among 722 males and females². About 1 of 4 women had an increased risk for metabolic complications because of waist circumference that is more than 88cm; among men, only 2% had a waist circumference of more than 102cm.

The BMI of 47% of the females and 58% of the males were within the normal range of 18.5 to 24.9 (Figure 5-19) Figure 5- 19: Distribution of BMI among Males & Females, 2001 (n=722). There were *more women (about 1 of 3) who were overweight and obese than the men (about 1 of 4)*. About 1 of 4 men and 1 of 6 women were undernourished.

The nutritional status of under 5 years old children is a major modifiable determinant of non-communicable diseases³. While overweight and obesity are emerging problems, under-nutrition is one of the major continuing problems in Sri Lanka. Both extremes in body weight are linked to NCD. Malnutrition has been shown to be linked to hypertension, coronary heart disease, diabetes mellitus, cerebro-vascular accidents, and certain cancers. The reasons for under-nutrition among children under the age of 5 are low birth weight, pre-term labour and intrauterine growth retardation. Factors after birth include stunting and wasting.

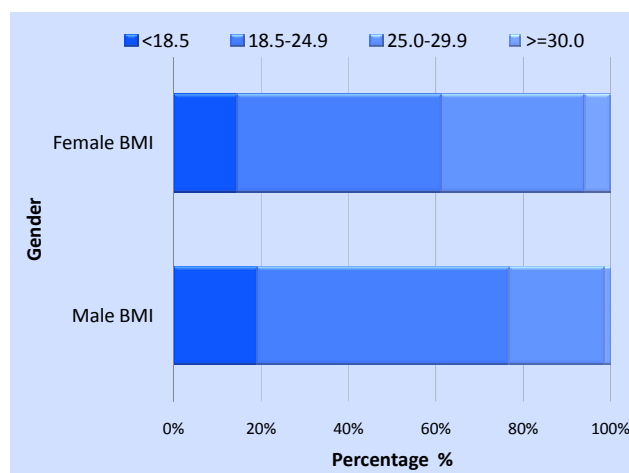


FIGURE 5- 19: DISTRIBUTION OF BMI AMONG MALES & FEMALES, 2001 (N=722)¹

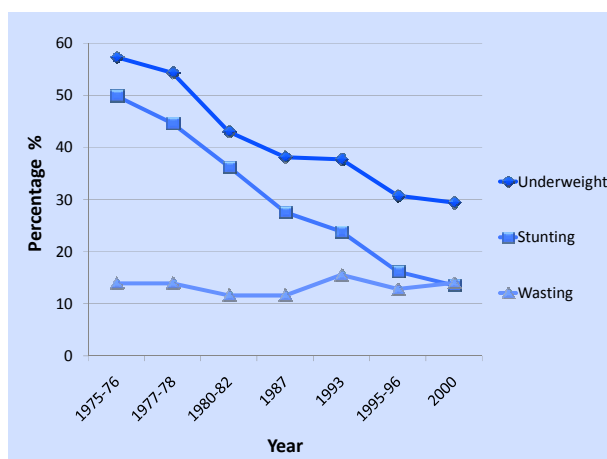


FIGURE 5- 20: TRENDS IN UNDER-NUTRITION AMONG UNDER-5 YEARS OLD CHILDREN

¹MRI, Screening for Diabetes Mellitus, 2001

²MRI, Screening for Diabetes Mellitus, 2001

³Dr.Fernandopulle

During the last quarter of the 20th century, the nutritional status of under-5 year old children in Sri Lanka has improved particularly when one looks at the trends in underweight and stunting (**Figure 5-19 & Figure 5-20**). However, the reduction of stunting to 14% is still not enough as this is almost 3 times the 5% cut-off for a child population to have a height for age that is less than the fifth percentile on the reference curve. This means that that the under-5 children in Sri Lanka is said to have a higher-than-expected prevalence of stunting, a reflection of chronic malnutrition. Stunting is often associated to poor mental development and altered behaviour. There are many possible reasons, but their contributions to stunting prevalence rate are only partly understood. Generally, inadequate nutrition is the first cause considered. Low birth weight may account for 20-40% of the prevalence of growth stunting particularly for children under the age of 2 years. In Sri Lanka, about 1 of 6 babies were born with low birth weight from 1998-2003 (**Figure 5-21**).

According to the Barker hypothesis foetal under-nutrition at critical periods of development in the intrauterine environment as well as under-nutrition during infancy causes permanent changes in the body structure and metabolism. The growth of a foetus is a continuous process while in the mother's womb and there are essential periods which require nutrition in its right quantity and quality. If this is denied, in order to survive in an inadequate nutritional environment, the foetus will be predisposed to a reduction in growth, alteration in body proportions, metabolic and cardio vascular changes which will persist after birth. Once the nutrients are in abundance it will contribute to NCD.

Irrespective of size at birth, under-nutrition in early life increases the risk of coronary heart diseases in adult life. It is seen that low height, weight and BMI at the age of one increases the aforementioned risk to a great deal. Adult height is inversely proportional to the risk of coronary heart diseases, cerebro-vascular accidents and diabetes Mellitus.

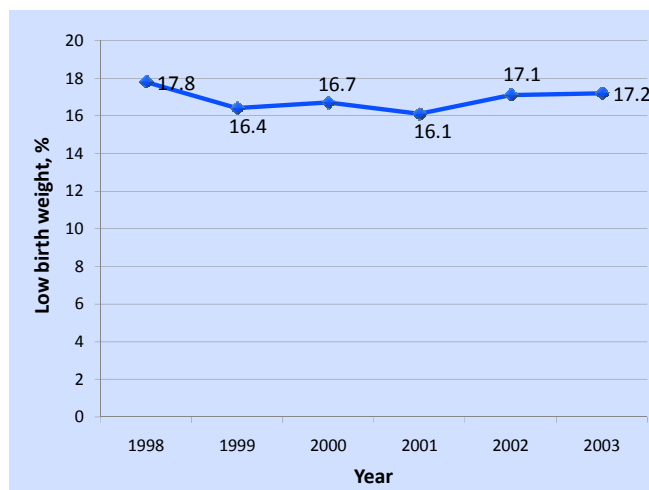


FIGURE 5- 21: TRENDS IN LOW BIRTH WEIGHT, 1998-2003¹

¹Annual Health Bulletin, 2003