

Prevalence of obesity and chronic energy deficiency (CED) in adult Malaysians

Ismail MN¹, Zawiah H¹, Chee SS¹ and Ng KK²

¹ Department of Nutrition and Dietetics, Faculty of Allied Health Sciences, Universiti Kebangsaan Malaysia, 50300 Kuala Lumpur; ² Amway (Malaysia) Sdn. Bhd., Petaling Jaya, Selangor.

ABSTRACT

Anthropometry is the single most portable, easily applied, inexpensive and non-invasive method of assessing body composition. It reflects both health and nutrition and predicts performance, health and survival. The use of body mass index (BMI) as a measure of obesity has been widespread and has recently been promoted for assessment of chronic energy deficiency (CED) in adults. This report provides BMI values of 2636 adult males and 2111 adult females from the three main ethnic groups residing in urban areas and BMI of adult Malay and Dayak (380 males and 496 females) residing in rural areas in Peninsular Malaysia, Sabah and Sarawak. The percent prevalence of obesity and CED in males for the three ethnic groups were apparently quite similar. However, in the females, CED were higher in the Malays and Chinese while overweight problems were more serious in the Indians. Among the Malays, prevalence of CED for males and females were 7% and 11% in urban areas and 11% and 14% in rural areas, respectively. In the males, it is interesting to note that there is a two-fold difference between urban and rural, while a high prevalence of overweight women (20%) even in the rural areas should be viewed as a potential health problem of the future.

INTRODUCTION

There are numerous methods available to assess nutritional status, however only a few methods are suitable in large scale epidemiological studies. Quetelet in 1869 was the first person to observe that among adults of normal build but different heights, weight was roughly proportional to height square: Quetelet Index (Wt/H^2) was later

renamed 'body mass index (BMI)' by Keys *et al.* (1972).

FAO over the last decades has been advocating the collection and analysis of adult anthropometry worldwide. The effort gained momentum following the International Dietary Energy Consultancy Group (IDECG) meeting in Guatemala in 1987 while address-

ing issues related to chronic energy deficiency (CED). Following that meeting, FAO embarked on a detailed analysis of BMI data from all over the world (Ismail & Zawiah, 1991) and encouraged the recalculation of data and reevaluation of morbidity data which might provide us a practical evaluation of the usefulness of the chosen cut-off points in BMI.

Despite Its Inherent limitations, BMI has been widely used as a measure of obesity and risk of mortality. Its use as a valid index for the assessment of undernutrition in adult has been a subject of interest in recent years. However, unlike the children, where body weight and height have long been used to define nutritional state, no comparable criteria exist for adults.

The need to promote the use of BMI as a simple indicator of nutritional well-being in any community has prompted FAO to convene an informal meeting In 1992 to look into the functional consequences of low BMI. More recently, WHO (1993) organized an Expert Committee Meeting in Geneva, to examine the uses of anthropometry in health and to formulate recommendations on appropriate reference data and also to devise simple methods for collecting and interpreting information. This paper reports the use of body mass index (BMI) as an Indicator of obesity and CED in adult Malaysians.

SUBJECTS AND METHODS

Subjects

Anthropometric data from 5623 adults aged 18 - 60 years (3016 males and 2607 females) from three main ethnic groups (Malay, Chinese and Indians) and Dayak were compiled from earlier reports (Ismail & Zawiah, 1991) and a recently concluded Intensification of Research in Priority Areas (IRPA) study on energy requirements of adult Malaysians. This nationwide study comprised of a stratified random sample from various locations, namely, Northern region (Karangan and Pendang, Kedah), Southern region (Johor Bharu, Skudai and Layang-Layang, Johore), Eastern region (Kampung Bukit Payung and Kampung Raja Besut, Terengganu), Central region (Klang Valley and Kuala Pilah, Negeri Sembilan), Sabah (Pitas district and Kota Kinabalu) and Sarawak (Ensebang Plaie, Kota Samarahan and Kuching).

The selection of areas under study was based on the recommendation of the Social Economic Research Unit (SERU) and Economic Planning Unit (EPU) for the rural poor while urban areas in the same region were selected through discussion with relevant departments in the Ministry of Health and State Secretariat in the regions.

Methods

Body weights were measured in light clothings, without shoes to the nearest 0.1 kg using a digital SECA balance (Model 713 Germany). Heights were measured to the nearest 0.1 cm using the SECA balance with height attachment. Body mass index (Wt/Ht^2) was calculated for each individual. Percent body fat were measured in a sub-sample of 577 males and 588 females. Skinfold thickness measurements were taken using the Harpenden skinfold calipers (British Indicators, United Kingdom) at four sites as recommended by Durnin and Rahaman (1967) and body fat, as a percentage of body weight was calculated from the sum of four measurements of skinfold thickness (Durnin & Womersley, 1974).

RESULTS AND DISCUSSION

BMI are most effectively used as indicators to describe the nutritional status of population and as an expression of the magnitude and distribution of undernutrition and overnutrition. BMI of some 2636 adult males and 2111 adult females from three ethnic groups in urban areas were compiled and the results as shown in Table 1 revealed that in males, about 64% could be classified as normal, 7% as underweight, conforming grades I - III CED while 29% were overweight, out of which 5% were obese grade II. In females, about 63% were normal, 11% were classified as CED, while 26% were overweight including 8% who were obese grade II. The overall picture indicates that in an urban setting, overweight problems overshadowed the underweight problem, and this

Table 1. Percentages of Subjects From Urban Area According To Classes of BMI In Malaysia.

	n	BMI Classification*								Total
		3rd CED < 16.0	2nd CED >16.0 - < 17.5	1st CED >17.5 - < 18.5	Low Normal >18.5 - < 20.0	Normal ≥20.0 - < 25.0	1st Obese >25.0 - < 30.0	2nd Obese >30.0 - < 40.0	3rd Obese >40.0	
MALE										
Malay	1018	0.5	1.1	5.3	10.7	52.9	23.9	5.6	0.0	100
Chinese	1146	0.9	1.6	4.8	11.1	56.1	22.0	3.5	0.0	100
Indian	472	1.5	1.5	5.9	10.8	47.2	27.4	5.7	0.0	100
Total	2636	0.8	1.4	5.1	10.8	53.3	24.0	4.7	0.0	100
FEMALE										
Malay	817	0.2	1.7	9.2	14.7	45.8	19.8	8.6	0.2	100
Chinese	979	0.5	1.0	10.3	17.6	53.4	12.9	4.3	0.0	100
Indian	315	0.3	1.6	4.4	8.4	38.4	29.5	16.5	0.8	100
Total	2111	0.4	1.4	8.9	15.1	48.2	18.1	7.7	0.2	100

*WHO (1980)

Figure 1. Percentages of male subjects from urban areas in Malaysia according to classes of BMI

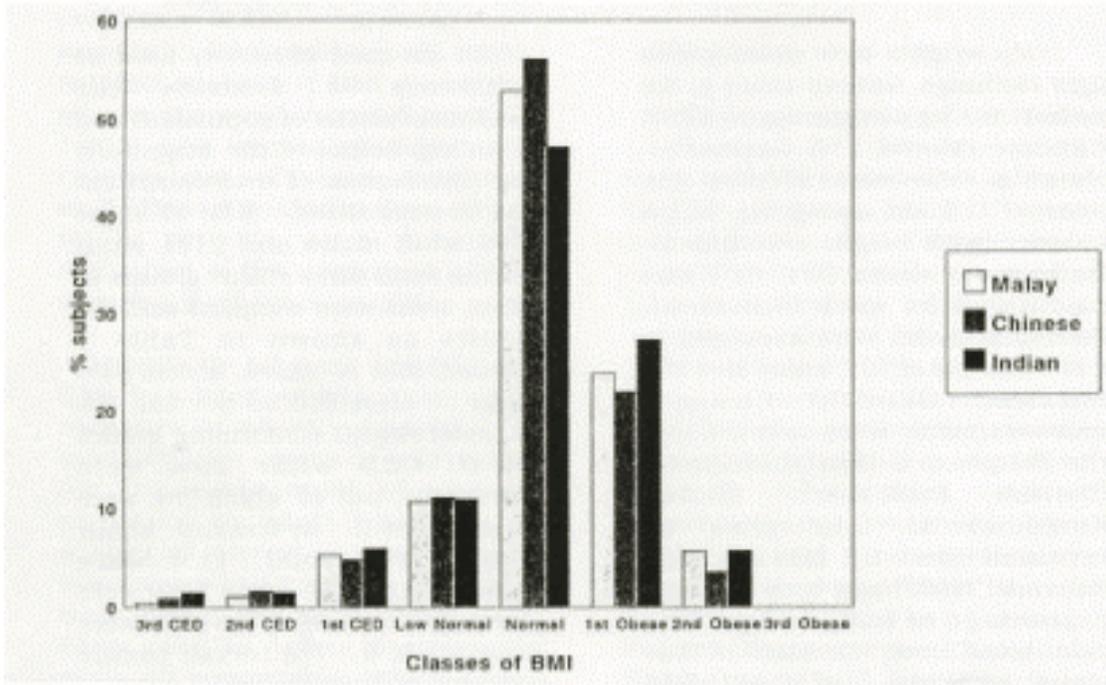
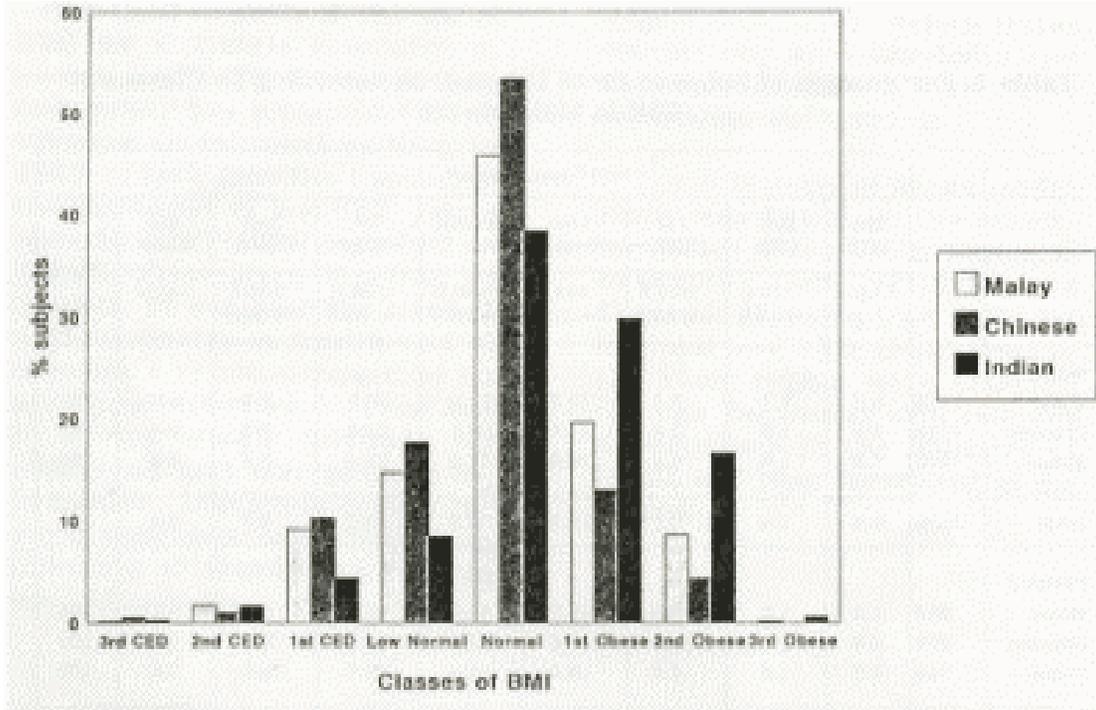


Figure 2. Percentages of female subjects from urban areas in Malaysia according to classes of BMI.



may be the trend in other developing countries too. Figure 1 and Figure 2 highlight the ethnic differences in BMI of males and females, respectively. The percent prevalence of CED and obesity in males for all three ethnic groups were apparently quite similar (Figure 1). However in the females, CED were higher in the Malays and Chinese, while overweight problem were more serious in the Indians (Figure 2).

True to the scenerio of a rapidly developing country, Malaysia appears to have a fair share of nutritional problem, be it under or overnutrition. The change in food habits and largely sedentary lifestyle may have contributed to the current trend of overweight among the middle to high income urban population of both sexes. It is also interesting to note that a somewhat similar trend in BMI's were previously reported in the three main ethnic groups in Singapore (Hughes *et al.*, 1990).

The population census of Malaysia for 1988 reported some 59% of the 14 millions inhabitants live in the rural areas. While

most nutritional studies have been focussed on the vulnerable groups, the preschoolers and pregnant mothers, studies on adults population are precious few, more so in the rural areas, where logistics appears to be the limiting factor. Data compiled from this study enabled us to compare the urban and rural Malay population, since very few Indian and Chinese live in the rural areas.

Table 2 presents the BMI's of Malays living in urban and rural areas. prevalence of CED for males and females were 7% and 11% in urban areas and 11% and 14% in rural areas, respectively. In males there was a small difference in CED but a 2-fold difference in overweight between those in urban and rural areas (Figure 3). In females, CED prevalence were similar with an interestingly high incidence of overweight in rural areas (Figure 4). In two recent surveys, Anuar (1991) reported an alarmingly high glucose intolerance 12.8% and hypercholesterolaemia (30%) in rural agricultural development schemes. Although Table 2 did not include specific age groups, detailed analysis of raw data revealed that

Table 2. Percentages of Malay Subjects From Urban And Rural Areas According To Classes of BMI in Malaysia.

	n	BMI Classification*								Total
		3rd CED < 16.0	2nd CED >16.0 - < 17.5	1st CED >17.5 - < 18.5	Low Normal >18.5 - < 20.0	Normal >20.0 - < 25.0	1st Obese >25.0 - < 30.0	2nd Obese >30.0 - < 40.0	3rd Obese >40.0	
MALE										
Urban	1018	0.5	1.1	5.3	10.7	52.9	23.9	5.6	0.0	100
Rural	380	0.3	2.6	7.9	16.8	57.6	12.9	1.8	0.0	100
FEMALE										
Urban	817	0.2	1.7	9.2	14.7	45.9	19.6	8.6	0.2	100
Rural	496	1.8	2.6	9.6	16.9	48.8	17.5	2.6	0.0	100

*WHO (1990)

Figure 3. Percentages of Malay male subjects from urban and rural areas in Malaysia according to classes of BMI.

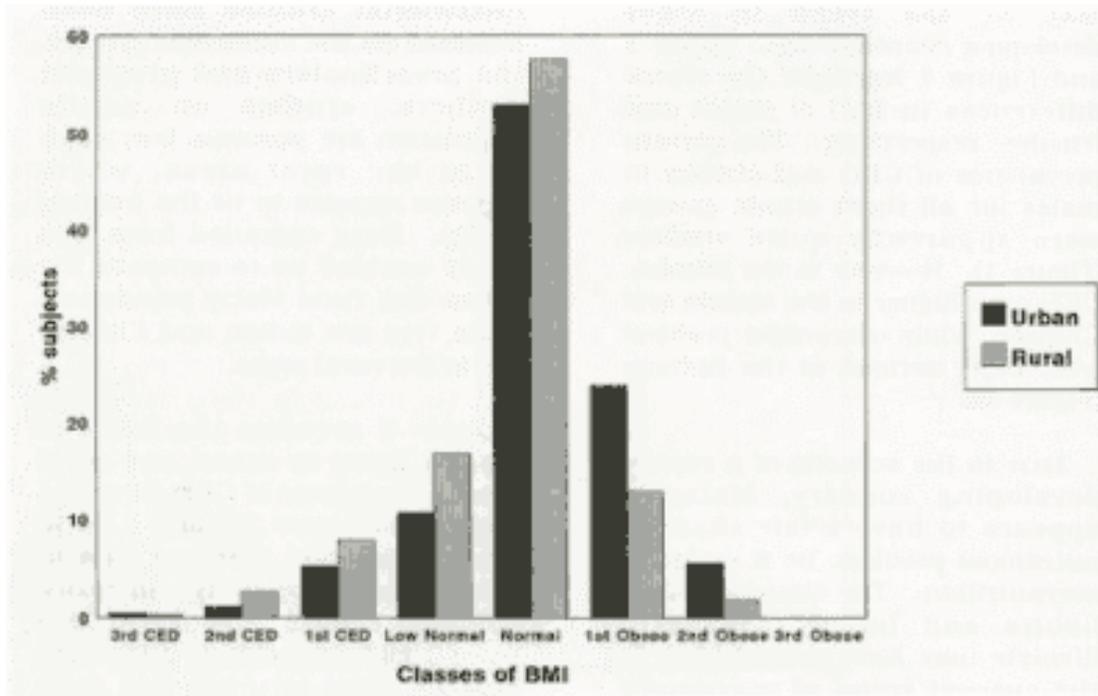


Figure 4. Percentages of Malay female subjects from urban and rural areas in Malaysia according to classes of BMI.

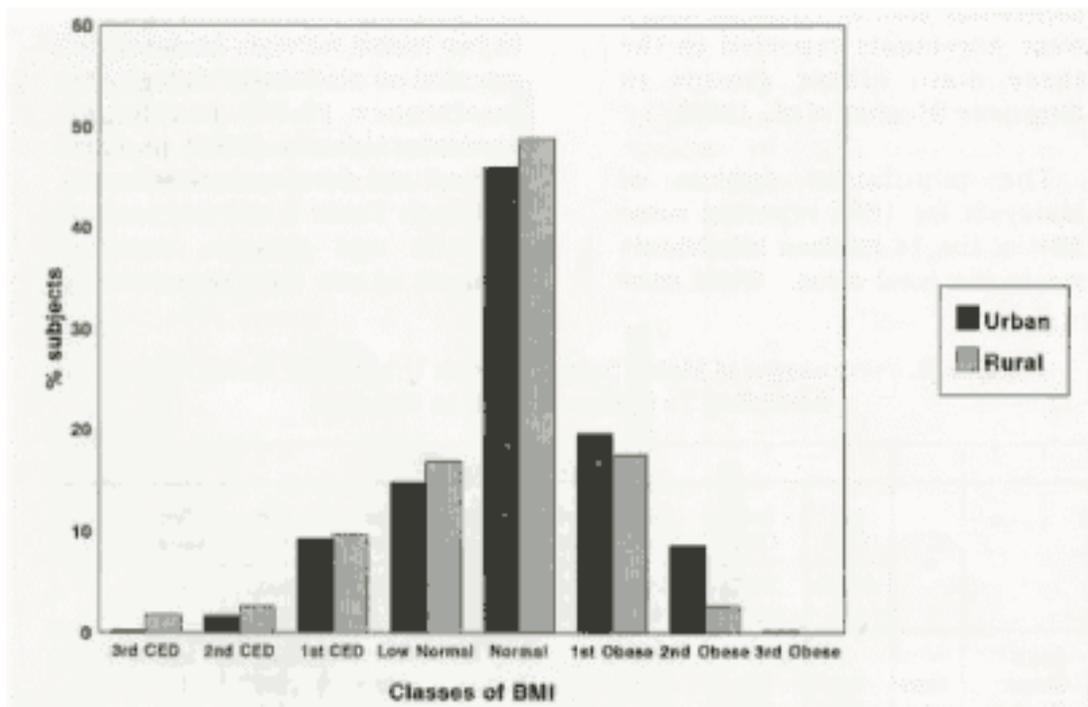


Table 3. The body mass index of some Asian populations¹

	MALES		FEMALES	
	Mean	% CED	Mean	% CED
China	21.1	11.3	21.6	13.3
India	18.6	50.0	18.6	49.0
Malaysia	22.0	11.0	21.7	15.0
Pakistan (Sind)	18.9	48.0	19.4	40.0
Vietnam	18.3	28.0	19.9	29.0

James & Ralph (1991)

many of the CED subjects in urban areas were university students aged between 20 - 24 years who incidentally are from low-income families and were more likely to be undernourished in the early years of life (Ismail, 1992).

CED based on BMI's of several Asian communities is shown Table 3. These preliminary data were compiled from reports received by FAQ. Surprisingly China seems to have a narrow distribution of BMIs with only a small proportion of Grade I or mild CED. In Vietnam about 28% of the adult population has CED. Data from Malaysia are not representative but CED may not be a problem (James & Ralph, 1991).

The lower limit of acceptable BMI, and hence of lean body mass (LBM), must depend in part on the level of physical activity that has to be maintained. Shetty (1984) has provided an interesting example where Indian labourer (BMI < 17.0) were classified physically fit by standard tests. However, it is difficult to imagine that their work output was optimum.

The relationship between BMI and percent body fat has been tested using smaller population sample (males n = 577, females n = 588). It was found that the correlation coefficients between BMI and percentage body fat (sums of four skinfolds) were 0.76 (p < 0.05) for males and 0.79 (p < 0.05) for females. To compare our results with adults from different part of the world, we plotted the Malaysian data together with Italian, New Guinea, Ethiopian, Somalian and British soldiers (James *et al.*, 1988) for males (Figure 5) and females (Figure 6). In both male and females, the proportion of body fat of Malaysian was at equivalent BMIs, to that of Italian and British (in males) and Italian (in females). The women in developing countries, as elsewhere, have a greater fat mass than men at each level of BMI.

There are limits to the amount of weight which an individual can lose if good health is to be maintained. It is argued that a BMI below 17.0 constitutes a risk to health and could lead to an impaired physical capacity (James *et al.*, 1988), while BMI of 12.0 may be the absolute lower limit compatible with life (Henry, 1990). In recent years several evidence were reported on the functional consequence of low BMI. For example, in India, a remarkable association of BMI with low birth weight has been reported and men with BMI less than 16.0, have a three fold greater mortality rate than those with BMI above 18.5 (Vaidya, 1994). The FAQ meeting in 1992 and WHO meeting in 1993 had brought together experts to discuss and address key issues related to BMI, namely; its relationship to illness, its thresholds for males and

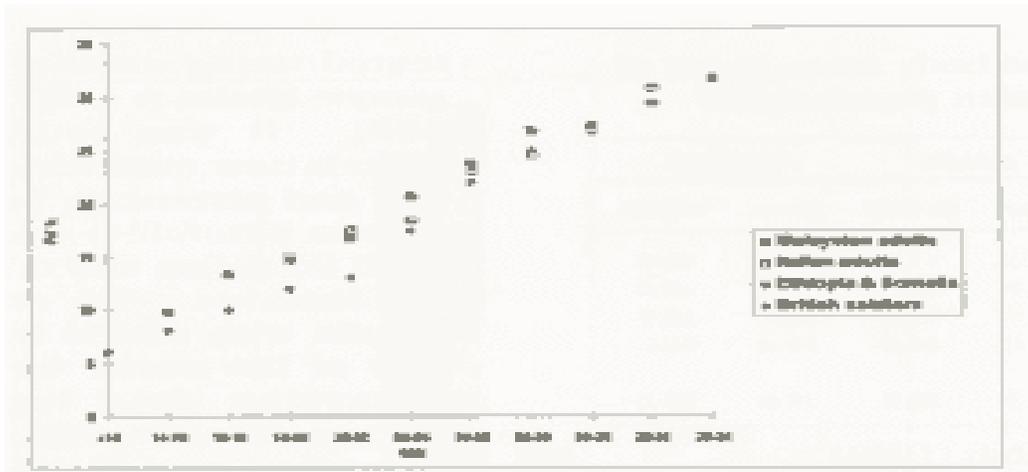


Figure 5: Body mass index and body fat in adult males from different parts of the world.

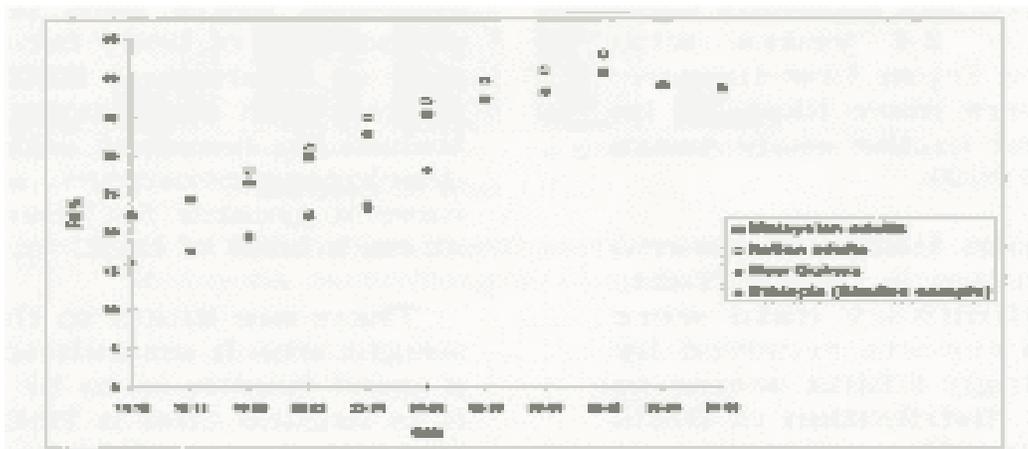


Figure 6: Body mass index and body fat in adult females from different parts of the world.

females, BMI and socio-economic conditions, seasonality, pregnancy, BMI and diet, BMI of mothers versus nutritional status of under 5 children and the use of BMI for monitoring impact of socio-economic changes on nutritional status.

In conclusion, adult nutritional status have far too long been taken for granted and the BMI issue have provided the impetus for us to refocus our attention to improve the overall nutritional status of adults. The desire to know more accurately the role of BMI in the assessment of nutritional status

in adults should not be viewed as a mere academic exercise, but a basic agenda in nutrition research, particularly in the developing countries. BMI is an index of choice and its advantages far out-weighs its limitations. The present study revealed that in an urban setting, obesity was more prevalent in both males (29%) and females (26%) as compared to CED, % and 11%, respectively. Similar trends were observed in the rural areas where obesity incidence were higher in both males (15%) and females (20%) as compared to CED, 11% and 14%, respectively.

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