

## Energy Intake and Energy Expenditure Pattern in Middle Aged Females 30-50 Years of Age Living in Urban Slums of Punjab

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### Abstract

The purpose of the study was to examine if any discrepancy exists between energy intake & expenditure in females (N=600) between 30-50 years of age living in urban slums of Punjab. Daily dietary record and energy expenditure data was collected for three consecutive days for all the subjects. The subjects of the present study gain weight with increase in age. On an average, the females especially after the age of 40 years, exhibit greater caloric intake than their energy expenditure.

**Key Words: Daily Dietary Energy Intake, Energy Expenditure, Energy Balance**

### Introduction

Urbanization is an inevitable and unavoidable feature in the process of development. In India the influx of rural poor to urban slums in search of livelihoods is changing demographic, social, and economic profiles of the country. The key problems of the slums therefore are; the nutrition and health behavior of slum families; and develop intervention programs to improve their access to food, income, and utilization of health services provided by government and nongovernment agencies. Women and children, who proportionally spend more time at home, are the ones most adversely affected by poor living conditions caused by the lack of potable water, sanitation facilities, proper solid waste disposal, etc. More than 25 percent of slum residents are home-based workers, mostly women. For these families, access to decent living conditions and basic urban infrastructure and services is important not only for their health and welfare, but also for their ability to remain economically productive.

Adolescent girls and adult women who are not pregnant or lactating are often

out of focus in most of our public health programmes which are beamed predominantly to pregnant women and children. The importance of nutrition of adolescent girls is now being appreciated. Women constitute nearly half the population and their health status apart from their reproductive health should be a matter of concern. There is little concrete research available concerning food behavior and dietary intake and expenditure during middle years of life. At this stage of life, concern about maintaining health often precipitates a new surge of interest in the type and quality of food eaten and weight control. Many adults subtly gain few kilograms each year (*Durnin & Womersley, 1974; Rogers & Evans, 1993; Snow Harter, 1991*). This causes modern nutritional drawback in their eating behavior which includes lack of variety, high calcium density, high sugar contents, high proportion of saturated fat, high sodium contents and preponderance of refined food and lack of food sources of fiber (*Kendler, 1984; Anderson & Clarke, 1986; Byers, 1986; Herbert, 1987; and Sentora, 1987*). Recent developments in the field of nutrition has revealed differential needs of

nutrients during different stage of human life and as a result special dietary needs are emphasized for humans depending upon their age, sex and other conditions (*Riggs & Melton, 1992 and Disgora et al, 1994*).

In India a number of surveys conducted on diets consumption revealed that majority of population depends on cereal based diet. Because cereals being the cheapest source of calories contribute 70-80 percent of the total calories in diet (*Gopalan et al, 1985*). The consumption pattern in Andhra Pradesh was studied by *Pushpamma et at (1984)* who reported that the average intake of fruits and vegetables was below the recommended level because fruits were taken occasionally in that states.

*Hira et al (1991)* conducted a study on 160 farming families from 8 villages of Ludhiana district of age group 30- 60 years. The results showed that the energy consumption was low in landless low-income group (0-5 acres) than middle income group (5-10 acres). The proteins intake was more than the RDA in all the groups. A number of other investigators have rported a linkage between the energy consumption and socio-economic status of the subjects (*Rao et al, 1986; Rao, 1987 and Kang, 1990*).

In general, it can be said from the above reviewed studies that deviations are reported in daily dietary intake from the normally recommended dietary allowances in Indian females. There is need to interpret these findings in the light of functional changes with age in females as well as changes in their lifestyle and the social environment.

Keeping in view the above, the present investigation has been planned to study the dietary intake and energy expenditure profiles of middle aged women belonging to 30-50 years age group with the following aims and objectives.

1. To report daily dietary intake of nutrients by the females from age 30-50 years.
2. To study the daily energy expenditure profiles in women from 30-50 years of age
3. To examine if any discrepancy exists between energy intake & energy expenditure in females between 30-50 years.

**Materials and Methods**

**Table-I**

Age Group (Years)	(N)	Age range (Years)	Mean Decimal Age (Years)
30-35	150	30.00-35.00	32.57
35-40	150	35.00-40.00	38.02
40-45	150	40.00-45.00	43.39
45-50	150	45.00-50.00	48.56

Keeping in view the aims of the present study, the females ranging in age from 30-50 years, have been selected to cover the early and middle adulthood phase of life. In addition to this, female subjects were studied from urban slums of Punjab in Ludhiana, Patiala, Ropar and Jullandhar. To study the changes in the dietary profiles and energy expenditure profiles through middle age in the females, the subjects have been divided into four, 5 yearly age groups as under :-

The following equipments were used for the recording of general information, daily dietary intake and daily energy expenditure:

1. Performa for recording general information
2. Performa for recording daily dietary food intake.
3. Performa for recording energy expenditure

Three days consecutive dietary records of each subject was taken and fed into the computer for dietary analysis of food for calculating composition of its nutrients with the help of Dine Healthy Software

**Results and Discussion:**

**Daily Energy Intake**

**Table 2: Comparison of Mean Daily Total Energy Intake and Daily Total Energy Expenditure among females belonging to different age groups**

	Age Group	N	Mean	S.D.	S.E.M.
Daily Dietary Energy Intake (Kcal)	30-35	150	2098.84	167.95	13.71
	35-40	150	2134.68	174.94	14.28
	40-45	150	2169.09	175.57	14.34
	45-50	150	2238.98	194.44	15.88
Daily Energy Expenditure (Kcal)	30-35	150	2174.38	166.19	13.57
	35-40	150	2143.49	168.42	13.75
	40-45	150	2130.55	111.25	9.08
	45-50	150	2098.55	127.59	10.42
Daily Energy Intake (Kcal/Kg Body Weight)	30-35	150	38.68	4.24	0.35
	35-40	150	39.44	5.18	0.42
	40-45	150	39.15	7.33	0.60
	45-50	150	38.28	7.30	0.60
Daily Energy Expenditure (Kcal/Kg Body Weight)	30-35	150	40.11	4.68	0.38
	35-40	150	39.67	5.52	0.45
	40-45	150	38.51	7.05	0.58
	45-50	150	36.11	7.56	0.62

Average daily energy intake has been observed to increase with increase in age. Group-1 (30-35 years) females on an average consume 2098.6 kcal in their daily diet that increase to 2238 kcal in the age group-IV (45-50 years), thus demonstrate an increase of 6.67% (Table 2). Administration of ANOVA tests to the daily dietary energy intake data of different groups reveals the existence of significant differences between the various age groups (Table 3). Further exploration with the Schaeffe post Hoc test recognized significantly greater intake of daily dietary energy intake values by females belonging to the higher groups as compared to the lower age groups (Tables 4-6).

Expressions of daily dietary energy intake in relation to the body weight of the subjects' exhibit comparable mean values with statistically non significant differences (Tables 3).

Table 7 compares the mean dietary energy intake of slum females (present study) with the sedentary urban females studied by *Kaur et al (2002)*. Females' of the present study are observed to ingest 111 to 188 Kcal more in their daily diet than sedentary urban females at corresponding ages between 30-50 yrs.

**Table 3: ANOVA**

		Sum of Squares	df	Mean Square	F	Sig.
Daily Dietary Energy Intake	Between Groups	1605243	3	535081.1	16.80	<b>0.00</b>
	Within Groups	18988428	596	31859.8		
	Total	20593672	599			
Daily Energy Expenditure	Between Groups	443906.3	3	147968.8	6.99	<b>0.00</b>
	Within Groups	12611615	596	21160.4		
	Total	13055521	599			
Daily Dietary Energy Intake (Per kg body weight)	Between Groups	116.986	3	39.0	1.03	0.38
	Within Groups	22622	596	38.0		
	Total	22738.98	599			
Daily Energy Expenditure (Per kg body weight)	Between Groups	1442.915	3	481.0	12.07	<b>0.00</b>
	Within Groups	23743.74	596	39.8		
	Total	25186.65	599			

**Table 4: Scheffe Post hoc for Mean differences in daily dietary energy intake**

Age Group	35-40	40-45	45-50
30-35	-35.84	<b>-70.24*</b>	<b>-140.14*</b>
35-40		-34.40	<b>-104.30*</b>
40-45			<b>-69.90*</b>

\* Significant at 5% level

**Table 5: Scheffe Post hoc for Mean differences in Daily Energy Expenditure**

	35-40	40-45	45-50
30-35	30.89	43.83	<b>75.83*</b>
35-40		-30.89	12.94
40-45			32.00

\* Significant at 5% level

**Table 6: Scheffe Post hoc for Mean differences in daily energy expenditure/kg body weight**

	35-40	40-45	45-50
30-35	0.44	1.60	<b>4.00*</b>
35-40		1.16	<b>3.56*</b>
40-45			<b>2.40*</b>

As per the NIN recommendations for Indian women, the daily energy intake by the females between 30 to 50 years exhibit 10 to 16% higher calorie intake in their daily diets. Mean daily energy intake values observed in the present study are higher than the finding of some earlier investigations on Punjabi women (Ahluwalia, 1981; Kaur, 1992; Chatha, 1996; Mann et al, 1997; Kaur, 2002).

### Daily Energy Expenditure

Comparable mean values of daily energy expenditure are observed in the females belonging to the first three age groups with statistically non significant outcome (Table 3). However, the total daily energy expenditure is observed to significantly decline in the last group i.e. 45-50 yr age group as compared to younger age groups (Table 2). After accounting for the increase in body weight by expressing the daily energy expenditure in relation to the body weight of the subjects, a comprehensible gradual decrease in energy expenditure with the increase in age is observed. ANOVA test establishes significant mean differences in this variable between different age groups (Table 3).

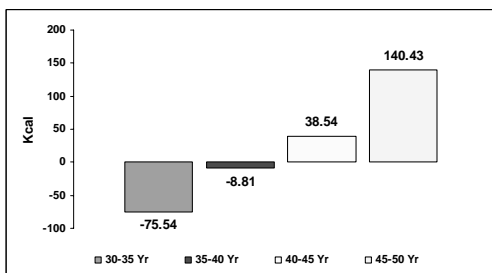


Figure 1: Comparison of mean daily energy balance in females

It is interesting to observe that females in the first two age groups spend more calories both in absolute terms as well as in relation to their body weight than what they consume while in the succeeding age groups (i.e. 40-45 and 45 to 50 years), the

opposite is found to be the case (Fig 1). This means that after the age of 40 years the females tend to have a positive energy balance which if sustained for a long period of time can lead to further weight gain in them. The same trend has been reported by Kaur (2002) in her study on normal sedentary females of Punjab. Higher average daily energy expenditure both absolute and in terms of body weight in the first two age groups with concomitant negative energy balance though small in magnitude as compared to the sedentary urban female subjects of Kaur (2002), reflect a relatively more active lifestyle of the present group of females'. The slum females engage themselves in routine physical jobs for their livelihood and therefore exhibit elevated daily energy expenditure over the sedentary females of corresponding ages. This is supported by the results of average energy spending by females in various activity categories detailed and explained below.

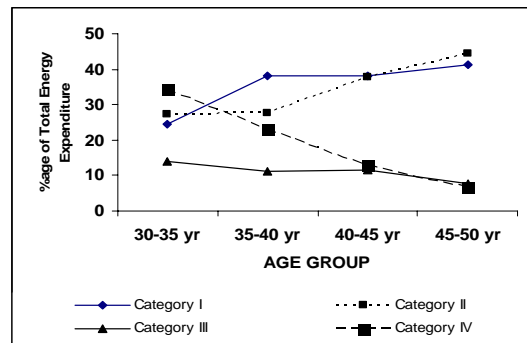


Figure 2: Comparison of % total energy expenditure by females belonging to different age groups in various categories

It is obvious from Fig 2, that females' belonging to 30 to 35 years age group spend 24% of their daily total energy expenditure in sleeping and resting in bed (Category-I) and with enhancement in age, the energy spent by the females in this category also increase to the level that females belonging to the last age group i.e.

45 to 50 years are observed to spend 41% of their daily energy expenditure in this category. In category-II which consists of activities like sitting, eating, listening writing etc. the same tendency of increase with age is observed as is noticed in the case of category – 1. Category - III comprises of light activity like standing, washing, shaving, combing hair, cooking etc. In this category the younger females spend more energy as compared to the older ones. In category – IV that consists of slow walking, driving, dressing, showering etc. the same trend is observed (Fig 2)

**Table 7: Comparison of daily dietary energy intake and expenditure among sedentary Females (Kaur, 2002) and Slum Females (Present Study)**

	Age Group	Sedentary Females (Kaur, 2002)	Slum Females (Present Study)
Daily Dietary Energy Intake (Kcal)	30-35	1911.06	2098.84
	35-40	1942.64	2134.68
	40-45	2057.35	2169.09
	45-50	2117.73	2238.98
Daily Energy Expenditure (Kcal)	30-35	2048.78	2174.38
	35-40	2066.85	2143.49
	40-45	2005.10	2130.55
	45-50	1923.29	2098.55

High daily energy intake is a major factor in the development of obesity in

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western societies. Many researchers have confirmed in their studies that if the every day diet include high amount of dietary fat, affinity to gain weight develops more easily (George *et al* 1990; Kendall *et al* 1991; Scotellaro *et al* 1991; Sheppard *et al*, 1991). However they further report that when the intake of carbohydrates and fiber is high, it is easier to, lose body weight.

The results of the present study clearly indicate that females especially after the middle age consume greater calories in their daily diets both total as well as in relation to their body weight and also exceed the recommended values. The energy expenditure profiles point to positive energy balance in these group of females with increase in age.

All these factors are indicative of a negative life style lead by them and increase the risk of obesity and other related diseases. It is therefore, felt necessary to form strategy to curb this unhealthy trend among subjects of present study and preventive measures in this regard are necessitated. These include the intake of healthful diets containing optimal amounts of various nutrients both major and minor as well as increase in the physical activity in their daily life.

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