Combat Poverty Agency

HKF

Research Report Series

PATTERNS OF FOOD AND NUTRIENT
INTAKE IN A SUBURB OF DUBLIN
WITH CHRONICALLY HIGH
UNEMPLOYMENT

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REPORT OF A PHYSICIAN
ON THE RESULTS OF
EXAMINATION OF A
PATIENT

By: [Signature]
In: [Signature]

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INTRODUCTION.

Background:

The pattern of diseases underlying morbidity and mortality has shifted markedly from the beginning of this century. The contributions of the infectious diseases has declined and the incidence of such degenerative diseases as cancer and coronary heart disease has increased dramatically during the same period. These changes have had a considerable impact on community medical strategies. In the case of the infectious diseases, the causes were clear cut, the relationship of risk exposure to disease development was strong and the efficacy of treatment and prevention were immediately obvious. The validity of this is evident from the rise in the incidence of whooping cough following a fall off in immunisation for this disease.

In the case of coronary heart disease, the causes are less obvious: the relationship of risk exposure to disease development is weak and very long term and the efficacy of treatment and prevention is difficult to demonstrate even in the long term. Given the lack of a single causative agent for coronary heart disease, epidemiologists have established a profile of "factors" which are associated with increased "risk" of coronary heart disease. These risk factors are the basis upon which preventative medicine proposes to deal with diseases of unknown or multifactorial causation.

Risk factors may or may not be amenable to change. Those which are not readily changed include height, family, age and sex. Those which are amenable to change and which may possibly play a role in damage to blood vessels include: elevated serum cholesterol, elevated blood pressure and smoking. These are the three big variables to be tackled by community health programmes. Two of these, serum cholesterol and blood pressure are influenced by diet.

Diet and Cardiovascular Disease:

Given that elevated levels of both blood cholesterol and blood pressure are (a) risk factors for coronary heart disease and (b) amenable to change by diet, many groups of experts have put forward dietary guidelines aimed at communities to reduce the prevalence of these factors

and so influence coronary heart disease morbidity and mortality. The dietary guidelines issued by the Department of Health include:-

- (a) Avoid being obese.
- (b) Reduce dietary fat (to 35% of energy).
- (c) Increase dietary fibre (to 25 - 35 g/d).
- (d) Reduce salt intake (to 9 g/d).
- (e) Avoid excessive sugar intakes.
- (f) Avoid excessive alcohol intakes.

The basis for these guidelines are as follows. Obesity per se is a weak risk factor for coronary heart disease but obesity does increase the risk of elevated blood pressure, elevated blood cholesterol and of developing adult onset diabetes. By reducing total dietary fat, our intake of saturated fats will fall with, it is argued, a fall, on a community basis, of blood cholesterol. Increased intakes of dietary fibre help maintain dietary fat low and help digestive function. Low fibre diets are frequently implicated as a causative agent in such diseases as diverticular disease, irritable bowel syndrome and chronic constipation. High salt diets help to elevate blood pressure in certain genetically susceptible individuals and thus a high intake is not considered desirable. Frequent exposure to sugars increases the risk of dental caries and the adverse effects of excessive alcohol intake are well documented.

Translating Dietary Goals into Practice:

People do not shop for nutrients, they shop for foods and usually within the context of a meal in specific social circumstances. Indeed the factors influencing food selection are extremely complex ranging from physiological forces (taste preferences, hunger, thirst, appetite), to cultural forces (religions, ethnic, moral views), to social forces (peer pressure, health education), to psychological forces (phobias, addictions) and to economic forces (income, food availability, housing). The translation of nutrient-related goals to food terms requires some understanding of the acceptability and feasibility of the message to the target audience. Lower socio-economic groups are quite different from the higher socio-economic groups in the negative and positive forces influencing food selection. To date no work has been done on the scale of the problem in introducing a healthy eating programme into the socially

and economically disadvantaged. The following data are a prerequisite to the introduction of a healthy eating programme:

- (1) How do current eating habits deviate from the dietary guidelines?
- (2) What pattern of food consumption distinguishes those achieving and those failing to achieve dietary guidelines?
- (3) What groups are currently at risk in terms of consuming inadequate levels of key nutrients and how would that problem be improved or exacerbated by a healthy eating programme?

The purpose of the present study was to provide such data as would begin to answer these questions.

1. METHODS.

1.1 Sample Selection and Recruitment:

Fettercairn, a large Corporation housing estate in West Tallaght, was chosen for the study because it was felt that this was representative of areas with high levels of unemployment and also because the population consisted mainly of young families. The 50 households surveyed were selected randomly from the electoral register of 694 households. Each household was sent a letter inviting them to participate in the study (Appendix 1). This letter explained the purpose of the study and outlined what would be required from the participating families. An incentive of £20 was offered to each family successfully completing the study. Each family was visited to arrange an appointment and the confidentiality of the study was stressed.

1.2 Dietary Assessment:

The method most suited to this type of dietary survey was the diet history of a typical 7 days in a recent month (Cameron and Van Staveren, 1988). The mother and/or father was first questioned about weekly food purchases and about foods obtained gratis through work, fishing, gardening, contacts etc. Details on total income and on food expenditure were also taken. These three data sets i.e. shopping basket, total income and food expenditure provided a tight cross check on reported food consumption with families. As far as possible each family member was interviewed separately. However, in the case of young children the parent or guardian gave the necessary details and these were then supplemented where appropriate with information obtained from the children about food or drinks consumed outside the home.

The diet history took meal patterns and foods commonly consumed in chronological order. The subjects were not prompted about what foods might or might not be consumed. Food intakes were measured using household measures and using volumetric models. Household measures were subsequently quantified for each household as were the plasticine based food models. All food and drink consumed inside and outside the home was considered. For each family the record of food intake was checked against household expenditure and against reported weekly shopping baskets. Families were re-visited to clarify any discrepancies. In

general, the diet history required two 3 hour visits per family.

An average of three families were studied per week from November 1987 to April 1988. No visits were made in the three weeks prior to Christmas or for five weeks after Christmas.

1.3 Height and Weight:

Height was recorded using a Microtoise tape with the subject standing against a wall with the head in the Frankfort plane. Weights were recorded using a bathroom scales (Hanson).

1.4 Socio-Economic and other Data:

Data from each family was obtained on shopping practices, food expenditure, total income, source of income, charitable receipts, family distribution and on cooking facilities (Appendix 2). Each family member was further questioned on education status, on current health status and smoking habits (Appendix 3).

1.5 Analysis of Data:

The study group was subdivided into age groups corresponding to those for which recommended dietary allowances are available (Kevany, 1983).

These are -

1.0 - 3.9	years, boys and girls combined.
4.0 - 6.9	" " " " separately.
7.0 - 10.9	" " " " "
11.0 - 14.9	" " " " "
15.0 - 17.9	" " " " "

18 years and older, males and females separately.

Because the numbers in the age ranges 11.0 - 14.9 (11 boys, 7 girls) and 15.0 - 17.9 (5 boys, 4 girls) were small, these two groups were combined.

Food intakes were converted into nutrient intake using a micro-computerised version (Bassham & Fletcher, 1984) of McCance and Widdowson's Table of Food Composition (Paul & Southgate, 1978). This database was modified to take account of Irish bread composition (Downey, 1983; 1988) and a special entry was placed in the data base for sausages and mince

bought locally. Both of these were analysed for protein and fat and the values incorporated into the existing data base entries.

1.6 Data Evaluation:

Data on food and nutrient intakes were analysed using three approaches.

- (1) The mean values for various adult groups were compared with one another (i.e. single parent v. married) or with a reference population of mixed socio-economic status (i.e. Kilkenny Health Project).
- (2) The intakes of nutrients by individual groups were compared with recommended minimum and maximum intakes of nutrients. Recommended dietary allowances (RDA) are issued by Governments for a variety of nutrients over a number of age ranges (Appendix 4). It is expected that if the level of intake specified in the RDA is achieved, then the needs of 97.5% of the population will be met. A difficulty in using RDAs is that the values vary between countries and that the accuracy of certain RDAs (eg zinc, folic acid) is doubtful. Maximum recommended levels of intake usually involve fat, salt, fibre, and calories: Fat, 35% energy; salt, 9 g/d; fibre, 25 -35 g/d; calories, in balance at ideal weight.
- (3) In order to learn more of the nutrition and food selection patterns of potential "at-risk" groups, the intakes of the upper and lower quartiles of intake were evaluated and compared.

1.7 Adjustment of Family Income for Family Size:

Family income varies with the number of incomes and entitlements of the household. Frequently family monies are adjusted to account for family size. From a nutritional viewpoint, heads per household is a somewhat weak adjusting factor since the nutritional needs vary with age and sex. A family of one adult and three small children will differ markedly from a family of three adults and one grown child. Thus in the present study, income and food expenditure were adjusted per diet head where the adjusting factor is the total energy requirement of the family and not the number per family.

2. RESULTS.

2.1 : RESPONSE RATE.

Of the 53 families randomly chosen from the electoral register, 50 agreed to participate representing a response rate of 94%. This remarkably high response rate is probably attributable to the £20 incentive offered to participating families. Another important factor was that most families felt that they had a worthwhile contribution to make to the study. In all the diets of 55 women, 42 men and 121 children under 18 years of age were assessed.

2.2 : SOCIO-DEMOGRAPHIC & ECONOMIC DATA.

Data on the distributions of household size, age, gross weekly income and main source of income in the present study are compared in Tables 2.1 to 2.4 to similar data for the total population living in Fettercairn (Codan, 1987). Results show that the random sample chosen for the study was indeed representative of the general population in this suburb. The majority of households consisted of families with young children. Eighty-six percent had gross income less than £150 per week and 76% were in receipt of Social Welfare. The distribution of weekly expenditure on food is given in Table 2.5. Most families (66%) spent less than £50 per week on food with 84% spending below £60.

The relationships between family income and both family size and expenditure on food is given in Table 2.6. Family income increased from £92 to £134/week while food expenditure per family remained constant. Because family size and family energy needs declined with increasing gross income, the adjustment of food expenditure to either £ per head per week or £ per diet head per week led to an increase in adjusted food expenditure with rising income. The lower quintiles of income were characterised by larger numbers of children per family reflecting higher family requirements for energy. In effect, as family numbers and family energy requirements rise, family income declines, and food expenditure per head or per diet head also declines.

Family shopping habits are summarised in Table 2.8. As can be seen 70% of families shopped at least once a week in a major supermarket, 64% shopped regularly in the local small supermarket and 54% shopped regularly in the small local shop or van.

Because of pressures for additional finance (toys at Christmas, Communion or Confirmation outfits) many families took out loans or sought financial assistance from other sources. Table 2.7 gives a breakdown of loans and financial or other assistance obtained. Overall 52% of families had either taken out loans with money lenders or other agencies or had received help from the St. Vincent de Paul. When the sample is divided according to employment status it can be seen that 42% of the families where the head of the household was employed had taken out loans as compared with 32% in the unemployed groups. However, whereas none of the employed group had received financial assistance from other sources (e.g. Vincent de Paul, EHB etc), 74% of the unemployed had.

Data on special diets, recent medical history and smoking habits are presented in Table 2.9. Overall, 16% of the females and 2% of the males were on special diets, and 35% of the females and 7% of the males were attending a doctor. The number of smokers in the total sample was extremely high with 64% of the females smoking on average 19 cigarettes a day and 71% of the males smoking on average 17 cigarettes a day. The average school leaving age for females was 14.7 ± 1.5 years and for males it was 14.5 ± 1.4 years.

Anthropometric data is given in Table 2.10. Body mass index (BMI) is derived from the formula $[\text{Weight (kg)}]/[\text{Height (m)}]^2$. Recommended maximal values are 25.0 for adult men and 23.0 for adult women. The mean values of the sample fell on or below these targets. The comparable values for the Kilkenny Healthy Project are 25.9 ± 3.2 for men and 24.7 ± 3.8 for women.

Table 2.1

HOUSEHOLD SIZE.

Household size (persons)	Present Study		Recent Study of Households in Fettercairn *	
	n	%	n	%
One	1	2	7	1.1
Two	4	8	74	11.5
Three	9	18	101	15.7
Four	15	30	150	23.3
Five	11	22	134	20.8
Six	8	16	98	15.2
Seven	1	2	55	8.6
Eight	0	0	14	2.2
Nine	0	0	7	1.1
Ten or more	1	2	3	0.5
Total	50	100	643	100

* Codan, 1987

Table 2.2

AGE PROFILE

Age Range (years)	Present study		Study in 1984 of Households in Fettercairn *	
	n	%	n	%
0.0 - 10.0	86	39.5	1,183	47.0
10.1 - 16.0	32	14.7	243	9.7
16.1 - 24.0	20	9.2	121	4.8
24.1 - 39.0	62	28.4	798	31.7
39.1 - 50.0	9	4.1	153	6.1
50.1 or greater	9	4.1	20	0.8
Total	218	100	2,518	100

* Codan, 1987

Table 2.3

INCOME DISTRIBUTION (Principal Earners)

Range (Gross Income/week £)	Present Study		Recent Study of Households in Fettercairn *	
	n	%	n	%
Less than 60	2	4	54	8.4
60 - 99	20	40	330	51.3
100 - 149	21	42	153	23.8
150 - 199	5	10	94	14.6
200 or more	2	4	12	1.9
Total	50	100	643	100

* Codan, 1987

Table 2.4

MAIN SOURCE OF FAMILY INCOME

Source	Present Study		Recent Study of House- holds in Fettercairn *	
	n	%	n	%
Wages	12	24	197	30.6
Social Welfare:	38	76	446	69.4
Unemployment Assistance	18	36	240	37.3
Deserted Wives Allowance	7	14	49	7.6
Unemployment Benefit	2	4	47	7.3
Disability Benefit	2	4	35	5.4
Disability & Unemployment Benefit or Assistance	5	10	-	-
Unmarried Mothers' Allowance	1	2	29	4.5
Widows' Pension	1	2	18	2.8
Old Age Pension	0	0	3	0.5
Separate Payments	2	4	-	-
Other Miscellaneous	0	0	25	3.9
Total	50	100	643	100

* Codan, 1987

Table 2.5

DISTRIBUTION OF WEEKLY EXPENDITURE ON FOOD.

Range £s per Week	Number of Families	%
20 - 30	6	12
30 - 40	6	12
40 - 50	21	42
50 - 60	9	18
60 - 70	3	6
70 - 80	3	6
80 - 90	1	2
More than 90	1	2

Table 2.6

DISTRIBUTION OF FAMILY INCOME AND FOOD EXPENDITURE ACCORDING TO QUINTILES OF INCOME PER DIET HEAD.

	Quintiles of Income per Diet Head.				
	1	2	3	4	5
Gross income £s per week	92 (20) [#]	96 (18)	104 (27)	104 (26)	134 (44)
Food expenditure £s/week	50 (16)	49 (11)	47 (6)	47 (15)	49 (21)
No. of adults in family	2.0 (0.4)	1.6 (0.5)	1.9 (0.3)	2.0 (0.6)	2.2 (1.0)
No. of children in family	4.0 (2.2)	3.0 (0.9)	2.7 (0.8)	1.6 (1.1)	0.8 (0.9)
Family energy needs MJ/d	52.4 (19.2)	41.0 (+ 8.5)	38.6 (9.5)	31.0 (+8.8)	27.8 (13.3)
Gross income/diet head	1.81 (0.3)	2.34 (0.1)	2.68 (0.1)	3.38 (0.3)	5.33 (1.5)

[#] Figures represent mean (S.D.)

Gross income/head	16.0 (2.2)	21.1 (2.2)	22.3 (2.0)	29.2 (4.2)	47.0 (9.3)
Food expenditure/head	8.7 (1.7)	10.8 (1.9)	10.4 (1.7)	13.2 (3.6)	16.8 (4.2)

Table 2.7

BREAKDOWN OF LOANS AND FINANCIAL OR OTHER ASSISTANCE OBTAINED.

	% of Total (n = 50)	% Employed (n = 12)	% Unemployed (n = 38)
Money Lenders	22	25	21
Other loans (Hire Purchase etc)	12	17	11
St. Vincent de Paul Society	18	0	24
Help with ESB Bill (Relieving Officer)*	32	0	42
Help from family	6	0	8

* Community Welfare Officer (Eastern Health Board)

Table 2.8

FAMILY SHOPPING HABITS.

Location	Frequency	Number of Families	% of Families
MAJOR SUPERMARKET	2 or 3 times/week	5	10
	once a week	30	60
	once every 2 weeks	2	4
	once a month	1	2
		—	—
	Total	38	76
LOCAL SUPERMARKET	6 or 7 times/week	13	26
	3 or 4 times/week	12	24
	1 or 2 times/week	7	14
		—	—
	Total	32	64
VAN OR SMALL LOCAL SHOP	5, 6 or 7 times/week	21	42
	2 or 3 times/week	6	12
		—	—
	Total	27	54

Table 2.9

RESPONSES TO QUESTIONS ON INDIVIDUAL SOCIAL QUESTIONNAIRE FOR ADULT MALES + FEMALES.

		Adult Females		Adult Males	
		n	%	n	%
On Special Diet	{Weight reducing	5	9	0	0
	{Other	4	7	1	2
		-	-	-	-
	Total	9	16	1	2
Attending Doctor	{Pregnant	2	4	-	-
	{Nerves/Depression	4	7	0	0
	{Other reasons	13	24	3	7
		-	-	-	-
Total		19	35	3	7
Smokers		35	64	30	71
Age leaving school (years)		14.7 $\pm$ 1.5		14.5 $\pm$ 1.4	

Table 2.10

MEAN AGE AND MEAN BODY MASS INDEX (BMI) OF THE VARIOUS AGE GROUPS STUDIED.

Age Group Years	Sex	n =	Age (Years) Mean (SD)	BMI Mean (SD)
1 - 3.9	M	14	2.3 (0.8)	16.8 (2.0)
	F	10	2.3 (1.0)	17.8 (4.0)
4 - 6.9	M	9	5.2 (0.8)	18.3 (2.6)
	F	11	5.6 (1.0)	15.7 (1.3)
7 - 10.9	M	25	9.1 (1.1)	17.2 (2.8)
	F	22	8.1 (1.1)	15.8 (1.5)
11 - 17.9	M	16	13.5 (1.9)	18.0 (2.6)
	F	11	13.9 (2.1)	19.0 (2.1)
≥ 18	M	42	34.2 (9.6)	24.5 (3.6)
	F	55	32.6 (11.1)	23.2 (4.3)

3. RESULTS

3.1 : GENERAL ASPECTS OF ADULT'S DIET AND COMPARISON WITH A REFERENCE POPULATION:

Mean nutrient intakes of adult males and females (i.e. > 18 years) are presented in Tables 3.1 and 3.2 where they are compared with the intakes of similar groups studied in the Kilkenny Health Project (Gibney et al 1989). As can be seen, while energy intakes of both males and females were very similar in the two studies, there were a number of differences in dietary intake patterns.

In the present study the contribution (%) of protein to energy intake was lower and the contribution (%) of carbohydrate higher than in the Kilkenny project. In the present study, females obtained a lower proportion (37%) of their energy from fat compared with other groups. The recommended value is 35%. Fibre intakes in both studies were below the minimum 25 g per day recommended by the Food Advisory Committee (1984), but were particularly low in females in the present study (i.e. 14 g/day).

Micro-nutrient intakes were also generally lower in the present study, the main exception being calcium. In the case of Vitamin A, the lower intakes are of no concern because in both studies intakes were well above the Recommended Dietary Allowance (RDA) of 750 µg. Similarly, while the average intake of Vitamin C in adult males in the present study was 30 mg below that in Kilkenny, this lower intake was in line with the RDA and an examination of the distribution of Vitamin C intakes showed that only 19% of adult males had intakes below 75% of the RDA. The mean iron intake of adult males was also well above the RDA of 10 mg per day and only 10% had intakes below this level. However, of particular concern are the very low intakes of iron and Vitamin C in adult females in the present study, both in relation to the Kilkenny group and in relation to the RDA. Results showed that 98% of adult females consumed less than the RDA of iron (14 mg/day), 91% consumed less than 75% RDA and 31% less than 50% RDA. The corresponding figures for vitamin C were : 84% with intakes less than the RDA (60 mg/day), 64% less than 75% RDA and 18% less than 50% RDA. These findings will be discussed in more detail later. Zinc intakes were also below the recommended level but there is great uncertainty about the amount of zinc required and results from dietary studies with other groups of adults indicate that the RDA may be set too high (Solomons, 1982). This is also the case for folate intakes. Little is known about the requirement and other studies have shown that while the average intakes

recorded were well below the RDA, no evidence of widespread deficiency was observed (Poh Tan et al, 1984; McNulty et al, 1987).

Foods consumed were grouped under various headings and the findings for adult males and females are presented in Tables 3.3 and 3.4 respectively where they are compared with similar data from the Kilkenny study. The differences observed in food consumption patterns explain many of the variances recorded in nutrient intakes. For example the relatively higher calcium intakes in the present study can be accounted for by the higher milk consumption; the average daily intake of milk by females was 68% higher than for Kilkenny women. The men had milk intakes some 29% higher than the Kilkenny men. On the other hand the poor iron and zinc intakes in adult females is related to the relatively low fresh meat consumption, on average half that of Kilkenny females. Fresh meat consumption was also considerably lower in males in the present study but bread and potato consumption was higher. Lower fruit and vegetable consumption accounts for the relatively low vitamin C intakes recorded in the present study. Another significant finding is that table sugar consumption was almost three times higher in females in the present study and twice as high in males when compared with the similar groups in the Kilkenny study. Soft drinks consumption was also higher and cakes and biscuit consumption lower in the present study.

KEY POINTS.

- * ENERGY INTAKES RECORDED IN THE PRESENT STUDY ARE VERY COMPARABLE TO THOSE RECORDED IN THE KILKENNY HEALTH PROJECT FOR SUBJECTS OF MIXED SOCIO-ECONOMIC BACKGROUND.
- * THE HIGHER CONSUMPTION OF MILK BY BOTH SEXES IN THE PRESENT STUDY IS REFLECTED IN HIGHER INTAKES OF CALCIUM.
- * FOR BOTH SEXES, THERE WAS A TENDENCY FOR A HIGHER PROPORTION OF ENERGY FROM CARBOHYDRATE AND A LOWER PROPORTION OF ENERGY FROM PROTEIN COMPARED TO KILKENNY ADULTS.
- * INTAKES OF TABLE SUGAR WERE HIGHER FOR MALES (x 2) AND FOR FEMALES (x 3) COMPARED TO KILKENNY ADULTS.

* THE DIETS OF WOMEN WERE CHARACTERISED BY -

- (i) LOW INTAKES OF FIBRE.
- (ii) LOW INTAKES OF IRON.
- (iii) LOW INTAKES OF VITAMIN C.

* FOR BOTH SEXES, FAT INTAKE EXCEEDED THE RECOMMENDED VALUE OF 35% OF ENERGY.

3.2 : PATTERNS OF FOOD AND NUTRIENT INTAKE BY SUBJECTS IN UPPER AND LOWER QUANTILES OF IRON, VITAMIN C, FAT AND FIBRE INTAKE:

In order to examine the dietary intakes and patterns of food selection that differentiated high and low consumers of iron, vitamin C, fibre, fat and table sugar, the nutrient and food intakes of the upper and lower quartiles of these parameters were compared for both males and females. The upper quartile group contains the 25% of the sample with the highest intakes of these nutrients and the lower quartile comprises the 25% with the lowest intake. In many instances this division automatically led to groups with high and low energy intakes. Accordingly comparisons of food and nutrient intakes between upper and lower quartiles are adjusted to units/10 MJ of energy per day.

Iron:

The data for nutrient and food intake of subjects with high and low iron intakes are given in Tables 3.5 and 3.6. A marked difference in energy intake between the quartiles is the most notable feature along with, as expected, disparate intakes of iron. When these iron intakes are corrected for energy intake, the differences between upper and lower quartiles of iron intake disappear. In fact when the differences in energy intake are taken into account, the patterns of nutrient intake become generally similar for both quartiles and both sexes. In the case of women where iron intakes are generally low, the lower quartiles consume lower quantities of foods frequently perceived as "fattening" (i.e. bread, cakes and biscuits, sweets and chocolates, soft drinks and potatoes) and higher quantities of foods frequently consumed in weight reduction diets (i.e. fruits, fruit juices and vegetables). This might suggest that women with a low iron intake are deliberately consuming a low energy diet.

KEY POINTS.

- * The lower intakes of iron by both sexes in the lower quartiles of iron intake simply reflect a low consumption of food and do not imply an unbalanced diet.
- * When adjusted for energy intake, the intakes of all nutrients become similar for both sexes and both quartiles.
- * For women, where iron intake has been shown in the previous section to be a problem, the causative low energy intakes are associated with a pattern of food consumption indicative of a weight reduction diet.
- * Irrespective of adjustments for energy intake, iron consumption is inadequate for women as a group.

Vitamin C:

The data for nutrient and food intake of subjects with high and low vitamin C intakes are given in Tables 3.7 and 3.8. The division of the subjects into upper and lower quartiles of vitamin C intake also leads to a division into high and low energy intakes. However, in contrast to iron intakes, when the intakes of vitamin C are corrected for energy intake, the inter-quartile differences remain. This indicates a truly different dietary pattern between the upper and lower quartiles of intake of vitamin C. Table 3.8 clearly shows that for all of the foods rich in vitamin C, particularly for citrus fruits, the lower quartile of vitamin C intake for both sexes show lower intakes of these foods. No other consistent pattern is evident.

KEY POINTS:

- * The lower intakes of vitamin C were largely explained by lower intakes of fruit, oranges, orange juice, potatoes and vegetables.
- * A low intake of citrus fruits is strongly indicative of low vitamin C intakes.

Fibre:

The data for food and nutrient intake by individuals in the upper and lower

quartiles of fibre intake are given in Tables 3.9 and 3.10. Once again, energy intakes differ between the upper and lower quartiles. However, when fibre intake is corrected for energy intake, the differences between the upper and lower quartiles persist indicating a true difference in fibre intake between the two quartiles. As might be expected, the true difference in fibre intake is paralleled by a true difference in starch intake. An examination of patterns of food intake reveal that the high fibre diets of the upper quartile are generally characterised by higher intakes of such fibre rich foods as bread, breakfast cereals, fruits and peas and beans. In women where fibre intakes are particularly low, the potato consumption is also lower among low fibre eaters.

KEY POINTS:

- * Low fibre intakes were independent of low energy intakes indicating a quartile with a truly low fibre diet.
- * This low fibre diet was associated with low intakes of all the fibre rich foods: bread, cereals, fruit, vegetables, pulses and potatoes.

Fat:

Tables 3.11 and 3.12 give data on the patterns of food and nutrient intake in the upper and lower quartiles of fat energy intakes. In contrast to the other nutrients which have been considered, both total fat intake and % energy from fat are inversely related to energy intake. That is, a high fat diet is associated with a lower energy intake. In general, the adjustment of nutrient intake for energy intake, revealed that, with the exception of total sugars, intakes of all nutrients were higher in the high fat eaters. In general, high fat diets were associated with higher intakes of milk (women only), butter, cheese, cakes and biscuits, sweets and chocolates, eggs, fresh meat and processed meat. However, the true differences in patterns of nutrient intake may be compounded by the method of expressing fat intake. When a sub-sample is selected to represent a high intake of fat expressed as a % of energy, it follows that the sub-sample chosen will have a low intake of carbohydrate expressed as a % of energy. This is a consequence of the fact that of the three non-alcohol based energy sources, protein remains constant at 10 - 15% of energy with the remaining 85 - 90% being apportioned to either fat or carbohydrate. If one is high, the other must be low (See Table 3.11). Thus, in the

present study sugar intake is markedly different between high and low fat eaters - by a factor of 3.4 for men and 4.3 for women. Indeed sugar intakes alone explain the difference in energy intake between the upper and lower quartiles of fat intake:

Fat Intake	Males		Females	
	Upper Quartile	Lower Quartile	Upper Quartile	Lower Quartile
Energy (MJ/d)	14.0	11.7	10.8	7.8
Difference (MJ)	---	2.3	---	3.0
Sugars (g/d)	261	64	255	43
Difference (g)	---	197	---	212
Difference (MJ)	---	3.2	---	3.4

A fairer comparison of foods contributing to the high and low fat diets might therefore be to correct, not for total energy, but for non-sugars energy. These results are given in Table 3.13. Now, high fat eaters in general consume more cheese, butter and fresh meat.

The biggest single contribution to the differences in fat intake is butter. In men, the upper and lower quartiles of fat intake differ by 33 g/d with 57% of this difference due to the differential of 23 g/d in butter intake. In females, fat intakes differ by 19 g/d of which 65% is attributable to the 15 g/d differential in butter intake.

KEY POINTS:

- * High fat diets usually mean low sugar diets and vice-versa, when fat intake is expressed as a % of energy.
- * When adjusted for energy intake and for sugar intake, high fat diets are characterised by higher intakes of butter, cheese and meat for both sexes.
- * Between 57% and 65% of the difference in fat intakes between the upper and lower quartiles of fat intakes is due to a difference in butter consumption.

3.3 : Table Sugar Intake:

The data for food and nutrient intakes by individuals with low and high sugar intakes are given in Table 3.14 and 3.15. This method of presentation complies with previously studied nutrients and is included largely for completeness sake. However, the case against using this approach for table sugar is strong. The differential in energy intake between the upper and lower quartiles is 3.3 and 4.4 MJ/d for men and women respectively. The differences between the upper and low quartiles in sugar intake are 236 g and 249 g of sugars for males and females respectively. These correspond to 3.7 and 4.0 MJ/d or 112 and 91% of the observed energy differences. Thus, all the differences in energy intake between the upper and lower quartiles of sugar consumers are due solely to total sugar intake. In other words energy from sugars, supplements rather than replaces energy from other sources. This is seen in Table 3.16 where nutrients are expressed in terms of absolute intake. Clearly with the exception of non-starch carbohydrate intake, high table sugar intakes did not displace micronutrient intakes.

KEY POINTS:

- * A high intake of table sugar, supplemented energy intake but did not displace other energy sources.
- * Micronutrient intakes in absolute terms were not influenced by sugar intake.

Table 3.1

Comparison of mean daily nutrient intakes of adult males (≥ 18 years) in the present study with those of a similar group studied in the Kilkenny Health Project.

	Present Study n = 42		Kilkenny Study n = 30	
	Mean	(S.D.)	Mean	(S.D.)
Energy (MJ)	13.1	(3.0)	12.5	(2.6)
Protein (g)	100	(25)	107	(22)
Fat (g)	128	(33)	119	(35)
Carbohydrate (g)	409	(128)	344	(88)
Total sugars (g)	153	(103)	129	(58)
Fibre (g)	22	(6)	24	(6)
% Protein energy	13.0	(1.7)	16.0	(2.6)
% Fat energy	38.2	(7.3)	38.8	(6.3)
% Carbohydrate energy	48.7	(8.4)	45.7	(7.8)
Iron (mg)	13.5	(3.2)	13.1	(6.5)
Calcium (mg)	1233	(434)	1026	(364)
Zinc (mg)	12.9	(3.6)	15.1	(3.9)
Vitamin A (μ g RE)	1507	(1299)	1180	(677)
Vitamin C (mg)	59.7	(21.1)	89.0	(25.0)
Vitamin B6 (mg)	1.5	(0.3)	1.9	(0.4)
Folate (μ g)	211	(96)	237	(60)

Table 3.2

Comparison of mean daily nutrient intakes of adult females (> 18 years) in the present study with those of a similar group studied in the Kilkenny Health Project.

	Present Study n = 55	Kilkenny Study n = 30
	Mean (S.D.)	Mean (S.D.)
Energy (MJ)	8.5 (2.8)	8.4 (2.2)
Protein (g)	64 (18)	77 (22)
Fat (g)	81 (24)	87 (28)
Carbohydrate (g)	275 (131)	232 (67)
Total sugars (g)	113 (108)	82 (42)
Fibre (g)	14 (5)	20 (9)
% Protein energy	13.5 (3.7)	15.8 (3.4)
% Fat energy	37.0 (7.5)	39.6 (4.9)
% Carbohydrate energy	49.6 (9.8)	44.4 (5.5)
Iron (mg)	8.1 (2.3)	10.3 (4.2)
Calcium (mg)	905 (355)	761 (252)
Zinc (mg)	8.3 (2.5)	11.8 (4.5)
Vitamin A (ug RE)	1070 (1032)	1088 (1030)
Vitamin C (mg)	44.8 (18.2)	72.7 (31.5)
Vitamin B6 (mg)	1.0 (0.3)	1.3 (0.4)
Folate (µg)	137 (42)	166 (60)

Table 3.3

Comparison of mean daily intakes of selected foods by adult males (> 18 years) in the present study with those of a similar group studied in the Kilkenny Health Project.

Food (grams)	Present Study	Kilkenny Study
	n = 42	n = 30
	Mean (S.D.)	Mean (S.D.)
Bread	231 (104)	204 (87)
Milk	513 (257)	397 (256)
Cheese	18 (25)	14 (9)
Butter/Margarine	46 (21)	42 (22)
Breakfast cereals	15 (15)	16 (24)
Table sugar	95 (99)	49 (51)
Cakes/Biscuits	45 (52)	62 (47)
Soft drinks	115 (182)	77 (133)
Fish	18 (22)	22 (22)
Eggs	43 (25)	33 (37)
Fruits	31 (35)	63 (65)
Potatoes	307 (95)	267 (110)
Other vegetables	147 (62)	165 (86)
Fresh meat	90 (34)	148 (77)
Processed meat	55 (37)	46 (45)

Table 3.4

Comparison of mean daily intakes of selected foods by adult females (> 18 years) in the present study with those of a similar group studied in the Kilkenny Health Project.

Food (grams)	Present Study	Kilkenny Study
	n = 55	n = 30
	Mean (S.D.)	Mean (S.D.)
Bread	147 (83)	149 (81)
Milk	460 (234)	273 (192)
Cheese	10 (13)	7 (8)
Butter/Margarine	27 (15)	32 (18)
Breakfast cereals	9 (13)	15 (15)
Table sugar	73 (100)	28 (37)
Cakes/Biscuits	27 (35)	48 (35)
Soft drinks	65 (82)	33 (52)
Fish	8 (9)	11 (18)
Eggs	23 (17)	32 (19)
Fruits	33 (37)	74 (61)
Potatoes	179 (105)	161 (69)
Other vegetables	103 (54)	136 (62)
Fresh meat	53 (29)	104 (53)
Processed meat	29 (19)	23 (20)

Table 3.5

Mean daily nutrient intakes of adult males and females (≥ 18 years) in the upper and lower quartiles of iron intake.

	Males		Females	
	≤ 11.9 mg n = 12	≥ 14.8 mg n = 11	≤ 6.2 mg n = 15	≥ 9.6 mg n = 14
Iron Intake:				
Energy (MJ)	10.4	15.5	5.8	10.6
% Energy, fat	38.6	39.2	37.6	35.6
% Energy, carbohydrate	48.2	47.3	48.6	51.8
% Energy, protein	13.1	13.4	14.4	12.6
Iron intake (mg)	10.3	17.2	5.2	10.8
Nutrient intakes per 10 MJ				
Sugars (g)	121	99	134	131
Starch (g)	136	163	129	155
Fibre (g)	16	18	16	16
Calcium (mg)	980	970	1340	987
Iron (mg)	9.9	11.1	9.0	10.1
Zinc (mg)	10.0	10.3	10.2	9.4
Vitamin A (ug RE)	1000	886	1243	1377
Thiamine (mg)	1.4	1.5	1.7	1.5
Riboflavin (mg)	1.8	1.6	2.2	1.7
Nicotinic acid (mg NAE)	31.3	30.5	29.1	27.8
Vitamin C (mg)	47.5	44.3	61.2	49.6
Vitamin E (mg)	3.6	3.4	3.6	3.4
Vitamin B6 (mg)	1.3	1.2	1.2	1.2
Vitamin B12 (ug)	5.4	3.8	6.0	5.7
Folate (ug)	154	150	172	158

Table 3.6

Mean daily intake of selected foods by adult males and females (≥ 18 years) in the upper and lower quartiles of iron intake.

Iron Intake: Food (g/10 MJ)	Males		Females	
	≤ 11.9 mg n = 12	≥ 14.8 mg n = 11	≤ 6.2 mg n = 15	≥ 9.2 mg n = 14
Bread	148	208	169	191
Milk	465	362	732	446
Cheese	12	18	12	8
Butter	30	32	26	27
Margarine	4	2	2	5
Breakfast cereals	15	12	7	6
Table sugar	83	54	90	77
Cakes & Biscuits	21	28	17	43
Sweets & Chocolates	12	18	16	29
Soft drinks	100	75	55	64
Fish	13	10	7	9
Eggs	34	32	26	24
Fruits (except oranges)	25	20	36	23
Oranges	5	6	19	9
Fruit juices	7	17	14	8
Chips	56	37	36	46
Other potatoes	196	172	141	187
Peas & Beans	66	85	59	57
Other vegetables	48	45	90	53
Fresh meat	74	62	50	64
Processed meat	42	52	26	31
Liver	1	1	2	3

Table 3.7

Mean daily nutrient intakes of adult males and females (≥ 18 years) in the upper and lower quartiles of vitamin C intake.

	Males		Females	
	≤ 46 mg n = 12	≥ 71 mg n = 11	≤ 31 mg n = 14	≥ 56 mg n = 14
Vitamin C Intake:				
Energy (MJ)	11.5	15.4	7.4	9.7
% Energy, fat	38.6	38.4	39.0	35.4
% Energy, carbohydrate	48.1	48.2	47.7	51.9
% Energy, protein	13.1	12.4	13.1	12.7
Vitamin C intake (mg)	41.0	88.7	25.5	70.7
Nutrient intakes per 10 MJ				
Sugars (g)	116	110	126	138
Starch (g)	154	151	136	136
Fibre (g)	16	16	15	14
Calcium (mg)	876	1005	1064	1186
Iron (mg)	10.5	10.3	9.1	9.1
Zinc (mg)	9.6	10.6	9.5	9.6
Vitamin A (ug RE)	1243	1075	1084	1424
Thiamine (mg)	1.5	1.5	1.6	1.4
Riboflavin (mg)	1.7	1.6	2.0	2.1
Nicotinic acid (mg NAE)	30.6	30.3	28.5	27.8
Vitamin C (mg)	35.7	57.6	34.4	72.9
Vitamin E (mg)	3.7	3.5	3.5	3.4
Vitamin B6 (mg)	1.1	1.2	1.1	1.2
Vitamin B12 (ug)	6.9	4.4	5.5	5.8
Folate (ug)	146	155	146	169

Table 3.8

Mean daily intake of selected foods by adult males and females (≥ 18 years) in the upper and lower quartiles of vitamin C intake.

Vitamin C Intake:	Males		Females	
	≤ 46 mg	≥ 71 mg	≤ 31 mg	≥ 56 mg
Food (g/10 MJ)	n = 12	n = 11	n = 14	n = 14
Bread	192	180	178	146
Milk	379	382	583	606
Cheese	9	22	9	15
Butter	34	27	27	28
Margarine	6	4	7	0
Breakfast cereals	13	8	9	6
Table sugar	88	56	82	91
Cakes & Biscuits	23	55	22	47
Sweets & Chocolates	6	23	23	14
Soft drinks	24	98	72	76
Fish	19	8	5	7
Eggs	40	32	30	26
Fruits (except oranges) *	10	19	15	35
Oranges *	0	10	0	19
Fruit juices *	0	35	0	27
Chips	37	34	36	35
Other potatoes *	186	191	134	210
Peas & Beans	70	56	57	45
Other vegetables *	39	54	43	90
Fresh meat	67	73	54	65
Processed meat	51	41	43	23
Liver	3	1	1	3

* Indicates main sources of vitamin C.

Table 3.9

Mean daily nutrient intakes of adult males and females (≥ 18 years) in the upper and lower quartiles of fibre intake.

Fibre Intake:	Males		Females	
	≤ 17.2 mg	≥ 26.5 mg	≤ 10.5 mg	≥ 17.5 mg
	n = 12	n = 11	n = 14	n = 13
Energy (MJ)	11.3	15.5	6.0	9.4
% Energy, fat	38.0	37.7	39.2	37.7
% Energy, carbohydrate	48.7	49.2	45.4	49.3
% Energy, protein	13.2	13.0	16.0	12.9
Fibre intake (g)	15.0	30.0	8.0	21.0
Nutrient intakes per 10 MJ				
Sugars (g)	127	110	122	88
Starch (g)	132	165	110	183
Fibre (g)	13.3	19.4	13.3	22.3
Calcium (mg)	974	983	1411	1001
Iron (mg)	10.0	10.5	9.7	10.5
Zinc (mg)	10.0	9.9	11.7	9.4
Vitamin A (ug RE)	1190	865	1332	1231
Thiamine (mg)	1.5	1.5	1.7	1.7
Riboflavin (mg)	1.9	1.7	2.5	1.7
Nicotinic acid (mg NAE)	30.7	30.8	31.0	32.0
Vitamin C (mg)	46.5	43.2	61.0	54.3
Vitamin E (mg)	3.3	3.3	3.5	3.8
Vitamin B6 (mg)	1.2	1.2	1.3	1.3
Vitamin B12 (ug)	7.0	3.6	7.2	4.3
Folate (ug)	147	154	160	176

Table 3.10

Mean daily intake of selected foods by adult males and females (> 18 years) in the upper and lower quartiles of fibre intake.

Fibre Intake:	Males		Females	
	≤ 17.2 mg	≥ 26.5 mg	≤ 10.5 mg	≥ 17.5 mg
Food (g/10 MJ)	n = 12	n = 11	n = 14	n = 13
Bread *	156	183	137	219
Milk	461	352	770	406
Cheese	13	21	18	13
Butter	27	30	23	40
Margarine	4	0	2	1
Breakfast cereals *	10	15	5	17
Table sugar	85	59	82	34
Cakes & Biscuits	22	41	13	56
Sweets & Chocolates	25	18	13	26
Soft drinks	73	124	67	82
Fish	9	8	13	10
Eggs	37	28	37	18
Fruits (except oranges) *	11	19	22	44
Oranges *	4	10	8	13
Fruit juices	9	4	38	9
Chips *	56	39	32	29
Other potatoes *	181	185	128	190
Peas & Beans *	49	92	65	74
Other vegetables *	41	45	82	65
Fresh meat	79	58	73	65
Processed meat	43	47	42	29

* Main sources of fibre in the diet.

Table 3.11

Mean daily nutrient intakes of adult males and females (> 18 years) in the upper and lower quartiles of fat intake.

Fat Energy Intake:	Males		Females	
	≤ 31.5 %	≥ 43.8 %	≤ 31.8 %	≥ 42.8 %
	n = 11	n = 11	n = 14	n = 14
Energy (MJ)	14.0	11.7	10.8	7.8
% Energy, fat	29.1	47.2	26.7	45.8
% Energy, carbohydrate	59.4	38.4	63.0	39.3
% Energy, protein	11.4	14.3	10.3	14.9
Fat intake (g)	108	141	75	94
Nutrient intakes per 10 MJ				
Sugars (g)	186	55	236	55
Starch (g)	151	156	117	147
Fibre (g)	16.4	18.8	13.0	16.7
Calcium (mg)	881	963	889	1255
Iron (mg)	9.3	11.5	7.6	10.1
Zinc (mg)	8.4	10.6	7.6	11.5
Vitamin A (ug RE)	823	1979	719	1197
Thiamine (mg)	1.4	1.5	1.1	1.8
Riboflavin (mg)	1.6	1.9	1.5	2.2
Nicotinic acid (mg NAE)	26.8	33.6	21.5	32.8
Vitamin C (mg)	40.2	48.2	43.5	50.9
Vitamin E (mg)	2.7	4.1	2.5	4.0
Vitamin B6 (mg)	1.1	1.3	1.0	1.3
Vitamin B12 (ug)	4.1	7.7	3.6	5.5
Folate (ug)	178	167	131	172

Table 3.12

Mean daily intake of selected foods by adult males and females (> 18 years) in the upper and lower quartiles of fat energy intake.

Fat Energy Intake: Food (g/10 MJ)	Males		Females	
	≤ 31.5 %	≥ 43.3 %	≤ 31.6 %	≥ 42.8 %
	n = 11	n = 11	n = 14	n = 14
Bread	175	166	149	190
Milk *	393	385	500	679
Cheese *	7	14	6	18
Butter *	24	48	18	44
Margarine *	2	3	4	1
Breakfast cereals *	12	13	3	6
Table sugar	144	15	196	9
Cakes & Biscuits *	34	43	19	33
Sweets & Chocolates	11	15	15	23
Soft drinks	120	55	44	91
Fish	14	15	7	13
Eggs *	29	41	18	33
Fruits (except oranges)	11	10	17	28
Oranges	6	5	8	13
Fruit juices	6	13	0	9
Chips	41	31	36	26
Other potatoes	192	201	159	150
Peas & Beans	79	83	58	45
Other vegetables	29	62	55	60
Fresh meat *	53	87	43	76
Processed meat *	31	41	28	41

* Main sources of fat in the diet.

Table 3.13

Patterns of food intake in individuals consuming high and low fat diets adjusted for non-sugars energy.

% fat energy	Male		Female	
	Lower Quartile	Higher Quartile	Lower Quartile	Higher Quartile
g/10 MJ Non Sugar Energy				
Milk	560	422	804	745
Cheese	10	15	10	20
Butter	34	52	28	48
Margarine	3	3	6	2
Cakes & Biscuits	48	47	31	37
Sweets & Chocolates	15	17	24	25
Eggs	41	45	28	37
Fresh meat	75	96	68	83
Processed meat	45	45	45	45

Table 3.14

Mean daily nutrient intakes of adult males and females (≥ 18 years) in the upper and lower quartiles of table sugar intake.

Table Sugar Intake:	Males		Females	
	≤ 4 g n = 10	≥ 154 n = 10	≤ 0 g n = 15	≥ 126 g n = 12
Energy (MJ)	11.7	15.0	7.2	11.6
% Energy, fat	42.7	30.8	42.5	27.4
% Energy, carbohydrate	43.4	58.0	41.7	62.5
% Energy, protein	13.8	11.2	16.4	10.1
Table sugar intake	0	242	0	231
Nutrient intakes per 10 MJ				
Sugars (g)	54	199	47	243
Starch (g)	169	127	167	109
Fibre (g)	17	14	19	12
Calcium (mg)	854	900	1304	891
Iron (mg)	11.1	8.5	10.4	7.5
Zinc (mg)	10.4	8.4	11.7	7.4
Vitamin A (ug RE)	1268	892	1458	1136
Thiamine (mg)	1.4	1.3	1.8	1.1
Riboflavin (mg)	1.5	1.6	2.2	1.6
Nicotinic acid (mg NAE)	30.1	26.1	34.0	22.2
Vitamin C (mg)	48.3	39.9	59.6	42.6
Vitamin E (mg)	3.6	3.0	4.3	2.5
Vitamin B6 (mg)	1.2	1.1	1.4	0.9
Vitamin B12 (ug)	5.3	4.3	5.8	5.6
Folate (ug)	154	131	186	132

Table 3.15

Mean daily intakes of selected foods by adult males and females (≥ 18 years) in the upper and lower quartiles of table sugar intake.

Table Sugar Intake: Food (g/10 MJ)	Males		Females	
	≤ 4 g n = 10	≥ 154 n = 10	≤ 0 n = 15	≥ 126 n = 12
Bread	195	138	208	132
Milk	302	428	684	503
Cheese	10	11	19	9
Butter	40	21	38	18
Margarine	1	6	3	2
Breakfast cereals	3	12	7	6
Table sugar	0	161	0	200
Cakes & Biscuits	44	41	40	26
Sweets & Chocolates	33	8	21	16
Soft drinks	126	116	58	76
Fish	10	15	10	6
Eggs	35	30	29	21
Fruits (except oranges)	18	7	31	21
Oranges	9	5	19	13
Fruit juices	13	7	7	0
Chips	43	32	24	39
Other potatoes	229	189	193	141
Peas & Beans	65	63	68	47
Other vegetables	40	28	67	40
Fresh meat	80	59	71	44
Processed meat	44	29	36	25

Table 3.16

Nutrient intakes of males and females consuming high and low intakes of table sugars (unadjusted values).

		Men		Women	
		(Quartile of table sugar intake)			
		Lower	Upper	Lower	Upper
(n =)		(10)	(10)	(15)	(12)
Energy	(MJ/d)	11.7	15.0	7.2	11.6
Protein	(g/d)	91	100	64	69
Fat	(g/d)	127	123	81	83
Carbohydrate	(g/d)	312	552	191	460
Starch	(g/d)	198	190	120	126
Fibre	(g/d)	19.6	21.1	13.8	14.1
Iron	(mg/d)	13.1	12.8	7.5	8.7
Zinc	(mg/d)	12.2	12.6	8.4	8.6
Vitamin C	(mg/d)	57	60	43	49
Vitamin A	(ugRE/d)	1484	1339	1050	1317
Table sugar	(g/d)	0	242	0	231

4 - INCOME, EXPENDITURE AND POSSIBLE AT-RISK GROUPS:

4.1 Income:

Tables 4.1 and 4.2 compare food and nutrient intake in the upper and lower quartiles of income (£/diet head/week). When adjusted for differences in energy intakes, the nutrient intakes of both upper and lower quartiles for both sexes were remarkably similar. Fat intakes (% energy) rose with rising income. When the pattern of food intake is examined, differences do become evident. The lower income groups consumed more bread and butter/margarine, more table sugar (males only), less cakes and biscuits, sweets and chocolates, soft-drinks, fish, fruit (males only) and vegetables. Thus, the biggest differences by far were in a higher intake of confectionery and a lower intake of bread.

KEY POINTS:

- * When adjusted for differences in energy intake, the high and low quartiles of income did not influence nutrient intake, with the possible exception of fat intake.
- * The lower income quartile consumed less confectionery, less soft drinks and more bread than the upper income quartile.

4.2 FOOD EXPENDITURE:

The pattern of food and nutrient intake for upper and lower quartiles of food expenditure are given in Tables 4.3 and 4.4. By and large the results parallel those for income quartiles. Additional expenditure on food usually led to lower bread consumption, higher intakes of milk, cheese, soft drinks and fruit.

4.3 FOOD EXPENDITURE AND FAMILY INCOME IN RELATION TO KEY NUTRIENT INTAKE:

Table 4.5 gives mean values for income and expenditure on food (£/diet head/week) in the upper and lower quartiles of intakes of vitamin C, iron, fibre, % energy from fat and table sugar. With the exception of table sugar intake, food expenditure and income were lower in the lower quartiles of nutrient intake for both sexes. For table sugar, the lower quartiles of intakes were associated with a higher food expenditure and among women, a higher income. In general the average incomes for the upper and lower

quartiles of nutrient intake varied little with the means tending to range between the 3rd and 4th quartile of income. Equally, food expenditure tended to vary little between the upper and lower quartiles of nutrient intake. The main exception was with iron where among females, the income of the upper quartile of iron intakes failed to reach the central quartile of income.

4.4 WOMEN IN VARIOUS SUBGROUPS.

Given the generally poor standard of nutrient intake among women observed in the previous section, a closer look was taken at the dietary patterns of various subgroups i.e. married women with one or two children, married women with three or four children and single mothers or deserted wives. The nutrient and food intakes of these subgroups are presented in Tables 4.6 and 4.7 respectively where they are compared with the intakes of the total sample of women. As can be seen there was quite a large variation in energy and nutrient intakes with energy intakes being least in the group of single mothers and deserted wives and highest in the group of married women with three or four children. The pattern of food intake of the various groups show that these differences in energy intakes are largely due to differences in table sugar and milk consumption, both of which are probably related to the number of cups of tea consumed daily. Thus, single mothers and married women with one or two children had relatively low intakes of milk and sugar compared with married women with three or four children. Bread consumption was also high in married women with three or four children but soft drinks and fruit and fruit juice consumption was low. Despite the relatively low fruit and fruit juice consumption in this group vitamin C intakes were marginally better when compared with the other groups. Married women with one or two children had the lowest consumption of bread, milk, cheese and table sugar but the highest consumption of soft drinks. Meat consumption was considerably lower in single mothers accounting for their markedly low iron and zinc intakes. A lower consumption of fish, cakes and biscuits, sweets and soft drinks was also observed in single mothers but fruit and vegetable consumption was higher than in any of the other groups. However, the low energy intakes in this group would seem to be a limiting factor for all nutrients.

As might be expected income per diet head and food expenditure per diet head was lowest in the families with three or four children. There was little variation in income per diet head in any of the other groups but food expenditure per diet head was highest in families with one or two children. Income and food expenditure per diet head were no different in the group of single mothers than in the total sample suggesting that social rather than economic factors are placing this groups at risk.

The extent of the problem of inadequate nutrient intakes among women is explored further in Table 4.8 where iron and vitamin C intakes of single parent families are compared with women in two parent families (1,2 or 3 - 4 children) and with the total sample of men and women. With respect to vitamin C intake, there were no real differences between the various female subgroups in the extent of the problem of low intakes. Women always fared worse than men with about three times as many women having < 75% of the RDA for vitamin C. With regard to iron intake, no problem existed for men. Two parent families showed between 13 and 25% of mothers with iron intakes less than half the RDA. Among single mothers, only half the women achieved even half the RDA for iron.

Given that single parents consumed quite low levels of energy, iron and zinc, the children of single parents were compared in Table 4.9 with the total sample of children, in the age ranges 7 - 11 and 11 - 18 year olds. No differences whatever were seen between children from single or two parent families.

KEY POINTS:

- * The women at greatest nutritional risk were the single mother or deserted wife. This was especially evident for iron intakes.
- * Energy intakes differed between single mothers/deserted wives as compared to married women living with their husbands. These differences were almost entirely explicable by variations in sugar intake.
- * Meat consumption among single mothers and deserted wives was well below average which contributed significantly to their lowered iron intake.

- * Neither income nor expenditure explained the differences in eating patterns between groups suggesting that the social fabric of the home was a major factor.
- * There was no evidence that children of single parents or deserted wives shared the nutritional disadvantage of their mothers.

4.5 DRINKING HABITS:

Of the 42 men and 55 women questioned, 20 men and 7 women (i.e. 48% and 13% respectively) said they drank alcohol at least once a week. Thus, overall 27.8% of the adults drank on a regular basis. Most of the men ($n = 18$) drank pints of beer or lager and their average consumption was 8.3 ± 6.2 pints per week. Five of the women also drank pints of beer or lager and their average consumption was 3.5 ± 0.9 pints per week. This is equivalent to 2.6% and 0.5% of daily energy intake for men and women respectively which is well below the average values reported for the Kilkenny Health Project (Gibney et al, 1989). The confounding effects of energy from alcohol were excluded from the diet assessment given the generally low intakes.

Table 4.1

Mean daily nutrient intakes of adult males and females (≥ 18 years) in the upper and lower quartiles of income per diet head (£/diet head/week)

Income/Diet Head:	Males		Females	
	< £2.3	> £3.7	< £2.2	> £3.7
	n = 10	n = 10	n = 14	n = 14
Energy (MJ)	11.6	15.1	8.4	9.1
% Energy, fat	36.5	38.5	36.7	38.2
% Energy, carbohydrate	50.3	47.5	50.3	46.9
% Energy, protein	13.1	13.9	13.7	14.9
Nutrient intakes per 10 MJ				
Sugars (g)	117	120	125	144
Starch (g)	166	147	160	115
Fibre (g)	16	16	17	14
Calcium (mg)	885	1058	977	1219
Iron (mg)	11	10.5	9.3	8.9
Zinc (mg)	10	11.1	9.6	10.6
Vitamin A (ug RE)	995	905	1064	1080
Thiamine (mg)	1.6	1.6	1.7	1.5
Riboflavin (mg)	1.6	1.7	1.9	2.1
Nicotinic acid (mg NAE)	30.0	31.2	28.8	29.7
Vitamin C (mg)	41.6	43.6	46.4	51.5
Vitamin E (mg)	3.4	3.2	3.6	3.1
Vitamin B6 (mg)	1.1	1.2	1.1	1.3
Vitamin B12 (ug)	5.7	4.4	6.0	4.9
Folate (ug)	201	150	168	147

Table 4.2

Mean daily intake of selected foods by adult males and females (≥ 18 years) in the upper and lower quartiles of income per diet head (£/diet head/week).

Income/Diet Head: Food (g/10 MJ)	Males		Females	
	< £2.3 n = 10	> £3.7 n = 10	< £2.2 n = 14	> £3.7 n = 14
Bread	222	177	230	130
Milk	393	398	573	659
Cheese	7	26	10	14
Butter	28	32	30	29
Margarine	8	0	7	0
Breakfast cereals	13	10	8	11
Table sugar	84	62	90	97
Cakes & Biscuits	12	26	13	16
Sweets & Chocolates	16	32	15	22
Soft drinks	21	126	39	100
Fish	9	21	4	15
Eggs	42	25	24	30
Fruits (except oranges)	15	23	19	16
Oranges	1	8	13	10
Fruit juices	6	6	2	15
Chips	37	30	24	34
Other potatoes	209	165	157	156
Peas & Beans	60	68	48	65
Other vegetables	39	61	49	67
Fresh meat	74	75	56	77
Processed meat	33	54	30	34

Table 4.3

Mean daily nutrient intakes of adult males and females (≥ 18 years) in the upper and lower quartiles of food expenditure (£/diet head/week).

Food expenditure: (£/diet head/week)	Males		Females	
	< £1.0 n = 9	> £1.7 n = 10	< £1.0 n = 14	> £1.7 n = 14
Energy (MJ)	12.0	14.1	9.3	8.3
% Energy, fat	36.5	40.1	32.7	39.4
% Energy, carbohydrate	50.3	46.5	55.4	45.7
% Energy, protein	13.1	13.5	11.8	14.8
Nutrient intakes per 10 MJ				
Sugars (g)	106	105	149	127
Starch (g)	182	152	159	130
Fibre (g)	17	17	16	16
Calcium (mg)	809	1016	797	1205
Iron (mg)	11.7	11.0	9.7	9.9
Zinc (mg)	10.0	11.0	8.7	10.7
Vitamin A (ug RE)	1008	1384	835	1381
Thiamine (mg)	1.5	1.5	1.4	1.8
Riboflavin (mg)	1.5	1.7	1.6	2.2
Nicotinic acid (mg NAE)	29.9	31.1	26.5	31.9
Vitamin C (mg)	43.7	42.9	50.0	48.8
Vitamin E (mg)	3.3	3.8	3.1	3.6
Vitamin B6 (mg)	1.2	1.1	1.0	1.3
Vitamin B12 (ug)	5.6	6.1	4.9	5.8
Folate (ug)	205	153	153	148

Table 4.4

Mean daily intake of selected foods by adult males and females (> 18 years) in the upper and lower quartiles of food expenditure (£/diet head/week).

Food expenditure:	Males		Females	
	< £1.0 n = 9	> £1.7 n = 10	< £1.0 n = 14	> £1.7 n = 14
Food (g/10 MJ)				
Bread	233	184	215	143
Milk	307	338	459	580
Cheese	6	26	8	16
Butter	34	35	28	31
Margarine	3	2	3	1
Breakfast cereals	12	9	6	14
Table sugar	65	43	102	70
Cakes & Biscuits	29	28	26	29
Sweets & Chocolates	21	35	26	19
Soft drinks	42	172	44	145
Fish	10	14	4	14
Eggs	38	27	19	35
Fruits (except oranges)	11	26	22	37
Oranges	0	11	12	7
Fruit juices	18	4	16	17
Chips	38	28	23	23
Other potatoes	218	155	158	153
Peas & Beans	76	70	55	70
Other vegetables	33	52	55	58
Fresh meat	72	68	55	76
Processed meat	43	57	33	40

Table 4.5

Mean values for income and expenditure on food (£/diet head/week) in the upper and lower quartiles of intakes of vitamin C, iron, fibre, % energy from fat and table sugar.

	Male		Female	
	Upper Quartile	Lower Quartile	Upper Quartile	Lower Quartile
Vitamin C				
Income/diet head	3.2	2.7	3.4	3.1
Expenditure/diet head	1.41	1.23	1.40	1.38
Iron				
Income/diet head	3.4	3.1	3.1	2.9
Expenditure/diet head	1.39	1.31	1.28	1.22
Fibre				
Income/diet head	3.3	2.6	2.9	3.6
Expenditure/diet head	1.46	1.24	1.40	1.46
% Energy Fat				
Income/diet head	3.4	2.8	3.2	3.0
Expenditure/diet head	1.39	1.23	1.48	1.21
Table sugar intake				
Income/diet head	3.1	3.1	2.9	3.2
Expenditure/diet head	1.37	1.42	1.2	1.39

Table 4.6

Comparison of mean nutrient intakes for various subgroups of women.

Nutrient		Married with Husband		Single Mother	Total
		& 1 or 2 Children	& 3 or 4 Children	or Deserted Wife	Sample Women
		n = 16	n = 16	n = 11	n = 55
Energy	g	7.4	10.1	7.1	8.5
Protein	g	63.7	70.3	54.5	64.0
Fat	g	78.8	88.3	64.9	81.0
Carbohydrate	g	213.0	349.0	238.0	275.0
Total sugar	g	62.0	154.0	90.0	113.0
Fibre	g	13.6	14.6	13.3	13.9
% Protein Energy		15.5	12.0	13.3	13.5
% Fat Energy		40.7	33.7	35.3	37.0
% Carbo Energy		44.5	54.3	51.3	49.6
Iron	mg	8.3	9.1	6.9	8.1
Calcium	mg	850.0	913.0	853.0	905.0
Zinc	mg	8.3	8.9	7.2	8.3
Vitamin A	µgRE	1485.0	850.0	689.0	1070.0
Vitamin C	mg	44.4	46.5	44.7	44.8
Vitamin B6	mg	1.1	1.1	0.9	1.0
Folate	µg	129.0	146.0	127.0	137.0
Income/Diet Head		3.2	2.6	3.2	3.1
Food Expenditure/DH		1.50	1.12	1.37	1.38

Table 4.7

Comparison of mean daily intakes of selected foods for various subgroups of women.

Foods (grams/10 MJ)	Married with Husband		Single Mother	Total
	& 1 or 2 Children	& 3 or 4 Children	or Deserted Wife	Sample Women
	n = 16	n = 16	n = 11	n = 55
Bread	118	193	140	147
Milk	417	505	406	460
Cheese	8	12	11	10
Butter	22	26	20	24
Margarine	4	6	4	3
Breakfast Cereals	8	8	9	9
Table Sugar	21	113	55	73
Cakes & Biscuits	35	31	9	27
Sweets & Chocolates	18	19	11	17
Soft Drinks	68	43	48	65
Fish	10	9	4	8
Eggs	23	26	22	23
Fruits (except Oranges)	24	16	32	23
Oranges	8	9	12	10
Fruit Juices	16	7	8	8
Chips	31	36	17	30
Potatoes (other)	165	157	169	149
Peas & Beans	54	51	53	51
Vegetables (other)	44	48	59	52
Fresh Meat	61	52	40	53
Processed Meat	28	32	20	29

Tables 4.8

Comparison of the distributions of nutrient intakes for various sub-groups of women with overall male and female patterns.

Vitamin C				
Groups	n =	% with intakes < the RDA	% with intakes < 75% RDA	% with intakes < 50% RDA
Women in Single Parent Families	11	82	55	18
Women with Husband & 1 or 3 Children	16	81	75	19
Women with Husband & 3 or 4 Children	16	81	56	19
Total Sample of Women	55	84	64	18
Total Sample of Men	42	64	19	0

Iron				
Groups	n =	% with intakes < the RDA	% with intakes < 75% RDA	% with intakes < 50% RDA
Women in Single Parent Families	11	100	100	55
Women with Husband & 1 or 3 Children	16	100	100	25
Women with Husband & 3 or 4 Children	16	94	75	13
Total Sample of Women	55	98	91	31
Total Sample of Men	42	10	0	0

Table 4.9

Intakes of selected nutrients by children from single parent families.

	7 - 11 Year Olds		1 - 18 Year Olds	
	Single Parent Families	Total Sample	Single Parent Families	Total Sample
Iron mg/10 MJ energy	11	10	10	10
Vitamin C mg/10 MJ energy	57	52	52	50
Fibre g/10 MJ energy	21	19	18	18
Fat g/10 MJ energy	90	92	91	95
Sugars g/10 MJ energy	102	113	112	110

5. RESULTS

5.1: DIETARY INTAKES OF CHILDREN UNDER 18 YEARS.

Mean daily intakes of some nutrients and foods for children in various age groups are presented in Tables 5.1 to 5.10. In both sexes mean nutrient intakes were either equal to or greater than the Recommended Dietary Allowances (RDAs). The main exceptions were iron, vitamin C, zinc and folate. As mentioned earlier there is very little known about the actual requirements for zinc and folate and the RDAs for these nutrients are somewhat arbitrary. Furthermore, some studies have shown that despite 'low' levels of these nutrients being recorded few clinical signs of malnutrition were observed. Thus, for the children studied here the low intakes of iron and vitamin C are the ones of most concern. Tables 5.9 and 5.10 respectively show the distributions of vitamin C and iron intakes in the various age groups. As can be seen (Table 5.9) intakes of vitamin C were well below the RDA for a large proportion of the children particularly the girls. A substantial proportion of children also had iron intakes below the RDA (Table 5.10) and here again the intakes of the girls were lowest.

In general boys consumed more food than girls, the differences between the sexes becoming more pronounced as the children got older. Consequently, nutrient intakes were generally higher in boys. When intakes were adjusted to allow for differences in energy intakes many of these differences in nutrient and food intakes were no longer evident. The main exceptions will be discussed below.

In the youngest age group (1 - 3.9 years), zinc and vitamin C intakes were relatively higher in girls after energy adjustments and vitamin A intakes were lower. A higher consumption of cheese, fish and vegetables and a lower consumption of cakes biscuits and sweets was also seen in girls.

In contrast to the younger age group, vitamin C intakes were slightly lower in girls in the 4 - 7 year age group but all other nutrient intakes were similar to those of the boys. A comparison of food intakes in this age group showed that consumption of milk, meat, fruits and soft drinks was lower in girls and consumption of bread, potatoes, cheese, cakes and biscuits was higher.

Most nutrient intakes (per 10 MJ of energy) were similar for children aged 7 to 11 years. The main exception was vitamin C intake which was higher in girls. The most striking differences in food intakes were in the consumption of bread and butter which was lower in girls and in fruit and fruit juices and to a lesser extent potatoes and soft drinks which was higher in girls.

Girls aged 11 to 18 years had a total sugar intake and a higher vitamin A intake per 10 MJ of energy than boys of the same age but other nutrient intakes were similar. Bread and potato consumption was lower in girls in this age group and vegetable, table sugar, sweets and soft drinks consumption was slightly higher.

A comparison of the nutrient densities of the diets in the various age groups shows that the quality of diets appeared to change very little as the children got older with the exception of vitamin C intakes which decreased due to a relatively lower consumption of fruits in the 11 to 18 year olds.

The diets of children in different family sizes were also compared and the results are presented in Tables 5.11 to 5.13. In each age group there was a tendency for higher energy, fibre and fat intakes and a lower intake of total sugars in children from families with one or two children. This trend persisted after adjustments were made for differences in energy intakes between the two groups.

Vitamin C and iron intakes were higher in young children from smaller families but were similar in children from 7 - 11 years of age. It was not possible to make comparisons of the dietary intakes of 11 to 18 year olds in different family sizes since there was only one child in this age group who was from a family of only one or two children.

KEY POINTS:

- * Relative to the RDAs, iron and vitamin C intakes were low particularly in girls.
- * Lower vitamin C intakes were associated with low intakes of fresh fruit and vegetables.

- * Low iron intakes were related more to relatively lower food intakes than to the consumption of a poorer quality diet.
- * Children aged 1 - 7 years of age from larger families appear to consume a poorer quality diet than their peers in smaller families. Thus, their iron and vitamin C intakes were lower, both in absolute terms and in relation to energy intakes.

Table 5.1

Mean daily intakes of some nutrients in children aged 1 - 3.9 years

	Boys (n = 14)		Girls (n = 10)	
	Mean	(SD)	Mean	(SD)
Energy (MJ)	6.8	(1.0)	6.4	(1.4)
% Energy, Fat	37.0	(4.5)	38.8	(3.1)
% Energy, Carbohydrate	50.0	(5.0)	46.8	(5.7)
% Energy, Protein	13.1	(1.6)	14.5	(3.9)

Nutrients	Absolute Intakes		Intakes/10 MJ	Absolute Intakes		Intakes/10 MJ
	Mean	(SD)		Mean	(SD)	
Sugars (g)	75	(25)	110	63	(31)	99
Fibre (g)	13	(4)	19	11	(5)	17
Calcium (mg)	1045	(238)	1537	1029	(329)	1608
Iron (mg)	7.1	(1.7)	10.4	7.0	(3.6)	10.9
Zinc (mg)	6.3	(1.1)	9.3	7.4	(4.5)	11.6
Vitamin A (μ g RE)	787	(507)	1157	574	(282)	897
Vitamin C (mg)	34.3	(8.9)	50.4	38.7	(36.8)	60.5
Vitamin B ₆ (mg)	0.9	(0.2)	1.3	1.0	(0.4)	1.6
Folate (μ g)	106	(21)	156	108	(41)	169

Table 5.2

Mean daily intakes of selected foods in children aged 1 - 3.9 years

Foods (Grams)	Boys (n = 14)		Girls (n = 10)	
	Mean (SD)	Intakes/10 MJ	Mean (SD)	Intakes/10 MJ
Bread	79 (30)	116	70 (26)	109
Milk	604 (197)	890	626 (336)	980
Cheese	3 (4)	5	7 (9)	11
Butter	13 (9)	19	14 (12)	21
Margarine	4 (12)	6	2 (5)	3
Breakfast cereals	27 (9)	39	24 (11)	38
Table sugar	17 (16)	25	17 (15)	27
Cakes/Biscuits	41 (40)	60	23 (12)	36
Sweets/Chocolates	26 (19)	38	15 (12)	23
Soft Drinks	61 (52)	90	62 (45)	97
Fish	6 (5)	8	9 (8)	14
Eggs	18 (14)	26	17 (12)	26
Fruits (except oranges)	60 (43)	88	41 (35)	65
Oranges	7 (10)	11	14 (31)	22
Fruit juices	4 (10)	6	0	0
Chips	13 (12)	20	12 (8)	18
Potatoes (other)	92 (29)	136	83 (59)	130
Peas/Beans	37 (39)	54	40 (35)	63
Vegetables (other)	11 (13)	16	12 (9)	19
Fresh meat	21 (9)	31	21 (19)	33
Processed meat	22 (13)	32	19 (13)	29

Table 5.3

Mean daily intakes of some nutrients in children aged 4 - 6.9 years

	Boys (n = 9)		Girls (n = 11)	
	Mean	(SD)	Mean	(SD)
Energy (MJ)	9.3	(2.4)	7.8	(1.0)
% Energy, Fat	36.3	(2.1)	35.7	(3.2)
% Energy, Carbohydrate	50.3	(2.3)	51.4	(4.1)
% Energy, Protein	13.3	(1.0)	12.8	(1.1)

Nutrients	Absolute Intakes		Intakes/10 MJ	Absolute Intakes		Intakes/10 MJ
	Mean	(SD)		Mean	(SD)	
Sugars (g)	107	(27)	115	76	(21)	97
Fibre (g)	18	(7)	19	15	(3)	20
Calcium (mg)	1257	(411)	1352	1005	(190)	1288
Iron (mg)	9.8	(3.0)	10.5	7.9	(1.1)	10.1
Zinc (mg)	9.6	(2.9)	10.3	7.2	(1.0)	9.2
Vitamin A (μ g RE)	762	(405)	819	527	(186)	676
Vitamin C (mg)	50.4	(28.5)	54.2	36.1	(19.8)	46.3
Vitamin B ₆ (mg)	1.2	(0.5)	1.3	0.9	(0.2)	1.2
Folate (μ g)	152	(40)	163	120	(16)	154

Table 5.4

Mean daily intakes of selected foods in children aged 4 - 6.9 years

Foods (Grams)	Boys (n = 9)		Girls (n = 11)	
	Mean (SD)	Intakes/10 MJ	Mean (SD)	Intakes/10 MJ
Bread	144 (25)	155	150 (42)	192
Milk	661 (22)	711	492 (117)	631
Cheese	7 (10)	8	13 (11)	17
Butter	21 (12)	23	18 (14)	23
Margarine	0	0	5 (8)	6
Breakfast cereals	33 (12)	35	28 (14)	36
Table sugar	24 (20)	26	18 (16)	23
Cakes/Biscuits	26 (19)	28	38 (20)	49
Sweets/Chocolates	39 (11)	42	32 (16)	41
Soft Drinks	163 (88)	175	50 (63)	64
Fish	6 (8)	6	8 (6)	10
Eggs	25 (14)	27	20 (15)	26
Fruits (except oranges)	95 (69)	102	34 (24)	44
Oranges	22 (22)	24	9 (12)	12
Fruit juices	17 (29)	18	10 (25)	13
Chips	35 (25)	38	16 (5)	21
Potatoes (other)	94 (81)	101	113 (50)	145
Peas/Beans	54 (43)	58	53 (25)	68
Vegetables (other)	15 (11)	16	14 (12)	18
Fresh meat	40 (18)	43	25 (6)	32
Processed meat	41 (22)	44	25 (13)	32

Table 5.5

Mean daily intakes of some nutrients in children aged 7 - 10.9 years

	Boys (n = 25)			Girls (n = 22)		
	Mean	(SD)		Mean	(SD)	
Energy (MJ)	10.5	(1.8)		8.8	(2.0)	
% Energy, Fat	34.9	(4.3)		34.2	(3.5)	
% Energy, Carbohydrate	52.7	(4.6)		52.7	(4.0)	
% Energy, Protein	12.3	(0.9)		13.0	(1.4)	

Nutrients	Absolute Intakes			Intakes/10 MJ			Absolute Intakes			Intakes/10 MJ		
	Mean	(SD)		Mean	(SD)		Mean	(SD)		Mean	(SD)	
Sugars (g)	112	(32)		107			105	(43)		119		
Fibre (g)	19	(4.0)		18			18	(4)		20		
Calcium (mg)	1269	(403)		1209			1141	(440)		1297		
Iron (mg)	10.6	(2.1)		10.1			9.1	(1.9)		10.3		
Zinc (mg)	9.5	(2.3)		9.0			8.7	(2.4)		9.9		
Vitamin A (μ g RE)	713	(403)		679			721	(526)		819		
Vitamin C (mg)	46.4	(18.6)		44.2			54.3	(29.3)		61.7		
Vitamin B ₆ (mg)	1.1	(0.3)		1.0			1.1	(0.3)		1.3		
Folate (μ g)	167	(36)		159			150	(29)		170		

Table 5.6

Mean daily intakes of selected foods in children aged 7 - 10.9 years

Foods (Grams)	Boys (n = 25)		Girls (n = 22)	
	Mean (SD)	Intakes/10 MJ	Mean (SD)	Intakes/10 MJ
Bread	220 (66)	210	145 (45)	165
Milk	622 (304)	592	592 (298)	673
Cheese	9 (10)	9	3 (7)	3
Butter	25 (17)	24	16 (12)	18
Margarine	5 (12)	5	3 (8)	3
Breakfast cereals	36 (20)	34	30 (11)	34
Table sugar	36 (26)	34	25 (25)	28
Cakes/Biscuits	39 (25)	37	33 (22)	38
Sweets/Chocolates	44 (27)	42	36 (22)	41
Soft Drinks	86 (111)	82	95 (112)	108
Fish	8 (9)	8	8 (7)	9
Eggs	22 (19)	21	20 (17)	23
Fruits (except oranges)	51 (42)	49	115 (76)	131
Oranges	16 (20)	15	19 (17)	22
Fruit juices	8 (21)	8	27 (46)	31
Chips	36 (25)	34	29 (18)	33
Potatoes (other)	123 (69)	117	125 (51)	142
Peas/Beans	43 (23)	41	45 (29)	51
Vegetables (other)	20 (18)	19	21 (19)	24
Fresh meat	35 (21)	33	40 (20)	45
Processed meat	40 (24)	38	28 (16)	32

Table 5.7

Mean daily intakes of some nutrients in children aged 11 - 17.9 years

	Boys (n = 16)		Girls (n = 11)	
	Mean	(SD)	Mean	(SD)
Energy (MJ)	13.4	(3.9)	10.0	(1.6)
% Energy, Fat	35.3	(3.8)	37.0	(3.0)
% Energy, Carbohydrate	52.5	(4.4)	50.5	(3.8)
% Energy, Protein	12.2	(1.4)	12.5	(1.2)

Nutrients	Absolute Intakes			Absolute Intakes		
	Mean	(SD)	Intakes/10 MJ	Mean	(SD)	Intakes/10 MJ
Sugars (g)	140	(75)	104	124	(57)	124
Fibre (g)	23	(7)	17	16	(4)	16
Calcium (mg)	1416	(540)	1057	1144	(279)	1144
Iron (mg)	14.1	(3.3)	10.5	10.1	(1.8)	10.1
Zinc (mg)	12.0	(3.9)	9.0	9.1	(1.5)	9.1
Vitamin A (μ g RE)	835	(327)	623	1128	(940)	1128
Vitamin C (mg)	55.9	(24.8)	41.7	45.3	(23.5)	45.3
Vitamin B ₆ (mg)	1.4	(0.4)	1.0	1.1	(0.2)	1.1
Folate (μ g)	209	(47)	156	159	(36)	159

Table 5.8

Mean daily intakes of selected foods in children aged 11 - 17.9 years

Foods (Grams)	Boys (n = 16)		Girls (n = 11)	
	Mean (SD)	Intakes/10 MJ	Mean (SD)	Intakes/10 MJ
Bread	307 (121)	229	178 (65)	178
Milk	592 (275)	442	527 (219)	527
Cheese	13 (22)	10	11 (8)	11
Butter	37 (30)	28	20 (17)	20
Margarine	7 (16)	5	5 (12)	5
Breakfast cereals	36 (17)	27	22 (10)	22
Table sugar	42 (35)	31	46 (49)	46
Cakes/Biscuits	47 (35)	35	27 (26)	27
Sweets/Chocolates	66 (49)	49	61 (34)	61
Soft Drinks	104 (108)	78	90 (120)	90
Fish	10 (11)	7	5 (6)	5
Eggs	26 (20)	19	25 (16)	25
Fruits (except oranges)	43 (40)	32	41 (35)	41
Oranges	16 (28)	12	14 (18)	14
Fruit juices	7 (20)	5	2 (4)	2
Chips	58 (27)	43	41 (30)	41
Potatoes (other)	187 (60)	140	97 (39)	97
Peas/Beans	63 (54)	47	36 (30)	36
Vegetables (other)	24 (23)	18	44 (59)	44
Fresh meat	53 (27)	40	50 (20)	50
Processed meat	59 (39)	44	43 (22)	43

Table 5.9

Percentages of children less than 18 years with various levels of vitamin C intakes

Group	n	% with intakes ≤ the RDA	% with intakes ≤ 75% RDA	% with intakes ≤ 50% RDA
Boys aged 1.0 - 3.9 years (RDA = 45 mg)	14	86	50	7
Girls aged 1.0 - 3.9 years (RDA = 45 mg)	10	90	70	30
Boys aged 4.0 - 6.9 years (RDA = 45 mg)	9	55	11	0
Girls aged 4.0 - 6.9 years (RDA = 45 mg)	11	91	55	18
Boys aged 7.0 - 10.9 years (RDA = 45 mg)	25	44	24	12
Girls aged 7.0 - 10.9 years (RDA = 45 mg)	22	45	14	5
Boys aged 11.0 - 17.9 years (RDA = 55 mg)	16	50	31	0
Girls aged 11.0 - 17.9 years (RDA = 55 mg)	11	82	55	9

Table 5.10

Percentages of children less than 18 years with various levels of iron intakes

Group	n	% with intakes ≤ the RDA	% with intakes ≤ 75% RDA	% with intakes ≤ 50% RDA
Boys aged 1.0 - 3.9 years (RDA = 8 mg)	14	71	36	0
Girls aged 1.0 - 3.9 years (RDA = 8 mg)	10	80	50	10
Boys aged 4.0 - 6.9 years (RDA = 9 mg)	9	55	0	0
Girls aged 4.0 - 6.9 years (RDA = 9 mg)	11	82	11	0
Boys aged 7.0 - 10.9 years (RDA = 10 mg)	25	44	12	0
Girls aged 7.0 - 10.9 years (RDA = 10 mg)	22	77	18	0
Boys aged 11.0 - 17.9 years (RDA = 13.5 mg)	16	44	6	0
Girls aged 11.0 - 17.9 years (RDA = 14 mg)	11	100	45	0

Table 5.11

Mean daily intakes of some nutrients in children aged 1 - 3.9 years from different family sizes

Nutrient	Two parent families with 1 or 2 children < 18 yrs (n = 12)		Two parent families with 3 or more children (n = 6)	
	Mean (SD)	Intakes/10 MJ	Mean (SD)	Intakes/10 MJ
Energy (MJ)	6.5 (1.1)		6.0 (1.1)	
Fibre (g)	11.8 (4.9)	18.2	9.5 (2.9)	15.8
Fat (g)	66.6 (13.0)	102	57.0 (9.2)	95
Sugars (g)	63.1 (25.4)	97	72.2 (23.5)	120
Iron (mg)	6.9 (2.0)	10.6	5.8 (1.7)	9.7
Vit C (mg)	33.7 (10.1)	51.8	26.3 (9.4)	43.8

Table 5.12

Mean daily intakes of some nutrients in children aged 4 - 6.9 years from different family sizes

Nutrient	Two Parent Families with 1 or 2 children < 18 years (n = 5)		Two Parent Families with 3 or more children < 18 years (n = 11)	
	Mean (SD)	Intakes/10 MJ	Mean (SD)	Intakes/10 MJ
Energy (MJ)	9.0 (1.4)		8.2 (2.2)	
Fibre (g)	18.1 (4.7)	20.1	15.0 (5.8)	18.3
Fat (g)	93.1 (15.9)	103	74.7 (21.7)	91.1
Sugars (g)	90.4 (29.4)	100	91.9 (31.3)	112
Iron (mg)	9.6 (2.3)	10.7	8.5 (2.7)	10.4
Vit C (mg)	57.9 (21.1)	64.3	38.1 (28.0)	46.5

Table 5.13

Mean daily intakes of some nutrients in children aged 7 - 10.9 years from different family sizes

Nutrient	Two Parent Families with 1 or 2 children < 18 years (n = 7)		Two Parent Families with 3 or more children < 18 years (n = 30)	
	Mean (SD)	Intakes/10 MJ	Mean (SD)	Intakes/10 MJ
Energy (MJ)	10.3 (2.0)		9.8 (2.1)	
Fibre (g)	19.1 (4.8)	18.5	17.6 (3.6)	18.0
Fat (g)	104.8 (26.2)	101.7	88 (22)	90
Sugars (g)	114.8 (39.2)	111.5	113 (39)	115
Iron (mg)	10.4 (2.5)	10.1	9.8 (2.0)	10
Vit C (mg)	52.2 (23.7)	50.7	49.4 (28.2)	50.4

6. DISCUSSION.

6.1 Introduction:

Social disadvantage is one of the most persistent risk factors for ill health in terms of both morbidity and mortality at all ages (Syme and Berkman, 1976; Morris, 1979; Holme et al, 1980; DHSS, 1980). Data presented in 'The Black Report' (DHSS, 1980) provide startling evidence of the social inequalities in health in Britain. "At birth and in the first month of life, twice as many babies of 'unskilled manual' parents (class V) die as do babies of professional class parents (class I) and in the next 11 months four times as many girls and five times as many boys. In later childhood, the ratio of deaths in class V to deaths in class I falls to 1.5 to 2.0 but increases again in early adult life before falling again in middle and old age. A class gradient can be observed for most causes of death which is particularly steep in the case of diseases of the respiratory system". (DHSS, 1980). The Black Report also highlighted the fact that despite general improvements in living conditions throughout the 1960s and early 1970s the gap between the social classes in the rate of mortality actually increased.

While the gradient in health associated with socio-economic position is caused by a number of complex variables, certain factors associated with increased risk of ill health have been identified and are amenable to change through preventive health programmes. In particular, improvements in dietary habits and a reduction in smoking may contribute to a reduction in the incidence of, for example, coronary heart disease, respiratory infections and cancer and may help redress the balance between the social classes in the rate of mortality and morbidity. This study has provided the information necessary to develop a set of guidelines for a healthy diet which take into account the current eating habits of a community living on a very low income.

6.2 General Observations:

The most striking features of the study group were the low self esteem of the unemployed and their families and the feeling of despair in both the unemployed and employed. All were under severe financial pressure but this was especially true for larger families. While fathers who were employed maintained a certain amount of self respect, their incomes were

only marginally above those of the unemployed and this led to discontentment and resentment. Many families also expressed resentment at the social welfare benefits being provided for unmarried mothers and deserted wives. They felt that they were being penalised for being married. Because of the demands of personal family problems little attention was given to creating a community atmosphere and as a result many families felt isolated.

The low alcohol consumption among these families was noteworthy in the light of the popular misconception that a lot of the poverty in disadvantaged areas is caused by excessive drinking. Most of the family income was spent on food and necessities for the children who were unquestionably the main focus of attention. Parents seemed to be prepared to make any sacrifice necessary to see that the children were not 'short' of anything. Often, however, this meant severe hardship particularly for the mother who usually went without herself.

The high incidence of smoking was very worrying (71% of males and 64% of females). A few women gave weight control as their reason for smoking but the majority of people said that cigarettes kept them from 'cracking up' and was their only form of relaxation. There seemed to be an awareness, though not a full appreciation, of the health hazards of smoking but most felt that it was worth the risk as they could not survive the pressures of life without a smoke. Some passed the comment that it was a case of "either cigarettes or Valium" and the former was more acceptable to them.

Only one family had had their electricity supply cut off during the previous year because they failed to pay their bill. This is because of the system in operation whereby, if a good enough case can be made, the Community Welfare Officer from the Eastern Health Board (commonly known as "The Relieving Officer") will pay up to half the amount due. Forty-two percent of families where the head of the household was unemployed availed of this facility during the year prior to the study. The balance of the electricity bill was usually made up with monies from the children's allowance.

Larger families (with three or more children) where the head of the household was unemployed seemed to be the ones suffering most through lack

of money. These were the families who most often needed help with their electricity bill or help from the St. Vincent de Paul and this constant pleading for financial assistance left them feeling very degraded.

6.3 Eating Habits:

The range of foods consumed was very limited and there was little variation in the types of food eaten from week to week. The main factors affecting food choices were cost, ease of preparation and convenience of transportation and storage. A wider variety of foods was consumed just after pay day when the bulk of the shopping was done but the choice diminished towards the end of the week when meals were made up from whatever was left in the house.

Diets were characterised by high consumption of milk, bread and potatoes and a low consumption of fresh fruit and vegetables. Economics clearly played a role in the types of meat consumed which were of the cheapest variety, eg poor quality beef, mince, sausages, frozen beefburgers, chicken and bacon. Fresh fish was seldom eaten though fish fingers were widely used.

Bread and milk were usually bought on a daily basis from the local supermarket, small shop or van. Sometimes these were bought 'on account' and the bill paid at the end of the week. This ensured at least a supply of these foods on the days just before pay day, when money had often run out. Most of the 48% of families who had milk delivered daily, supplemented this regularly with milk bought from the local shops. Potatoes which were eaten at least once a day were usually bought in 4 stone bags.

Tinned peas and beans were the most commonly used vegetable but carrots were also regularly eaten in stews. Fresh fruit was considered a luxury; a bag of 10 apples or oranges was the usually weekly purchase of fruit whatever the family size. This probably accounts for the relatively lower vitamin C intakes in larger families. Bananas were sometimes given at tea time on sandwiches. Children consumed a lot of breakfast cereals, mostly Cornflakes, Rice Krispies or Weetabix, often in the evening time as well as for breakfast.

During the week meal patterns depended on whether the head of the household was employed or unemployed. In families where the father was unemployed, meal patterns revolved around school hours. The children's breakfasts were taken early and usually consisted of cereals, tea and toast. Parents often did not eat at this time but waited until the children had gone to school. In some cases fathers who had no reason to get up did not have their first meal until after 12 o'clock. Children took a packed lunch to school, usually a sandwich of cheese or jam, and or a small chocolate biscuit or bar. The uptake of free milk at school was somewhat better than that of the sandwiches which most of the children said they did not like. The main meal of the day was usually at about 3.30 pm when the children came in from school with tea or supper at about 7.00 pm. The main difference in eating patterns in families where the father was employed was that he ate breakfast early and the main meal was taken in the evening time when the father came in from work.

At the week-ends meal patterns varied considerably from the rest of the week. Breakfast was usually much later and often consisted of a fry or grill. On Saturday, the main meal was usually eaten in the evening time and on Sunday, it was in the middle of the day.

6.4 Nutrient Intakes:

Comparison with findings in other studies: Adult males and females:

The average daily intakes of selected nutrients in adult males and females in the present study are compared with similar data from other studies in Tables 6.1 and 6.2. Differences seen here in energy intakes may be due to real differences in the amounts of food eaten by the various groups studied but they may also be due to the use of different dietary assessment methods. The diet history method used in the present study has generally been found to give higher mean values than the 7-day weighed intake method (Jain et al, 1980). It has not been established, however, which method gives the more accurate assessment of actual habitual dietary intakes. The choice of methodology is largely dictated by resources and by the group under study. On both accounts the diet history was preferred for the present study.

In general energy intakes of adult males and females in the present study are in agreement with those recorded in the Kilkenny, Orkney Islands,

Moorepark and Netherlands studies. For males, protein and fat intakes were also similar in these groups but females in the present study consumed less protein and fat than their counterparts in the other groups. Nevertheless fat still contributed 37% to dietary energy in females which is above the recommended figure of 35%. Carbohydrate intakes were higher in both males and females in the present study than in any of the other studies.

With the exception of males in the Netherlands, mean fibre intakes in all study groups were well below the minimum level of 25 g/day suggested by the Food Advisory Committee (1988). Fibre intakes in general were lower in women than in men being lowest in women in the present study. Males and females in the present study also had very low vitamin C intakes in comparison with a number of other studies and here again, females appeared to be worst.

Iron intakes were considerably lower in females in the present study than in any of the other groups. A recent study carried out by the Ministry of Agriculture, Fisheries and Food (Barber et al, 1985) also recorded very low iron intakes in a nationally representative sample of British women aged 15 - 25 years. The mean daily iron intake for the total sample of 461 women was 8.7 mg and in the lower social classes, the average intake was even lower at 7.9 mg. As in the present study iron intakes were found to be related to energy intakes and those at the highest risk of iron deficiency were women who were "on a diet" or "watching their weight". In the MAFF study energy intakes were lower than those recorded in the present study (7.5 MJ vs 8.1 MJ). However, the iron concentration of the diets was higher (11.5 mg/10 MJ vs 9.5 mg/10 MJ).

In summary, comparisons with findings from a number of other studies show that for males in the present study, the problems of high fat and low fibre intakes are similar to those seen in other groups but in contrast to many of the other comparable groups, vitamin C intakes were also low. In the case of women, the serious problems of low fibre, iron and vitamin C intakes which were identified in the present study are emphasised by the fact that intakes of these nutrients were lower than those recorded in most of the other studies.

Comparison with findings of other studies: Children under 18 years:

Energy, iron and vitamin C intakes of children in the present study are compared with similar data from other studies in Table 6.3. To facilitate comparisons between groups where energy intakes varied considerably, iron and vitamin C intakes are expressed in terms of intakes per 10 MJ of energy.

In general energy intakes of children in the present study were higher than those recorded in other studies. In some instances this may be partly due to differences in age distributions of the children within the various groups studied but it is more likely to be due to the use of different dietary assessment methods. As mentioned earlier, the Dietary History method was used in the present study whereas most other studies used the Weighed Intake Method over periods of 3 to 7 days. It is interesting to note that in a study in France where the Dietary History was also used (Rolland-Cachera and Bellisle, 1986) energy intakes were similar to those recorded in the present study.

Comparison of data for iron and vitamin C intakes show that while iron intakes per 10 MJ of energy in the present study were only slightly lower than those recorded in other studies, vitamin C intakes were considerably lower and actually deteriorated as the children got older. The iron densities of the diets in the present study remained remarkably similar in each age group. However, because of the increased demands of menstruating girls their intake should in fact have increased.

Many authors have questioned the usefulness of using the RDA as an indicator in assessing nutritional inadequacies in populations given that appreciable numbers of individuals have intakes below the RDA in the absence of clinical signs of malnutrition (Darke et al, 1980). However, it should be pointed out that iron and vitamin C intakes in the present study were lower than those recorded in most other study groups and were well below the RDA, particularly in adolescent girls.

Table 6.1

Comparison of average daily intakes of selected nutrients in adult males in the present study with similar data from other studies.

	Present Study 1988	Moloney 1988	Connolly 1980	Barker 1988	Bingham 1981	Barber 1986	Fehily 1984	Dutch National Food Survey 1988
Location	Dublin	Kilkenny	Moorepark	N Ireland	Cambridge	Orkneys	Caerphilly	Netherlands
Nutrient intakes								
Energy (MJ)	13.1	12.5	11.8	10.6	10.0	13.0	10.1	11.9
Protein (g)	100	107	112	85	77	107	83	91
Fat (g)	128	119	131	109	104	140	100	128
% Fat energy	38	38	42	39	39	41	37	40
Carbohydrate (g)	409	344	316	292	285	349	277	294
Fibre (g)	22	21	23	22	-	22	18	27
Iron (mg)	13.5	13.1	14.8	14.2	13.0	15.3	12.7	13.8
Vitamin C (mg)	60	89	96	-	70	57	48	74

Table 6.2

Comparison of average daily intakes of selected nutrients in adult females in the present study with similar data from other studies.

	Present Study 1988	Moloney 1988	Connolly 1980	Barker 1988	Bingham 1981	Barber 1986	Fehily 1986	Dutch National Food Survey 1988
Location	Dublin	Kilkenny	Moorepark	N Ireland	Cambridge	Orkneys	Caerphilly	Netherlands
Nutrient intakes								
Energy (MJ)	8.5	8.4	9.2	7.1	8.2	8.3	6.7	8.8
Protein (g)	64	77	83	60	67	73	58	72
Fat (g)	81	87	104	76	90	92	73	98
% Fat energy	37	40	43	41	41	42	41	41
Carbohydrate (g)	275	232	249	199	229	223	182	220
Fibre (g)	14	15	19	16	-	15	15	21
Iron (mg)	8.1	10.3	12.1	10.5	12.3	10.9	10.0	11.5
Vitamin C (mg)	45	73	72	-	75	45	46	71

Table 6.3

Comparison of Energy, Iron and Vitamin C Intakes in Children in the Present Study with those in Other Studies.

Study	Location	Age Group years	Sex	Numbers	Energy MJ/day	Iron mg/10 MJ	Vitamin mg/10 M
Present Study	Dublin	1 - 4	B+G	24	6.7	10.4	54
Lee (1988)		2 - 4	B+G	104	5.3	11.3	62
"	"	3 - 5	B+G	104	5.9	11.9	53
Dutch National Food Survey (1988)	Netherlands	1 - 3	B+G	231	5.8	10.2	118
Darke et al (1980)	Newcastle- upon-Tyne	2 - 3	B	206	5.7	11.9	63
"		2 - 3	G	201	5.4	11.9	72
Present Study	Dublin	4 - 7	B	9	9.3	10.5	54
"	"	4 - 7	G	11	7.8	10.1	46
Black et al (1976)	UK	5	B+G	26	6.7	11.9	80
Dutch National Food Survey (1988)	Netherlands	4 - 6	B+G	254	7.2	10.3	82
Connolly et al (1980)	Co Cork	3 - 9	B	34	8.1	10.4	62
"	"	3 - 9	G	22	7.6	11.0	61
Present Study (1988)	Dublin	7 - 11	B	25	10.5	10.1	44
"	"	7 - 11	G	22	8.8	10.3	62
Dutch National Food Survey (1988)	Netherlands	7 - 9	B+G	246	8.2	10.5	70
Rolland-Cachera & Bellisle (1986)	France	7 - 12	B+G	333	9.7	-	-
Present Study (1988)	Dublin	11 - 18	B	16	13.4	10.5	42
"	"	11 - 18	G	11	10.0	10.1	45
Dutch National Food Survey (1988)	Netherlands	10 - 15	B	294	10.6	10.4	56
"	"	16 - 21	B	312	12.7	10.4	56
"	"	10 - 15	G	275	9.5	10.7	64
"	"	16 - 21	G	325	9.2	11.6	82
Darke et al (1980)	Newcastle- upon-Tyne	14 - 15	B	92	11.2	12.0	52
"		14 - 15	G	85	8.6	11.6	55
Durnin et al (1974)	UK	15	B	198	10.9	12.8	-
"	UK	15	G	221	8.5	13.0	-
Connolly et al (1980)	Co Cork	10 - 19	B	28	12.8	11.2	54
"	"	10 - 19	G	26	8.4	12.1	63

6.5 SUGGESTIONS FOR IMPROVING DIETARY INTAKES:

Reducing fat intakes:

Meat and dairy products are usually the foods targeted when attempting to lower fat intake. However, considering the value of meat as a source of high quality iron, the low iron density of diets in general and the very low iron intakes recorded in females, a reduction of meat consumption is not desirable. Replacing poor quality meat with lean red meat might be suggested but the impracticality of this recommendation for families on a limited income is fully appreciated. An examination of the food intakes of high and low fat consumers showed that between 57% and 65% of the difference in fat intakes between the upper and lower quartiles was due to differences in butter consumption. Thus a reduction in butter consumption is highly desirable. This could be achieved by spreading butter more thinly on bread or by changing to a low fat spread. Many of the high fat eaters were in the habit of using butter as a garnish on their otherwise bland dinner and this habit should also be discouraged. It is surprising to find that none of the families in this study used low fat milk on a regular basis. Intakes of milk were very high in the present study which would greatly contribute to adequate intakes of many nutrients such as calcium, high quality proteins and many fat and water soluble vitamins. Whilst the high intake of milk may have contributed to the high overall fat intake, milk consumption did not differ between high and low fat eaters. Any nutrition education campaign which caused milk consumption to fall would be counterproductive.

Increasing fibre intakes:

Adults with relatively high fibre intakes in this study consumed more bread, breakfast cereals, fruits, peas and beans, vegetables and, in the case of women, more potatoes than those with lower fibre intakes. Therefore, low fibre eaters could improve their fibre intakes by consuming more of these foods. The consumption of brown or wholemeal bread was very low in the study group as a whole. This is probably largely due to the relatively higher cost of these breads. The white sliced pan which is most widely used is the cheapest sliced bread available. In order to affect any appreciable change in the type of bread consumed, the cost of high fibre breads available in local stores may have to be brought in line with the white bread.

Increasing iron intakes:

Iron intakes were generally found to be related to energy intakes. Thus, for men who consumed more food than women, the family diet was rich enough in iron to supply their requirements. On the other hand, women who ate considerably less and whose iron requirements are in fact higher than men failed to receive their recommended dietary allowance. Women who were particularly vulnerable were those on very low energy diets and women in single parent families for whom the problem of low food intake was compounded by a relatively lower consumption of meat per unit energy intakes.

The low energy and iron intakes in women in single parent families did not appear to be related to income since their income and food expenditure per diet head was no different from the total sample of women. It may have been that because these women were not catering for husbands they did not bother to sit down to a main meal but concentrated on feeding the children and only picked at food themselves. Only one out of the eleven women in this subgroup admitted to being on a weight reducing diet. Clearly, their very low energy intakes highlight the social nature of eating and highlight how social or geographic isolation contribute to poor nutrition.

In general improvements in iron intakes in women in the present study could be achieved if they consumed more food. However, in order to reach the recommended dietary allowance a better quality diet, including for example more red meat or liver, would also be necessary. Some consideration could be given to the possibility of fortifying Irish flour with iron as is the practice in the UK. Also, bearing in mind the importance of vitamin C in the absorption of dietary iron, consumption of foods rich in vitamin C should also be increased.

Increasing vitamin C intakes:

Vitamin C intakes were low in all age groups studied indicating that the family diet did not include enough foods containing this vitamin. In order to improve vitamin C intakes consumption of such foods as fresh fruit and vegetables need to be increased. For families who travel once a week, usually on the bus, to a large supermarket to buy their groceries carrying

large quantities of bulky perishable goods, such as fruit and vegetables, is difficult and as most of the money available for food is spent on this one shopping spree, there is seldom any money left to buy more fruit or vegetables locally during the week. However, lack of nutritional awareness is also an important factor in the low vitamin C intakes and education is needed in this area. Families should be encouraged to put aside some money and buy at least one extra bag of oranges during the week or to buy a carton of pure fruit juice instead of the fizzy drinks which are usually purchased from dealers who call to the door offering three or four bottles for a IR£1.

6.6 SUMMARY OF DIETARY FINDINGS:

- (1) Fat intakes in adult males and females exceeded the recommended value of 35% of energy.
- (2) Fibre intakes for adults of both sexes were below the recommended minimum 25 g per day but were particularly low in women (14 g/day).
- (3) Iron intakes in adult females and adolescent girls were very low. Many children, especially girls, also had iron intakes below their recommended dietary allowance.
- (4) Vitamin C intakes were low in women and children and although intakes in males were in line with the recommended dietary allowance they were low in comparison with those found in other studies.
- (5) Those found to be at the highest risk of nutritional inadequacy were women in general and in particular women in single parent families.

6.7 SUMMARY OF DIETARY RECOMMENDATIONS AND SUGGESTED DIETARY CHANGES:

RECOMMENDATION	TARGET GROUP*	SUGGESTED DIETARY CHANGE
Reduce fat intakes	Adult males Adult females	Lower butter consumption by spreading less on bread or by replacing it with a low fat spread. Do not use butter as a garnish.
Increase fibre intake	Adult females Adult males	Eat more fruit, vegetables, peas, beans and high fibre breakfast cereals. Females should eat more potatoes Eat more high fibre breads.
Increase iron intake	Adult females Adolescent girls Young children	Eat more lean red meat or liver.
Increase vitamin C intake	Adult females All children Adult males	Eat more fresh fruit and vegetables. Replace fizzy drinks with pure fruit juices.

* Within each section target groups are list^{ed} in order of priority.

6.8 GENERAL RECOMMENDATIONS FOR WEST TALLAGHT:

- (1) The findings of the present study should form the basis of a nutrition component of a health education programme. This programme should target smoking, diet, screening, stress and environmental aspects of health. It should involve the employment of a health education officer and a community dietitian who would work with existing health structures (clinics, public health nurses, general practitioners) and with community groups, trade unions, credit unions, sport clubs etc. In particular, women's groups should be given immediate access to detailed diet counselling. Both the present Government and its predecessor are of the view that health care should be increasingly community based. Accordingly money should be made available for community dietitians. Equally, community groups should seek support from organisations like the Irish Heart Foundation and the Irish Cancer Society to fund a health education officer and dietitian even on a two year trial.

- (2) Social Welfare payments are generally paid on the basis of a minimum personal rate for the parents and, for example, in the case of the short term unemployed in receipt of Unemployment Assistance, increments of £9.50 for each of the first two children and £8.00 for each subsequent child. No account is taken of age. However, as children grow older, their energy intakes rise as is clearly seen in the present study. This increased demand for food is not taken into account in vising social welfare payments. Thus a large family with, for example, several children over ten years of age are disadvantaged relative to a family with several young children. Some analysis should be undertaken by the Department of Social Welfare to establish the costs of providing adequate money for a healthy diet. For example the results of the present study show that each 1 MJ of dietary energy costs £0.161 in expenditure on food. (We do not know the current average national cost of 1 MJ of dietary energy but it is likely to be higher than this). Even at this low level, the weekly costs of meeting a 12 year old's dietary needs (£11.27 i.e. 10 MJ x 7 at £0.161/MJ) actually exceed the full financial allotment to the child (£8 - £9.50). The deficit is made up by surpluses from the parental allowance or from the surplus accruing to young children when energy needs are low. This necessarily disadvantages these families in other respects e.g. clothing, fuel, schooling, recreation etc. This

study cannot adequately resolve this problem. It simply highlights an apparent penalty against larger families with several older children as compared with the same size family where the children are younger.

- (3) Having identified widespread inadequate intakes of iron among women, some community based programme to establish the true incidence of clinical anaemia should be urgently undertaken by the Eastern Health Board.

REFERENCES:

- Barber, S.A., Bull, N.L. and Buss, D.H. (1985) Low iron intakes among young women in Britain. *Br. Med. Journal* Vol. 290, 743-744.
- Barber, S.A., Bull, N.L. and Cameron, A.M. (1986) A dietary survey of an isolated population in the U.K.: the islanders of Orkney. *Hum. Nutr.: Applied Nutr.* 46A No. 6, 462-469.
- Barker, M.E., McClean, F.I., McKenna, P.G., Reid, N.G., Strain, J.J., Thompson, K.A., Williamson, A.P. and Wright, M.E. (1989) Diet, lifestyle and health in Northern Ireland: A report to the Health Promotion Research Trust. U.U. and H.P.R.T. Publishers, Belfast.
- Bassham, S. and Fletcher, L.R. (1985) Calculation of nutrient intake by microcomputer. *Proceedings of the Nutrition Society* 44, 36A.
- Bingham, S., McNeil, N.I. and Cummings, J.H. (1981) The diet of individuals: a study of a randomly-chosen, cross-section of British adults in a Cambridgeshire village. *Br. J. Nutr.* 45, 23-35.
- Black, A.E., Billewicz, W.Z. and Thompson, A.M. (1976) The diets of pre-school children in Newcasatle-upon-Tyne 1968 - 1971. *Br. J. Nutr.* 35, 105-113.
- Cameron, S. and Van Staivaeren, W. (1988) *Dietary Intake Methodology*. Oxford University Press.
- Codan (1987) County of Dublin areas of need. Interim report November 1987. SUS Reserch, Dublin County Council.
- Connolly, J.F., Kevany, J.P., Brady, L.B., Stewart, D. and Harrington, D. (1980) Dietary, biochemical and anthropometric effects of dairy products on selected family groups. *Ir. J. Sci. Technol.* 4, 143-172.
- Darke, S.J., Disselduff, M.M. and Try, G.P. (1980) Frequency distributions of mean daily intakes of food energy and selected nutrients obtained during nutrition surveys of different groups of people in Great Britain between 1968 and 1971. *Br. J. Nutr.* 44, 243-252.

DHSS (1980) Department of Health and Social Security. Inequalities in health. Report of a Research Working Group.

Downey, G. (1983) The composition of bakers' white flour and white pan bread produced in the Republic of Ireland: A 2-year survey. Ir. J. Fd. Sci. Technol. 7(2), 91-104.

Downey, G. (1988) Proximate analysis of a selection of brown breads commercially produced in the Republic of Ireland (In press).

Durnin, J.V.G.A., Lonergan, M.E., Good, J. and Ewan, A. (1974) A cross sectional nutritional and anthropometric study with an interval of 7 years on 611 young adolescent schoolchildren. Br. J. Nutr. Vol. 32 No. 1, 169-179.

Dutch National Food Survey (1988) Centrale Directie Voorlichting, Documentatie en Bibliotheek van het ministerie van Welzijn, Volksgezondheid en Cultuur. Rijswijk.

Fehily, A.M. and Bird, G. (1986) The dietary intakes of women in Caerphilly, South Wales: a weighed and photographic method compared. Hum. Nutr: Appl. Nutr. Vol. 40A No. 4, 300 - 307.

Fehily, A.M., Phillips, K.M. and Sweetman, P.M. (1984) A weighed dietary survey of men in Caerphilly, South Wales. Hum. Nutr.: App. Nutr. 38A No. 4, 270-276.

Food Advisory Committee (1984) Guidelines for preparing information and advice to the general public on healthy eating. Dublin: Department of Health, Public Health Division.

Gibney, M.J., Moloney, M. and Shelley, E. (1989) The Kilkenny Health Project: Food and nutrient intakes in a randomly selected group of healthy adults. Br. J. Nutr. (In press).

Holme, I., Helgeland, A., Hjermann, I., Laren, P. and Lund-Larsen, P.G. (1980) Four-year mortality by some socio-economic indicators: the Oslo Study. J. Epidemiology. Community Health 34, 48-52.

- Kevany, J. (1983) Recommended dietary allowances. Personal Communication. Human Nutrition Unit, Trinity College Dublin. Also published by the Health Education Bureau, Dublin.
- Lee, P. (1988) Nutrition intervention in pre-school children. Ph.D. Thesis, Trinity College Dublin.
- McNulty, H., McPartlin, J.M., Weir, D.G. and Scott, J.M. (1987) Folate catabolism in normal subjects. *Human Nutr.: Appl. Nutr.* 41A, 338-341.
- Moloney, M. (1988) Food and nutrient intakes in a randomly selected group of healthy adults in the Kilkenny Health Project. M.Sc. Thesis. Trinity College Dublin.
- Morris, J.N. (1979) Social inequalities undiminished. *Lancet* i, 87-90.
- Paul, A. and Southgate, D.A.T. (1978) McCance and Widdowson's *The Composition of Foods*. 4th edition. H.M.S.O. London.
- Poh Tan, S., Wenlock, R.W. and Buss, D.H. (1984) Folic acid content of the diet in various types of British households. *Human nutrition: Appl. Nutr.* 38A, 17-22.
- Rolland-Cachera, M.F. and Bellisle, F. (1986) No correlation between adiposity and food intake: why are working class children fatter? 779-787.
- Solomons, N.W. (1982) Biological availability of zinc in humans. *Am. J. Clin. Nutr.* 35, 1048-1075.
- Syme, S.L. and Berkman, L.F. (1976) Social class, susceptibility and sickness. *Am. J. Epidemiol.* 104, 1-8.

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Division of Nutritional Sciences
DEPARTMENT OF CLINICAL MEDICINE
MEDICAL SCHOOL BUILDING
ST. JAMES'S HOSPITAL
JAMES'S STREET
DUBLIN 8

5th November 1987.

Dear Householder,

In connection with the West Tallaght Resource Centre, Trinity College is carrying out a study of the dietary habits of families living in the West Tallaght Area. Your household has been chosen at random from the Electoral Register to be included in the study and we would very much appreciate it if you would take part. It will involve answering questions about what individuals in the family would usually eat in an average week and how well or difficult you find it to manage, with the income available to you, to purchase food for the family. All families who participate in the study will receive £20.

The information collected will be strictly confidential and will be retained by Trinity College. No Government Agency will have access to information on individual families. Your help with this study is very important and will be much appreciated.

Our researcher, Pauline Lee, will be in your area over the next few weeks and will call and see you.

Yours sincerely,

Michael J. Gibney,
Senior Lecturer in Nutrition.

APPENDIX 2.

FAMILY CODE NUMBER

--	--

Q 1a Number of children in family

114

Q 1b No. of adults (18) in family

Q 2a Do you have a car? Yes No
1 2

Q 2b	Use of a car?	Yes	No
		1	2

Shopping

Q 3a	Where do you usually shop?	Specify (i).....Code 1/8	NA	9
		(ii)....."	NA	9
		(iii)....."	NA	9
		(iv)....."	NA	9

Q 3b How often do you shop in local shops? Specify Code 1/8 NA 9

Q 3c How often do you shop in larger supermarkets?Code 1/8 NA 9

Q 4a Do you have milk delivered? Yes No
1 2

Q 4b IF YES How often? Specify..... Code 1/8 NA 9

Q 4c How much per week would this milk bill come to? £

--	--	--	--

 NA 9999

Q 4d Are you entitled to have free milk? Yes No
1 2

Q 4e IF YES How much per week? Specify.....Pints
Code 1/8Litres

Q 5a Do you have bread delivered? Yes No
1 2

Q 5b IF YES How often? Specify Code 1/8 NA 9

Q 5c How much does this bread bill come to every week? £

--	--	--	--

 NA 9999

Q 6a Do you have vegetables delivered? Yes No
1 2

Q 6b IF YES How often? Specify..... Code 1/8 NA 9

Q 6c How much does vegetable bill come to every week? £

Q 7a Do you have meat delivered? Yes No
1 2

Q 7b IF YES How often? Specify.....Code 1/8 NA 9

Q 7c How much does this meat bill come to every week? £ 12.00 YA 9559

Q 8 How much on average do you spend on food per week?

Less than £15
01

E15-E20
02

E20-E30
03

£30-£40
04

E40-E50
05

E50-E60
06

E60-E70
07

£70-£80
08

E80-E90
09

more than £90
10

Q 9a On your cooker do you have
 (i) A grill that works (ii) An oven that works (iii) 4 plates that work
 0 or 1 0 or 2 0 or 3
 (iv) 3 plates that work (v) 2 plates that work (vi) 1 plate that works
 0 or 4 0 or 5 0 or 6

Q 9b Do you have a fridge? Yes No
 1 2

Q 9c Do you have any other electrical appliances in the kitchen? Yes No
 1 2

Q 9d IF YES Specify(i)..... Code 1/8 NA 9
 (ii).....Code 1/8 NA 9
 (iii).....Code 1/8 NA 9
 (iv).....Code 1/8 NA 9

Q 9e Has your ESB been cut off at any stage over the past year? Yes No
 1 2

Q 9f IF YES (i) How often? Specify..... Code 1/8 NA 9
 (ii) For how long? Specify.....Code 1/8 NA 9

Q 9g Have you needed assistance to pay ESB bills over the past year? Yes No
 1 2

Q 9h IF YES (i) How often? Specify.....Code 1/8 NA 9
 (ii) From whom? Specify(i).....Code 1/8 NA 9
 (ii).....Code 1/8 NA 9
 (iii).....Code 1/8 NA 9

Family Income

Q 10a Main Source?

Employed 01	Unemployment Assist. 02	Unemp. Ben. 03	Unmarried M. Allow 04
Deserted W. Allow 05	Disability Ben 06	Widows Pension 07	
Separate payments 08	Suppl. Welfare Allow 09	Other Specify.....	Code 10/19

Q 10b If on social welfare For how long? Under 1yr 1-2yr 2-3yr over 3 yr
 1 2 3 4 NA 9

Q 10c Other sources of income? Specify(i).....Code 1/8 NA 9
 (ii).....Code 1/8 NA 9
 (iii).....Code 1/8 NA 9

Q 10d Total Family income from all sources per week? (Excl children's allow)
 Less than £60 £60-£99 £100-£149 £150-£199 £200 or over
 1 2 3 4 5

Q 10e Have you needed to look for financial assistance from any source like e.g.
 St Vincent de Paul, money lender etc? Yes No
 1 2

Q 10f IF YES From whom Specify (i)

APPENDIX 5.

Name..... Code Family Code

Q 1 Male Female
1 2

Q 2 Age in years

Q 3 If pre-school attending a playgroup? Yes No
1 2 NA 9

Q 4a School going? Yes No
1 2 NA 9

Q 4b IF NO (i) At what age did you leave school? years NA 999

(ii) Did you sit for an exam before leaving school? Yes No NA 9

If (ii) YES Specify..... Code 1/8 NA 9

Q 5a Are you presently attending a doctor? Yes No
1 2

Q 5b IF YES Specify reason..... Code 1/8 NA 9

Q 5c Are you presently on any medication? Yes No
1 2

Q 5d IF YES Specify.....Code 1/8 NA 9

Q 6a Are you on a special diet? Yes No
1 2

Q 6b IF YES Specify.....Code 1/8 NA 9

Q 6c Was this special diet recommended by
a hospital G.P. Other Specify.....
1 1 Code 1/8 NA 9

Q 7a Have you ever received advice on general eating practices from .
G.P. Clinic T.V. Radio Books/Magazines School
1 2 3 4 5 6

Member of family Other Specify.....Code
7 8 NA 9

Height cms. _____
Weight Kg. _____

Recommended Dietary Allowances

B complex - thiamin, riboflavin, niacin.

Derived from U.K. 1979 recommendations to correspond with energy recommendations. Niacin is expressed in niacin equivalents (mg) which includes the tryptophan contribution (60 mg tryptophan = 1 mg niacin).

Pyridoxine (B6)

Derived from U.S.A. 1980 recommendations. There are no U.K. data for pyridoxine.

Ascorbic Acid

Derived from U.S.A. 1980 recommendations. These were selected on the basis of the physiological criterion of tissue saturation rather than on disease prevention (scurvy). The higher U.S. figure is also appropriate in Ireland where cooking losses may be substantial and where metabolic deauration associated with smoking is probably widespread.

Vitamin B12

Derived from U.S.A. 1980 recommendations. No U.K. recommendation exists.

Folate (total)

Derived from U.K. 1979 recommendations. Information on folate requirements and availability in food is still incomplete. The U.S.A. recommendation of 400 µg was considered unrealistically high for current Irish intakes. Australia and Canada's recommendations of 200 µg were considered too low as cooking losses in Ireland may be substantial.

Vitamin A

Derived from U.K. 1979 recommendations. Expressed in Retinol Equivalents (µg) to include carotene contribution (18 µg β-carotene = 1 µg Retinol/Vitamin A).

Vitamin D

Derived from U.S.A. 1980 recommendations. The more definite, higher U.S. figure was selected because of the low sunlight exposure in Ireland. For the same reason, the higher intake levels for young adults (7.5 µg) were retained through the middle and older age groups, instead of the original U.S.A. recommendation for these age groups of 5 µg.

Vitamin E

Derived from U.S.A. 1980 recommendations. There are no U.K. data for Vitamin E.

Calcium

Derived from U.S. 1980 data. The higher U.S.A. recommendation was preferred because of

- (i) the high proportion of elderly in the population with associated bone disease.
- (ii) the high protein intakes in Ireland associated with increased calcium loss.

Iron

Derived from Canada 1978 recommendations. The U.S.A. recommendation of 18mg for young women was considered unrealistically high for the Irish diet. Other recommendations were considered too low in view of the potential iron deficiency problem in Ireland.

Zinc

Derived from U.S.A. 1980 recommendations. There are no U.K. data for zinc.

Published by the Health Education Bureau,
34 Upper Mount Street, Dublin 2, Telephone 761116.

New Recommended Dietary Allowances

The Food Advisory Committee has devised a set of new Recommended Dietary Allowances (RDAs) and have recently been approved by the Department of Health.

Recommended Dietary Allowances are quantities of nutrients and energy to be consumed on a daily or regular basis for the maintenance of health and the prevention of disease. RDAs are based on available scientific evidence and vary according to specific age and sex groupings. They are recommendations established for healthy population groups and should not be confused with requirements for a specific individual. Such problems as pre-natal, birth, inherited metabolic disorders, infectious and chronic diseases and the use of medications all give specific nutrient needs and require special dietary and therapeutic measures which are not covered by RDAs.

The new RDAs have been devised for use by Irish health and related professionals by taking into account known environmental dietary and morbidity characteristics of Ireland and by considering values of RDAs published in a number of other countries.

RDAs are useful for the following purposes:-

- (i) Assessing the adequacy of dietary intakes of groups of individuals.
- (ii) Planning and procuring food supplies for a number of people.
- (iii) Setting standards for the contribution of specific interventions, e.g. school lunches to provide 33% daily RDA.
- (iv) Preparing nutrition education material, e.g. the number of servings of specific food groups needed to fulfill RDAs.
- (v) Defining the contributions of any given food to daily needs in nutritional labelling.

How RDA's are determined

The determination of RDA's is based on a review of available world literature relating to human requirements. Where sufficient data exists, the standard deviation for requirements is derived and the RDA calculated on the basis of the mean value plus two standard deviations; this should cover the needs of 97.5% of the population in any specific age/sex group. Where insufficient data exists to derive a standard deviation value, an arbitrary percentage safety margin is added to the mean value.

The important exception to this procedure is the energy recommendation. In Ireland, as in other countries with a plentiful food supply and a low frequency of undernutrition, the mean value for energy requirements is used directly as the RDA. Any additional safety margin would further aggravate existing problems of overweight and obesity.

In establishing RDA's for the use of health and related professionals in Ireland, it was decided to select values from a range of tables elaborated by the United Kingdom (1979) the United States of America (1980), Canada (1975) and Australia (1970). To have instituted a review of the same body of scientific information as had already been conducted by these countries, would have been substantially repetitive and unproductive.

It was decided therefore that recommendations would be selected from these tables taking into account known environmental, dietary and morbidity characteristics of Ireland. The basis for making each of the tables is given below. These recommendations will be up-dated periodically on the basis of new scientific information and changing nutrition conditions in Ireland.

Age Ranges

Based on the U.S. classification up to 18 years of age and U.K. from 18 years onwards. These classes were pre-established to correspond with usual public health administration groups e.g. pre-school, primary, secondary school, etc.

Weight and Height

Mean values for each age/sex group are from U.S. reference data. The U.K. does not provide body mass or height data and these are available. The values given are intended only as reference values for height and weight to indicate the body mass and the indicated allowances. Major variation in body mass would require adjustments in intake of energy and certain nutrients.

Energy

Derived from U.K. 1979 data, using their activity level classifications. Kilo-calorie values are rounded to the nearest 100.

Protein

Derived from the U.K. 1979 recommendations to correspond with energy recommendations. Protein intake is determined on the basis of 10% of energy intake and refers to a mixed diet in which there is approximately 75% biological utilization.

Table of Recommended Dietary Allowances (1983)

AGE RANGES (YEARS)	REFERENCE WEIGHT kg	REFERENCE HEIGHT in	ENERGY MJ kcal	PROTEIN g	THIAMIN mg	RIBOFLAVIN mg	NIACIN mg	ASCORBIC ACID mg	B ₁₂ µg	FOLATE µg	PANOTIC ACID µg	VIT. A µg	VIT. D µg	VIT. E µg	CALCIUM mg	IRON mg	ZINC mg
Infants	LESS THAN 1 YEAR		0.48-0.44 115-105 kcal	2.8-2.8 g	0.3	0.4	6	35	1.5	60	0.6	480	10	4	840	7	6
Children	1-3	13	29	60	35	0.6	0.7	45	2.0	100	0.9	300	10	5	800	8	10
	4-6	20	44	112	44	0.7	0.8	45	2.5	200	1.3	300	10	6	800	9	10
	7-10	28	62	132	62	0.8	1.1	45	3.0	200	1.8	480	10	7	800	10	10
Male Adolescents	11-14	46	99	167	82	1.1	1.4	60	3.0	300	1.8	720	10	8	1200	12	15
	15-18	68	145	178	99	1.2	1.7	60	3.0	300	2.2	780	10	10	1200	14	16
Female Adolescents	11-14	46	101	167	82	0.9	1.4	60	3.0	300	1.8	720	10	8	1200	14	16
	15-18	68	120	163	84	0.9	1.7	60	3.0	300	2.2	780	10	8	1200	14	16
Adults	19-24	70	164	178	70	1.2	1.8	60	3.0	300	2.2	780	7.5	10	800	10	15
	25-34	70	164	178	70	1.3	1.8	60	3.0	300	2.2	780	7.5	10	800	10	15
	35-44	70	164	178	70	1.3	1.8	60	3.0	300	2.2	780	7.5	10	800	10	15
	45-54	70	164	178	70	1.3	1.8	60	3.0	300	2.2	780	7.5	10	800	10	15
	55-64	70	164	178	70	1.3	1.8	60	3.0	300	2.2	780	7.5	10	800	10	15
	65-74	70	164	178	70	1.3	1.8	60	3.0	300	2.2	780	7.5	10	800	10	15
	75+	70	164	178	70	1.3	1.8	60	3.0	300	2.2	780	7.5	10	800	10	15
Older Adults	75+	70	164	178	70	1.3	1.8	60	3.0	300	2.2	780	7.5	10	800	10	15
Very Active	19-24	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	25-34	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	35-44	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	45-54	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	55-64	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	65-74	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	75+	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
Very Active	19-24	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	25-34	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	35-44	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	45-54	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	55-64	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	65-74	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	75+	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
Very Active	19-24	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	25-34	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	35-44	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	45-54	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	55-64	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	65-74	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	75+	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
Very Active	19-24	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	25-34	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	35-44	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	45-54	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	55-64	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	65-74	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	75+	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
Very Active	19-24	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	25-34	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	35-44	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	45-54	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	55-64	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	65-74	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	75+	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
Very Active	19-24	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	25-34	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	35-44	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	45-54	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	55-64	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	65-74	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	75+	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
Very Active	19-24	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	25-34	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	35-44	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	45-54	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	55-64	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	65-74	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	75+	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
Very Active	19-24	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	25-34	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	35-44	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	45-54	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	55-64	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	65-74	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	75+	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
Very Active	19-24	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	25-34	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	35-44	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	45-54	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	55-64	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	65-74	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	75+	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
Very Active	19-24	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	25-34	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	35-44	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	45-54	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	55-64	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	65-74	66	170	163	64	1.0	1.5	60	3.0	300	2.2	780	7.5	10	800	10	15
	75+	66	17														