Results

RESULTS

Results of the present study will be demonstrated according to 5 parts, as follows:

- Part I: Characteristics of study samples (Tables 1-3)
- Part II: Knowledge of mothers and their schoolchildren regarding nutrition (Tables 4-21) and Figures (1a,b)
- Part III: Attitude of mothers and their schoolchildren regarding nutrition (Tables 22-28) and Figures (2,3)
- Part IV: Condition of home environment as regard nutrition (Table 29)
- Part V: Correlation between knowledge and attitude scores of mothers with their schoolchildren (Tables 30-33)

Part I: Characteristics of study samples

Table (1): Sociodemographic characteristics of mothers in study sample

Variable	Urban (n=100) No.	%	Rural (n=100 No.	%	Total (n=200) No.	%
Age group:						
• 20-	0	0.0	27	27.0	27	13.5
• 30-	52	52.0	27	27.0	79	39.5
• 40 +	48	48.0	46	46.0	94	47.0
	$\chi2$=34.95				p<0.001	
Education:						
• Illiterate	8	8.0	40	40.0	48	24.0
• Read and write/Primary	8	8.0	26	26.0	34	17.0
• Preparatory	32	32.0	13	13.0	49	24.5
• Secondary or equivalent	36	36.0	16	16.0	48	24.0
• University	16	16.0	5	5.0	21	10.5
	$\chi2$=52.34				p<0.001	
Employment:						
• Housewife (unemployed)	44	44.0	74	74.0	118	59.0
• Employed	56	56.0	26	26.0	82	41.0
- Farmer	4	4.0	12	12.0	16	8.0
- Laborer	10	10.0	8	8.0	18	9.0
- Employee	42	42.0	6	6.0	48	24.0
	$\chi2$=18.60				p<0.001	
Family size:						
• <6	64	64.0	21	21.0	85	42.5
• 6-	32	32.0	38	38.0	70	35.0
• 8+	4	4.0	41	41.0	45	22.5
	$\chi2$=52.69				p<0.001	
Family monthly income (LE)						
• <200	4	4.0	32	32.0	36	18.0
• 200 –	36	36.0	54	54.0	90	45.0
• > 400	60	60.0	14	14.0	74	37.0
	$\chi2$=53.97				p<0.001	
Expenditure on food:						
• <50%	6	6.0	8	8.0	14	7.0
• About 50%	56	56.0	72	72.0	128	64.0
• > 50%	38	38.0	20	20.0	58	29.0
	$\chi2$=7.87				p=0.019	

Table (1) shows that less than half of mothers aged 40 years or more (48% in urban areas and 46% in rural areas). As regard education, more than one third of mothers in urban areas were those who had secondary education (36%), while in rural areas, two-fifths of mothers (40%) were illiterate mothers. More than half of mothers were employed in urban areas (56%) while less than three-fourths of mothers in rural areas (74%) were unemployed (housewives). Less than two-thirds of the families of schoolchildren in urban areas were less than 6 members (64%), while more than two-fifths of family size in rural areas was for those of 8 members or more (41%). As regard monthly income, three fifths of families in urban areas (60%) earned more than 400 LE monthly, while in rural areas, more than half of the families (54%) earned 200-400 LE monthly. More than half of the families in urban areas (56%) spent about 50% of their income on food, while less than three fourths of the families in rural areas (72%) spent the same percentage on food.

Table (2): Characteristics of schoolchildren in study sample

	Urban (n=100)	Rural (n=100)	Total (n=200)	t Value	P Value
Variable	Mean±SD	Mean±SD	Mean±SD		
Age (years)	9.92±0.27	9.62±0.49	9.77±0.42	11.979	P<0.001
Weight (kg)	28.60±4.40	26.64±3.70	27.62±4.17	3.827	P<0.001
Height (cm)	110.16±12.80	99.92±9.97	105.04±12.53	6.318	P<0.001

Table (2) shows that the mean age of schoolchildren was 9.77±0.42 years. Rural schoolchildren were significantly younger than those in urban areas ($p<0.001$). Mean weight of schoolchildren was 27.62±4.17 kg, with urban schoolchildren having significantly more body weight. Mean height of schoolchildren was 105.04±12.53 cm, with urban schoolchildren being significantly taller than rural schoolchildren ($p<0.001$).

Table (3): Sex distribution of schoolchildren in study sample

Sex	Urban (n=100)	Rural (n=100)	Total (n=200)	
	No.	No.	No.	%
- Female	48.0	36.0	84	42.0
- Male	52.0	64.0	116	58.0

$\chi 2=2.956$ $p=0.085$

Table (3) shows that more than half of students were males (58%). Proportion of males was higher in rural than urban areas, i.e., less than two thirds vs. more than half (64% vs. 52%, respectively). However, difference was not statistically significantly ($p=0.085$).

Part II: Knowledge of mothers and their schoolchildren regarding nutrition

Table (4): Sources of information about nutrition for mothers and their schoolchildren*

Sources of information	Urban (n=100)		Rural (n=100)		Total (n=200)		Z Value	P Value
	No.	%	No.	%	No.	%		
Mothers								
Mass media	12	12.0	80	80.0	92	46.0	13.195	<0.001
Relatives	88	88.0	48	48.0	136	68.0	6.712	<0.001
Neighbors	44	44.0	20	20.0	32	16.0	3.765	<0.001
Health unit	0	0.0	0	0.0	0	0.0	--	--
Children								
Family	84	84.0	44	44.0	128	64.0	6.482	<0.001
Teachers	41	41.0	52	52.0	93	46.5	1.569	0.116
Friends	1	1.0	32	32.0	33	16.5	6.499	<0.001
Mass media	15	15.0	14	14.0	29	14.5	0.201	0.840
Health unit	0	0.0	0	0.0	0	0.0	--	--

** Options are not mutually exclusive, i.e., more than one option is possible*

Table (4) and figures (1a and 1b) show that the main sources for information of mothers were relatives as stated by two thirds of mothers, followed by mass media as stated by less than half of mothers. On the other hand, the main sources for information about nutrition for schoolchildren were the family, as stated by almost two thirds of schoolchildren (64%), followed by teachers, as stated by less than half of schoolchildren (46.5%). It is also to be noted that the health unit was not a source of information about nutrition for mothers, nor their children.

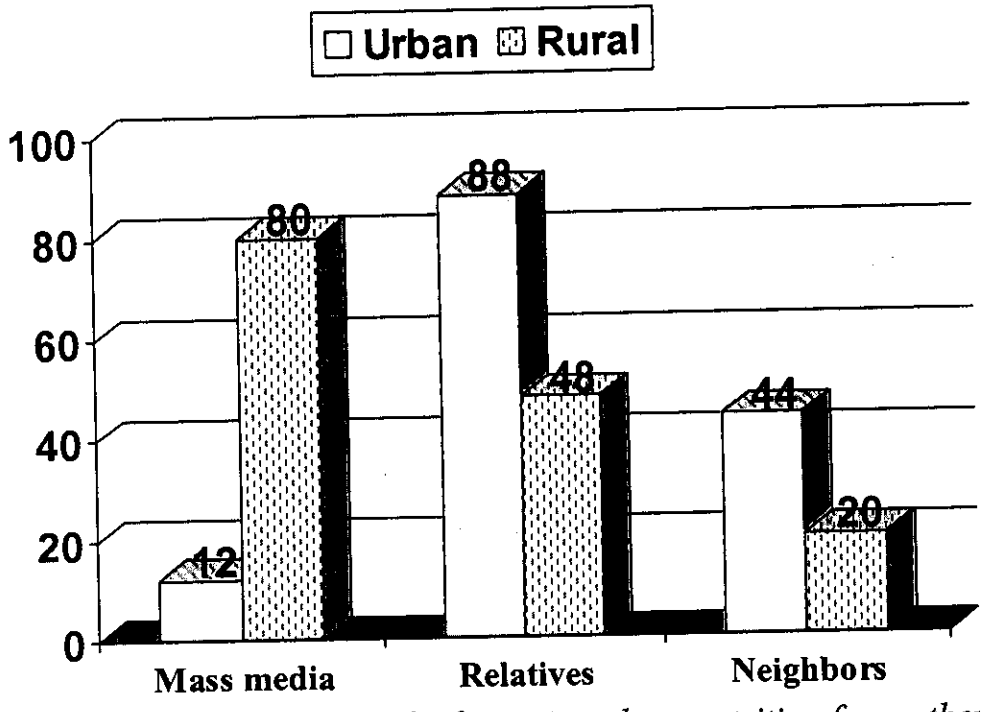

Figure (1a): Sources of information about nutrition for mothers

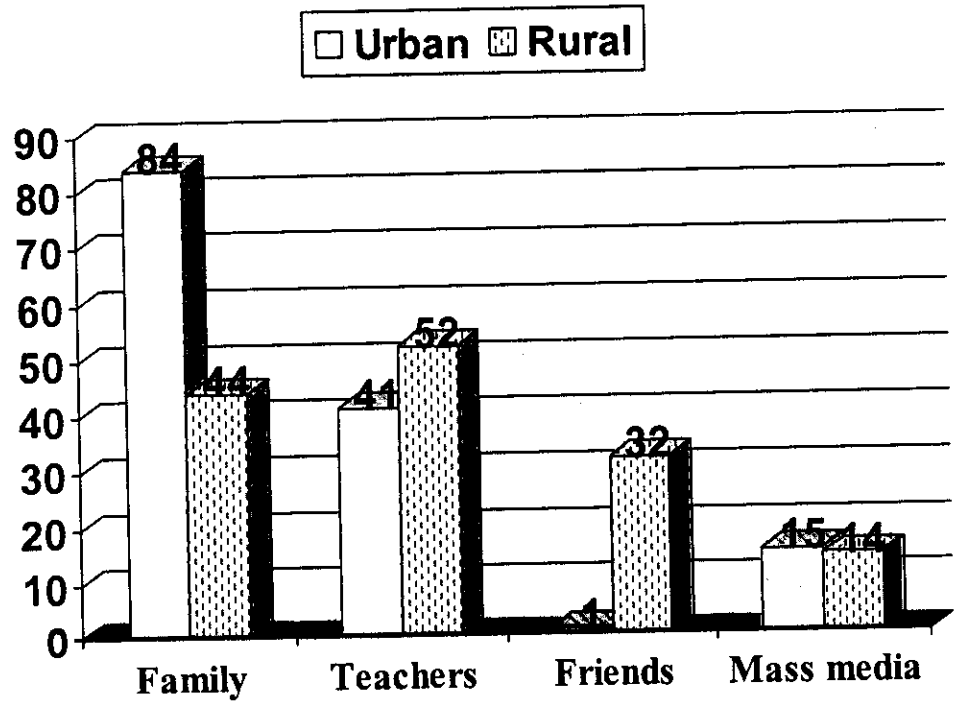

Figure (1b): Sources of information about nutrition for schoolchildren

Table (5): Knowledge scores of mothers and their schoolchildren living in urban areas before, immediately after and 4 months after applying the health promotion nutritional educational program

Knowledge items	Before	Immediately after	Follow up after 4 months		F Value	P Value
	Mean±SD	Mean±SD	Mean±SD			
Mothers:						
Importance of food	1.60±.492	3.90±.302	3.77	.423	977.7	<0.001
Nutrients	16.60±2.09	44.21±0.82	43.65	1.40	10668.5	<0.001
Food requirements	19.40±1.99	39.79±.537	39.55	.687	8704.7	<0.001
Balanced diet	1.12±.327	3.72±.451	3.56	.499	1139.1	<0.001
Vitamin A	1.40±.492	5.87±.338	5.72	.451	3450.4	<0.001
Calcium	1.88±.518	5.76±.429	5.64	.482	2131.1	<0.001
Iron	2.36±.56	4.86±.349	4.68	.469	890.5	<0.001
Iodine	.36±.482	1.82±.386	1.66	.476	316.1	<0.001
Preserving nutritional value of food	8.04±1.22	14.45±0.80	14.07	1.19	1094.0	<0.001
Children:						
Importance of food	1.32±.469	3.80±.402	3.67	.473	966.5	<0.001
Nutrients	17.00±2.07	43.65±1.00	43.65	1.40	9799.5	<0.001
Food requirements	9.24±1.28	21.39±.777	21.27	.750	5210.5	<0.001
Balanced diet	1.12±.327	3.63±.485	3.48	.502	1000.6	<0.001

Table (5) shows that in urban areas, knowledge scores of mothers about nutrition improved significantly immediately after the application of health promotion nutritional educational program in all components compared with their knowledge scores immediately after the application of the program. However, a slight decline occurred 4 months later.

Knowledge scores of schoolchildren about nutrition improved significantly immediately after the application of health promotion nutritional educational program in all components compared with their knowledge scores immediately after the application of the program. However, a slight decline occurred 4 months later.

Table (6): Knowledge scores of mothers and their schoolchildren living in rural areas before, immediately after and 4 months after applying the health promotion nutritional educational program

Knowledge items	Before	Immediately after	Follow up after 4 months	F Value	P Value
	Mean±SD	Mean±SD	Mean±SD		
Mothers					
Importance of food	1.04±0.20	3.72±0.45	3.57±0.50	1390.44	<0.001
Nutrients	14.88±2.00	42.67±0.93	42.10±1.38	11260.12	<0.001
Food requirements	17.84±3.34	39.54±0.74	39.20±0.85	3706.79	<0.001
Balanced diet	1.04±0.20	3.59±0.49	3.42±0.50	1152.08	<0.001
Vitamin A	1.04±0.20	5.57±0.50	5.41±0.49	3733.96	<0.001
Calcium	1.16±0.62	5.62±0.49	5.46±0.50	2205.82	<0.001
Iron	1.36±0.69	4.65±0.48	4.50±0.50	1076.58	<0.001
Iodine	0.12±0.33	1.60±0.49	1.44±0.50	330.60	<0.001
Preserving nutritional value	6.92±1.42	13.79±0.87	13.32±1.07	1135.16	<0.001
Children					
Importance of food	1.04±0.35	3.57±0.50	3.42±0.50	983.98	<0.001
Nutrients	11.00±1.93	41.94±1.05	42.10±1.38	14290.13	<0.001
Food requirements	5.92±1.36	21.06±0.79	20.59±2.22	3016.29	<0.001
Balanced diet	1.04±0.20	3.44±0.50	3.29±0.45	1095.06	<0.001

Table (6) shows that in rural areas, knowledge scores of mothers about nutrition improved significantly immediately after the application of health promotion nutritional educational program in all components compared with their knowledge scores immediately after the application of the program. However, a slight decline occurred 4 months later.

Knowledge scores of schoolchildren about nutrition improved significantly immediately after the application of health promotion nutritional educational program in all components compared with their knowledge scores immediately after the application of the program. However, a slight decline occurred 4 months later.

Table (7): Knowledge scores of mothers and their schoolchildren before applying health promotion nutritional educational program according to their residence

Knowledge items	Urban (n=100) Mean±SD	Rural (n=100) Mean±SD	t value	P Value
Mothers				
Importance of food	1.60±0.49	1.04±0.20	10.56	<0.001
Nutrients	16.60±2.09	14.88±2.00	5.95	<0.001
Food requirements	19.40±1.99	17.84±3.34	4.02	<0.001
Balanced diet	1.12±0.33	1.04±0.20	2.10	0.037
Vitamin A	1.40±0.49	1.04±0.20	6.79	<0.001
Calcium	1.88±0.52	1.16±0.62	8.96	<0.001
Iron	2.36±0.56	1.36±0.69	11.26	<0.001
Iodine	0.36±0.48	0.12±0.33	4.12	<0.001
Preservation of food	8.04±1.22	6.92±1.42	5.98	<0.001
Children:				
Importance of food	1.32±0.47	1.04±0.35	4.81	<0.001
Nutrients	17.00±2.07	11.00±1.93	21.21	<0.001
Food requirements	9.24±1.28	5.92±1.36	17.77	<0.001
Balanced diet	1.19±0.39	1.04±0.20	3.403	<0.001

Table (7) shows that knowledge scores of mothers and their schoolchildren living in urban areas about nutrition were significantly better than those for rural areas before the application of health promotion nutritional educational program in all components.

Table (8): Knowledge scores of mothers and their schoolchildren immediately after applying health promotion nutritional educational program according to their residence

Knowledge items	Urban (n=100) Mean±SD	Rural (n=100) Mean±SD	t value	P value
Mothers				
Importance of food	3.90±0.30	3.72±0.45	3.32	.001
Nutrients	44.21±0.82	42.67±0.93	12.40	<0.001
Food requirements	39.79±0.52	39.54±0.74	2.72	.007
Balanced diet	3.72±0.45	3.59±0.49	1.94	.054
Vitamin A	5.87±0.34	5.57±0.50	4.99	<0.001
Calcium	5.76±0.43	5.62±0.49	2.16	.032
Iron	4.86±0.35	4.65±0.48	3.54	<0.001
Iodine	1.82±0.39	1.60±0.49	3.52	.001
Preservation of food	14.45±0.80	13.79±0.87	5.60	.001
Children:				
Importance of food	3.80±0.40	3.57±0.50	3.60	<0.001
Nutrients	43.65±1.00	41.94±1.05	11.79	<0.001
Food requirements	21.39±0.78	21.06±0.79	2.98	.003
Balanced diet	3.63±0.49	3.44±0.50	2.73	.007

Table (8) shows that knowledge scores of mothers and their schoolchildren living in urban areas about nutrition were significantly better immediately after the application of health promotion nutritional educational program in all components.

Table (9): Knowledge scores of mothers and their schoolchildren 4 months after applying health promotion nutritional educational program according to their residence

Knowledge items	Urban (n=100) Mean±SD	Rural (n=100) Mean±SD	t-value	p-value
Mothers				
Importance of food	3.77±0.42	3.57±0.50	3.03	.003
Nutrients	43.65±1.40	42.08±1.39	7.90	<0.001
Food requirements	39.55±0.69	39.20±0.85	3.15	.002
Balanced diet	3.56±0.50	3.42±0.50	2.00	.047
Vitamin A	5.72±0.45	5.41±0.49	4.64	<0.001
Calcium	5.64±0.48	5.46±0.50	2.59	.010
Iron	4.68±0.47	4.50±0.50	2.61	.010
Iodine	1.66±0.48	1.44±0.50	3.19	.002
Preservation of food	14.07±1.19	13.31±1.08	4.73	<0.001
Children:				
Importance of food	3.67±0.47	3.42±0.50	3.66	<0.001
Nutrients	43.05±1.42	41.26±1.29	9.27	<0.001
Food requirements	21.27±0.75	20.59±2.22	2.89	.004
Balanced diet	3.48±0.50	3.29±0.45	2.85	.005

Table (9) shows that 4 months after the application of health promotion nutritional educational program, knowledge scores of mothers and their schoolchildren living in urban areas were significantly better in all components than those for mothers and their school children living in rural areas. As regard mothers, the most significantly different items were nutrients, vitamin A and preservation of food ($p<0.001$). Similarly, as regard school children, the most significantly different items were importance of food and nutrients ($p<0.001$).

Table (10): Knowledge scores of mothers and their schoolchildren before applying health promotion nutritional educational program according to gender of schoolchildren

Knowledge items	Females (n=84) Mean±SD	Males (n=116) Mean±SD	t value	P value
Mothers				
Importance of food	1.38±0.49	1.28±0.45	1.57	.117
Nutrients	16.23±2.30	15.37±2.08	2.75	.006
Food requirements	18.81±2.63	18.48±3.00	0.80	.425
Balanced diet	1.05±0.21	1.10±0.31	-1.44	.152
Vitamin A	1.24±0.43	1.21±0.41	0.52	.601
Calcium	1.48±0.59	1.55±0.73	-0.78	.434
Iron	2.05±0.79	1.72±0.79	2.87	.005
Iodine	0.33±0.47	0.17±0.38	2.66	.008
Preservation of food	7.47±1.60	7.48±1.30	-0.03	.975
Children:				
Importance of food	1.05±0.38	1.28±0.45	-3.79	<0.001
Nutrients	13.67±3.96	14.24±3.32	-1.11	.267
Food requirements	7.86±2.75	7.38±1.50	1.58	.116
Balanced diet	1.10±0.30	1.07±0.25	0.67	.502

Table (10) shows that before the application of health promotion nutritional educational program, knowledge scores of mothers of girls were significantly better than those of boys as regard intake vitamins ($p<0.001$), iron ($p=0.005$) and iodine ($p=0.008$). However, knowledge scores of girls were significantly better than those of boys as regard importance of food ($p<0.001$).

Table (11): Knowledge scores of mothers and their schoolchildren immediately after applying health promotion nutritional educational program according to gender of schoolchildren

Knowledge items	Females (n=84) Mean±SD	Males (n=116) Mean±SD	t value	p value
Mothers				
Importance of food	3.80±0.40	3.82±0.39	-.378	.706
Nutrients	43.51±1.06	43.38±1.23	.740	.460
Food requirements	39.70±0.62	39.64±0.69	.681	.497
Balanced diet	3.67±0.47	3.65±.48	.294	.769
Vitamin A	5.75±0.44	5.70±0.46	.801	.424
Calcium	5.65±0.48	5.72±0.45	-.914	.362
Iron	4.75±0.44	4.76±0.43	-.139	.889
Iodine	1.73±0.45	1.70±0.46	.427	.670
Preservation of food	14.09±0.87	14.13±0.91	-.333	.740
Children:				
Importance of food	3.70±0.46	3.67±0.47	.448	.654
Nutrients	42.83±1.36	42.76±1.31	.345	.731
Food requirements	21.19±0.86	21.25±0.76	-.519	.604
Balanced diet	3.51±0.50	3.55±0.50	-.555	.580

Table (11) shows that immediately after the application of health promotion nutritional educational program, mean knowledge scores of mothers of boys and those of girls in addition to those of boys and those of girls were not statistically significant in all items.

Table (12): Knowledge scores of mothers and their schoolchildren 4 months after applying health promotion nutritional educational program according to gender of schoolchildren

Knowledge items	Females Mean±SD	Males Mean±SD	t-value	p-value
Mothers				
Importance of food	3.64±0.48	3.69±0.46	-0.74	.460
Nutrients	42.90±1.54	42.85±1.64	0.23	.815
Food requirements	39.46±0.74	39.32±0.82	1.31	.191
Balanced diet	3.48±0.50	3.50±0.50	-0.33	.742
Vitamin A	5.55±0.50	5.58±0.50	-0.44	.662
Calcium	5.54±0.50	5.56±0.50	-0.36	.721
Iron	4.54±0.50	4.63±0.49	-1.36	.177
Iodine	1.52±0.50	1.57±0.50	-0.65	.519
Preservation of food	13.61±1.16	13.75±1.21	-0.77	.444
Children:				
Importance of food	3.54±0.50	3.55±0.50	-0.24	.814
Nutrients	13.61±1.16	13.75±1.21	-0.77	.444
Food requirements	20.80±2.43	21.04±0.74	-0.98	.327
Balanced diet	3.42±0.49	3.36±0.48	0.81	.417

Table (12) shows that 4 months after the application of health promotion nutritional educational program, differences in mean knowledge scores of mothers of boys and those of girls in addition to those of boys and those of girls were not statistically significant.

Table (13): Knowledge scores of mothers and their schoolchildren before applying health promotion nutritional educational program according to education of mother

Knoweldge items	Illiterate Mean±SD	Read & write/ Primary Mean±SD	Preparatory Mean±SD	Secondary Mean±SD	University Mean±SD	F Value	P Value
Mother:							
Importance of food	1.02±0.14	1.18±0.39	1.51±0.51	1.42±0.50	1.57±0.51	11.911	<0.001
Nutrients	14.71±2.12	14.88±2.11	16.04±1.59	16.79±2.46	16.38±1.83	8.332	<0.001
Food requirements	17.75±3.29	18.32±3.11	19.02±2.10	19.04±2.89	19.19±2.46	1.964	.102
Balanced diet	1.04±0.20	1.12±0.33	1.02±0.14	1.17±0.38	1.05±0.22	2.344	.056
Vitamin A	1.06±0.24	1.15±0.36	1.33±0.47	1.25±0.44	1.38±0.50	3.855	.005
Calcium	1.27±0.54	1.41±0.70	1.69±0.68	1.63±0.73	1.62±0.59	3.235	.013
Iron	1.38±0.61	1.65±0.88	2.10±0.68	2.19±0.84	2.00±0.63	9.704	<0.001
Iodine	0.06±0.24	0.21±0.41	0.18±0.39	0.44±0.50	0.38±0.50	5.998	<0.001
Food preservation	6.90±1.51	7.24±1.18	7.98±1.45	7.48±1.38	8.05±1.20	4.896	.001
Child:							
Importance of food	1.06±0.32	1.09±0.51	1.10±0.31	1.35±0.48	1.38±0.50	5.096	.001
Nutrients	12.35±2.87	11.97±2.96	15.16±3.38	14.85±3.54	16.38±3.79	11.376	<0.001
Food requirements	6.13±1.65	7.00±2.02	8.43±1.79	8.33±2.21	8.14±1.88	12.434	<0.001
Balanced diet	1.02±0.14	1.18±0.39	1.16±0.37	1.18±0.73	1.05±0.22	4.145	.003

Table (13) shows that generally, before the application of health promotion nutritional educational program, knowledge scores of mothers and their children who were within the secondary and university educated groups were significantly better than those within the other groups.

Table (14): Knowledge scores of mothers and their schoolchildren immediately after applying health promotion nutritional educational program according to education of mother

Knowledge items	Illiterate Mean±SD	Read & write/ Primary Mean±SD	Preparatory Mean±SD	Secondary Mean±SD	University Mean±SD	F Value	P Value
Mother:							
Importance of food	3.73±0.45	3.74±0.45	3.86±0.35	3.90±0.31	3.81±0.40	1.579	.181
Nutrients	42.85±1.15	43.15±1.10	43.86±1.02	43.71±1.17	43.67±1.06	6.624	<0.001
Food requirements	37.85±7.98	37.39±9.40	36.27±11.29	35.00±12.57	35.53±12.19	.498	.737
Balanced diet	3.56±0.50	3.50±0.51	3.76±0.43	3.71±0.46	3.76±0.44	2.370	.054
Vitamin A	5.56±0.50	5.71±0.46	5.80±0.41	5.81±0.39	5.71±0.46	2.399	.052
Calcium	5.71±0.46	5.71±0.46	5.61±0.49	5.73±0.45	5.71±0.46	.468	.759
Iron	4.67±0.48	4.68±0.47	4.82±0.39	4.83±0.38	4.76±0.44	1.444	.221
Iodine	1.65±0.48	1.71±0.46	1.78±0.42	1.73±0.45	1.67±0.48	.557	.694
Food preservation	42.85±1.15	43.15±1.10	43.86±1.02	43.71±1.17	43.67±1.06	1.802	.130
Child:							
Importance of food	3.65±0.48	3.44±0.50	3.78±0.42	3.77±0.42	3.76±0.44	3.608	.007
Nutrients	41.98±1.34	42.68±1.20	43.24±1.23	43.02±1.25	43.29±1.15	7.974	<0.001
Food requirements	21.17±0.66	21.18±0.87	21.20±0.87	21.29±0.82	21.33±0.80	.280	.891
Balanced diet	3.52±0.50	3.38±0.49	3.67±0.47	3.52±0.50	3.52±0.51	1.781	.134

Table (14) shows that generally, immediately after the application of health promotion nutritional educational program, knowledge scores of mothers and their children who were within the highest educational group were better than those within the other educational groups. Significant differences were observed as regard nutrients (for mothers) as well as importance of food and nutrients (for school children).

Table (16): Knowledge scores of mothers and their schoolchildren before applying health promotion nutritional educational program according to mother's employment

	Housewife Mean±SD	Employed Mean±SD	t Value	p-value
Mothers				
Importance of food	1.22±0.42	1.57±0.50	-5.02	<0.001
Nutrients	15.40±2.30	16.20±2.10	-2.32	.021
Food requirements	18.27±3.12	19.52±1.70	-2.83	.005
Balanced diet	1.03±0.17	1.21±0.41	-4.57	<0.001
Vitamin A	1.11±0.32	1.50±0.51	-6.54	<0.001
Calcium	1.46±0.71	1.68±0.54	-2.10	.037
Iron	1.72±0.83	2.21±0.59	-4.04	<0.001
Iodine	0.19±0.40	0.36±0.48	-2.44	.015
Preservation of food	7.60±1.60	7.40±1.20	1.04	.301
Children:				
Importance of food	1.06±0.33	1.50±0.51	-7.31	<0.001
Nutrients	13.00±3.20	15.40±3.70	-4.88	<0.001
Food requirements	7.19±2.23	8.59±1.37	-4.38	<0.001
Balanced diet	1.08±0.28	1.07±0.26	0.28	.782

Table (16) shows that before the application of health promotion nutritional educational program, knowledge scores of employed mothers were significantly better than those of unemployed mothers as regard importance of food ($p<0.001$), food requirements ($p=0.005$), balanced diet ($p<0.001$), intake of vitamin A ($p<0.001$), iron ($p<0.001$) and iodine ($p=0.015$). Moreover, knowledge scores of children of employed mothers were significantly better than those of unemployed mothers as regard importance of food, intake of nutrients as well as nutritional requirements ($p<0.001$ for each).

Table (15): Knowledge scores of mothers and their schoolchildren 4 months after applying health promotion nutritional educational program according to education of mother

Knowledge items	Illiterate Mean±SD	Read & write/ Primary Mean±SD	Preparatory Mean±SD	Secondary Mean±SD	University Mean±SD	F Value	P Value
Mother:							
Importance of food	3.60±0.50	3.53±0.51	3.65±0.48	3.85±0.36	3.70±0.47	3.044	.018
Nutrients	42.30±1.55	42.29±1.62	43.16±1.65	43.31±1.43	43.45±1.32	4.964	.001
Food requirements	39.32±0.86	39.35±0.81	39.43±0.76	39.38±0.79	39.45±0.69	.163	.957
Balanced diet	3.45±0.50	3.32±0.47	3.47±0.50	3.60±0.49	3.65±0.49	2.233	.067
Vitamin A	5.47±0.50	5.47±0.51	5.57±0.50	5.69±0.47	5.65±0.49	1.653	.163
Calcium	5.57±0.50	5.50±0.51	5.49±0.51	5.58±0.50	5.65±0.49	.542	.705
Iron	4.51±0.51	4.53±0.51	4.63±0.49	4.69±0.47	4.55±0.51	1.028	.394
Iodine	1.49±0.51	1.50±0.51	1.55±0.50	1.63±0.49	1.60±0.50	.576	.680
Food preservation	13.48±1.15	13.47±1.08	13.67±1.33	13.92±1.11	14.10±1.22	1.733	.144
Child:							
Importance of food	3.55±0.50	3.29±0.46	3.57±0.50	3.63±0.49	3.70±0.47	3.102	.017
Nutrients	41.40±1.51	41.59±1.56	42.51±1.73	42.67±1.46	42.85±1.18	6.948	<0.001
Food requirements	3.34±0.48	3.24±0.43	3.45±0.50	3.42±0.50	3.50±0.51	1.452	.218
Balanced diet	20.96±0.59	20.21±3.65	20.84±0.80	21.29±0.80	21.50±0.69	2.854	.025

Table (15) shows that generally, immediately after the application of health promotion nutritional educational program, knowledge scores of mothers and their children who were within the highest educational group were better than those within the other groups. Significant differences were observed as regard importance of food and nutrients (for mothers) as well as importance of food, nutrients and balanced diet (for school children).

Table (16): Knowledge scores of mothers and their schoolchildren before applying health promotion nutritional educational program according to mother's employment

	Housewife Mean±SD	Employed Mean±SD	t Value	p-value
Mothers				
Importance of food	1.22±0.42	1.57±0.50	-5.02	<0.001
Nutrients	15.40±2.30	16.20±2.10	-2.32	.021
Food requirements	18.27±3.12	19.52±1.70	-2.83	.005
Balanced diet	1.03±0.17	1.21±0.41	-4.57	<0.001
Vitamin A	1.11±0.32	1.50±0.51	-6.54	<0.001
Calcium	1.46±0.71	1.68±0.54	-2.10	.037
Iron	1.72±0.83	2.21±0.59	-4.04	<0.001
Iodine	0.19±0.40	0.36±0.48	-2.44	.015
Preservation of food	7.60±1.60	7.40±1.20	1.04	.301
Children:				
Importance of food	1.06±0.33	1.50±0.51	-7.31	<0.001
Nutrients	13.00±3.20	15.40±3.70	-4.88	<0.001
Food requirements	7.19±2.23	8.59±1.37	-4.38	<0.001
Balanced diet	1.08±0.28	1.07±0.26	0.28	.782

Table (16) shows that before the application of health promotion nutritional educational program, knowledge scores of employed mothers were significantly better than those of unemployed mothers as regard importance of food ($p<0.001$), food requirements ($p=0.005$), balanced diet ($p<0.001$), intake of vitamin A ($p<0.001$), iron ($p<0.001$) and iodine ($p=0.015$). Moreover, knowledge scores of children of employed mothers were significantly better than those of unemployed mothers as regard importance of food, intake of nutrients as well as nutritional requirements ($p<0.001$ for each).

Table (17): Knowledge scores of mothers and their schoolchildren immediately after applying health promotion nutritional educational program according to mother's employment

Knowledge items	Housewife Mean±SD	Employed Mean±SD	t value	p-value
Mothers				
Importance of food	3.76±0.43	3.93±0.26	-2.70	.008
Nutrients	43.30±1.20	43.70±1.20	-2.61	.010
Food requirements	39.65±0.67	39.71±0.62	-0.66	.511
Balanced diet	3.61±0.49	3.77±0.43	-2.11	.036
Vitamin A	5.67±0.47	5.84±0.37	-2.36	.019
Calcium	5.65±0.48	5.80±0.40	-2.18	.030
Iron	4.75±0.44	4.77±0.43	-0.26	.793
Iodine	1.67±0.47	1.80±0.40	-1.83	.070
Preservation of food	14.00±0.80	14.20±1.00	-1.48	.141
Children:				
Importance of food	3.63±0.48	3.82±0.39	-2.62	.009
Nutrients	42.60±1.30	43.00±1.30	-2.26	.025
Food requirements	21.13±0.81	21.46±0.71	-2.68	.008
Balanced diet	3.48±0.50	3.68±0.47	-2.57	.011

Table (17) shows that immediately after the application of health promotion nutritional educational program, knowledge scores of employed mothers were significantly better than those of unemployed mothers as regard importance of food (p=0.008), nutrients (p=0.01), balanced diet (p=0.036), vitamin A (p=0.019), calcium intake (p=0.030). Moreover, knowledge scores of children of employed mothers were significantly better than those of unemployed mothers as regard importance of food (p=0.009), balanced diet (p=0.011) well as nutritional requirements (p=0.008).

Table (18): Knowledge scores of mothers and their schoolchildren 4 months after applying health promotion nutritional educational program according to mother's employment

Knowledge items	Housewife Mean±SD	Employed Mean±SD	t value	p-value
Mothers				
Importance of food	3.61±0.49	3.84±0.37	-3.22	.002
Nutrients	42.60±1.60	43.30±1.50	-3.07	.002
Food requirements	39.37±0.79	39.41±0.78	-0.36	.722
Balanced diet	3.45±0.50	3.59±0.50	-1.76	.080
Vitamin A	5.52±0.50	5.68±0.47	-2.02	.044
Calcium	5.54±0.50	5.59±0.50	-0.69	.493
Iron	4.59±0.49	4.59±0.50	0.03	.977
Iodine	1.54±0.50	1.59±0.50	-0.69	.493
Preservation of food	13.60±1.20	13.90±1.20	-1.58	.117
Children:				
Importance of food	3.51±0.50	3.64±0.48	-1.73	.085
Nutrients	41.90±1.60	42.50±1.60	-2.77	.006
Food requirements	20.79±1.91	21.30±0.74	-1.96	.052
Balanced diet	3.33±0.47	3.52±0.50	-2.46	.015

Table (18) shows that 4 months after the application of health promotion nutritional educational program, knowledge scores of employed mothers were significantly better than those of unemployed mothers as regard importance of food (p=0.002), nutrients (p=0.002), vitamin A (p=0.044). Moreover, knowledge scores of children of employed mothers were significantly better than those of unemployed mothers as regard nutrients (p=0.006), and balanced diet (p=0.015).

Table (19): Knowledge scores of mothers and their schoolchildren before applying health promotion nutritional educational program according to family income

Knowledge items	<200 LE Mean±SD	200-399 LE Mean±SD	≥400 LE Mean±SD	F Value	P value
Mothers					
Importance of food	1.03±0.16	1.35±0.48	1.62±0.49	37.49	<0.001
Nutrients	14.90±2.10	15.30±2.10	17.00±1.90	20.85	<0.001
Food requirements	17.01±2.75	19.39±2.84	19.69±2.10	22.43	<0.001
Balanced diet	1.04±0.20	1.08±0.27	1.12±0.33	1.57	.210
Vitamin A	1.04±0.20	1.21±0.41	1.43±0.50	17.71	<0.001
Calcium	1.16±0.58	1.58±0.64	1.86±0.61	23.03	<0.001
Iron	1.37±0.70	1.85±0.79	2.42±0.53	40.92	<0.001
Iodine	0.12±0.33	0.24±0.43	0.37±0.49	5.96	.003
Food preservation	6.79±1.42	8.03±1.58	7.72±0.93	15.93	<0.001
Children:					
Importance of food	1.07±0.30	1.11±0.45	1.37±0.49	10.18	<0.001
Nutrients	11.08±1.99	14.19±3.52	17.09±2.18	91.09	<0.001
Food requirements	5.79±1.30	8.23±2.18	8.97±1.25	73.78	<0.001
Balanced diet	1.04±0.20	1.21±0.41	1.26±0.53	11.75	<0.001

Table (19) shows that generally, before the application of health promotion nutritional educational program, knowledge scores of mothers and their children who were within the highest income group (≥400 LE) were significantly better than those within the other two groups of lower income. However, no significant difference was observed as regard balanced diet.

Table (20): Knowledge scores of mothers and their schoolchildren immediately after applying health promotion nutritional educational program according to family income

Knowledge items	<200 LE Mean±SD	200-399 LE Mean±SD	≥400 LE Mean±SD	F Value	P value
Mothers					
Importance of food	3.71±0.46	3.82±0.39	3.91±0.29	4.436	.013
Nutrients	42.63±0.95	43.71±1.09	44.09±0.91	41.230	<0.001
Food requirements	39.49±0.78	39.82±0.46	39.71±0.63	4.540	.012
Balanced diet	3.59±0.50	3.60±0.49	3.78±0.41	3.661	.027
Vitamin A	5.59±0.50	5.71±0.46	5.88±0.33	7.518	.001
Calcium	5.60±0.49	5.74±0.44	5.74±0.44	2.058	.130
Iron	4.63±0.49	4.81±0.40	4.85±0.36	5.162	.007
Iodine	1.59±0.50	1.74±0.44	1.82±0.39	4.642	.011
Food preservation	13.84±0.91	14.16±0.85	14.40±0.83	7.390	.001
Children:					
Importance of food	3.60±0.49	3.63±0.49	3.83±0.38	4.961	.008
Nutrients	41.85±1.11	43.29±1.21	43.38±1.07	40.376	<0.001
Food requirements	21.07±0.75	21.18±0.90	21.45±0.71	4.132	.017
Balanced diet	3.47±0.50	3.44±0.50	3.71±0.46	6.102	.003

Table (20) shows that generally, immediately after the application of health promotion nutritional educational program, knowledge scores of mothers and their children who were within the highest income group (≥400 LE) were significantly better than those within the other two groups of lower income. Highest significant differences were observed as regard nutrients for mothers and school children ($p<0.001$).

Table (21): Knowledge scores of mothers and their schoolchildren 4 months after applying health promotion nutritional educational program according to family income

Knowledge items	<200 LE Mean±SD	200-399 LE Mean±SD	≥400 LE Mean±SD	F value	P Value
Mothers:					
Importance of food	3.61±0.49	3.61±0.49	3.80±0.40	3.692	.027
Nutrients	42.15±1.41	42.95±1.61	43.60±1.46	16.275	<0.001
Food requirements	39.25±0.85	39.46±0.74	39.45±0.75	1.520	.221
Balanced diet	3.44±0.50	3.41±0.50	3.62±0.49	3.181	.044
Vitamin A	5.43±0.50	5.56±0.50	5.72±0.45	6.247	.002
Calcium	5.49±0.50	5.57±0.50	5.60±0.49	.987	.375
Iron	4.49±0.50	4.64±0.48	4.66±0.48	2.632	.074
Iodine	1.47±0.50	1.52±0.50	1.66±0.48	2.623	.075
Food preservation	13.47±1.09	13.60±1.22	14.05±1.20	4.543	.012
Children:					
Importance of food	3.47±0.50	3.48±0.50	3.69±0.47	4.329	.014
Nutrients	41.31±1.37	42.41±1.63	42.88±1.48	20.214	<0.001
Food requirements	20.54±2.55	20.97±0.84	21.34±0.71	3.975	.020
Balanced diet	3.33±0.47	3.26±0.44	3.55±0.50	6.587	.002

Table (21) shows that generally, 4 months after the application of health promotion nutritional educational program, knowledge scores of mothers and their children who were within the highest income group (≥400 LE) were significantly better than those within the other two groups of lower income. Highest significant differences were observed as regard nutrients for mothers and school children ($p<0.001$).

Part III: Attitude of mothers and their schoolchildren regarding nutrition

Table (22): Attitude scores of both mothers and their schoolchildren in urban areas before, immediately after and 4 months after applying the health promotion nutritional educational program

Attitude	Before	Immediately after	Follow up after 4 months	F Value	P Value
	Mean±SD	Mean±SD	Mean±SD		
Mothers	15.30±2.66	23.18±4.06	20.72±3.50	123.65	<0.001
Children	11.96±3.20	18.16±4.71	15.41±4.86	89.32	<0.001

Table (22) and Figure (2) show that attitude scores of mothers in urban areas as regard nutrition improved significantly immediately after the application of the health promotion nutritional educational program (15.30±2.66 before the application of the program and 23.18±4.06 immediately after the application of the program). However, 4 months later, there was a slight decline in the attitude score of the mothers (20.72±3.50). Similarly, the attitude scores of schoolchildren as regard nutrition improved significantly immediately after the application of the health promotion nutritional educational program (11.96±3.20 before the application of the program and 18.16±4.71 immediately after the application of the program). However, 4 months later, there was a slight decline in the attitude score of the mothers (15.41±4.86).

Table (23): Attitude scores of both mothers and their schoolchildren in rural areas before, immediately after and 4 months after applying the health promotion nutritional educational program

	Before	Immediately after	Follow up after 4 months	F	P
Attitude	Mean±SD	Mean±SD	Mean±SD	Value	Value
Mothers	11.96±2.44	18.16±3.69	16.32±3.31	99.653	<0.001
Children	9.44±2.53	14.44±3.88	12.20±3.96	56.510	<0.001

Table (23) shows that attitude scores of mothers in rural areas as regard nutrition improved significantly immediately after the application of the health promotion nutritional educational program (11.96±2.4 before the application of the program and 18.16±3.69 immediately after the application of the program). However, 4 months later, there was a slight decline in the attitude score of the mothers (16.32±3.31). Similarly, the attitude scores of schoolchildren as regard nutrition improved significantly immediately after the application of the health promotion nutritional educational program (9.44±2.53 before the application of the program and 14.44±3.88 immediately after the application of the program). However, 4 months later, there was a slight decline in the attitude score of the mothers (12.20±3.96).

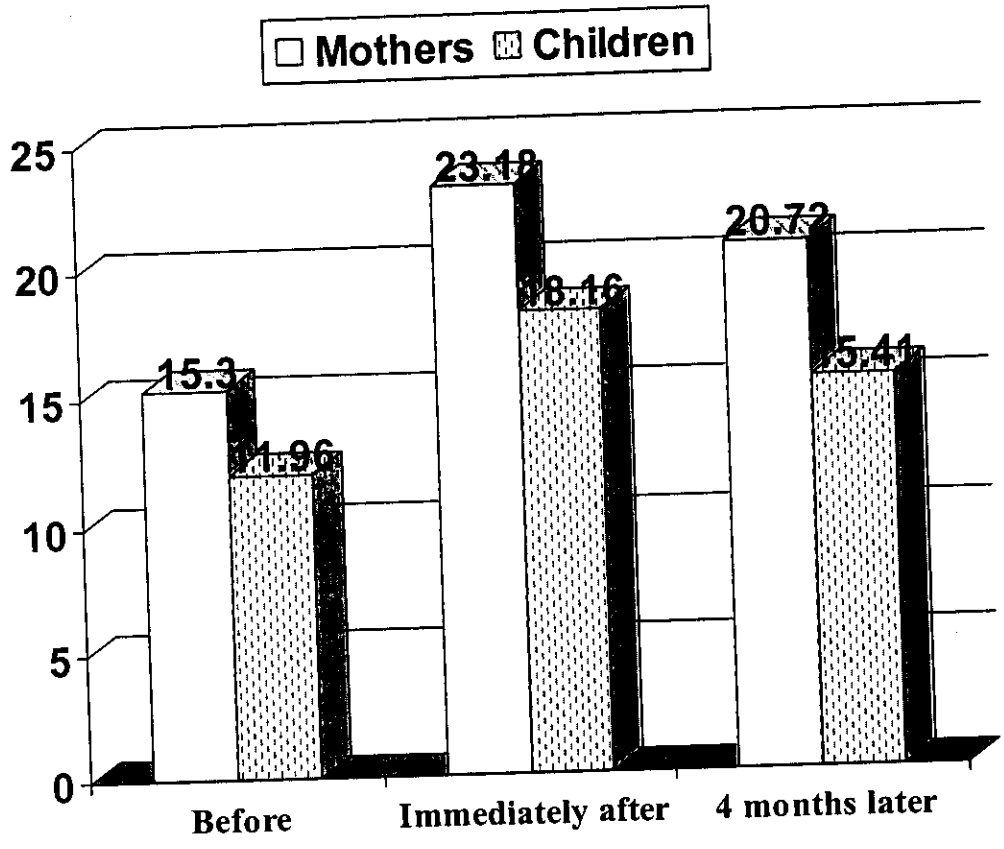

Figure (2): Mean attitude scores of mothers and their schoolchildren in urban areas before, immediately after and 4 months after applying the health promotion nutritional educational program

Table (24): Attitude scores of mothers and their schoolchildren before, immediately after and 4 months after applying health promotion nutritional educational program according to their residence

Attitude	Urban (n=100) Mean±SD	Rural (n=100) Mean±SD	t value	P Value
Mothers:				
Before	15.30±2.66	11.96±2.44	9.257	<0.001
Immediately after	23.18±4.06	18.16±3.69	9.143	<0.001
After 4 months	20.72±3.50	16.28±3.29	9.251	<0.001
Children:				
Before	11.96±3.20	9.44±2.53	6.183	<0.001
Immediately after	18.16±4.71	14.44±3.88	6.096	<0.001
After 4 months	16.12±4.32	12.76±3.57	5.996	<0.001

Table (24) shows that attitude scores of mothers and their schoolchildren living in urban areas about nutrition were significantly better before, immediately after and 4 months after the application of health promotion nutritional educational program ($p<0.001$ for all comparisons).

Table (25): Attitude scores of mothers and their schoolchildren before, immediately after and 4 months after applying health promotion nutritional educational program according to education of mother

Attitude	Illiterate	Primary	Preparatory	Secondary	University	F	P
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Value	Value
Mothers:							
Before	12.38±2.50	12.82±2.95	14.80±3.09	13.69±2.95	14.95±3.15	5.961	<0.001
Immediately after	18.73±3.76	19.56±4.42	22.41±4.69	20.75±4.51	22.67±4.82	5.852	<0.001
After 4 months	16.92±3.39	17.32±3.97	20.02±4.08	18.58±3.91	20.29±4.14	5.813	<0.001
Children:							
Before	9.27±2.58	10.88±2.48	10.63±3.00	11.29±3.77	12.48±2.86	4.998	0.001
Immediately after	14.15±3.96	16.65±3.75	16.18±4.44	17.19±5.56	18.90±4.28	5.007	0.001
After 4 months	12.56±3.65	14.68±3.37	14.37±4.16	15.21±5.09	16.76±3.95	4.540	0.002

Table (25) shows that generally, attitude scores of mothers and their children who were within the higher education group were significantly better than those within the other groups. Differences among mothers were significantly more than those among school children.

Table (26): Attitude scores of mothers and their schoolchildren before, immediately after and 4 months after applying the health promotion nutritional educational program according to gender of schoolchildren

	Females	Males	t-value	p-value
	Mean±SD	Mean±SD		
Mothers:				
Before	14.30±3.10	13.15±2.92	2.678	.008
Immediately after	21.65±4.66	19.96±4.48	2.603	.010
After 4 months	19.36±4.21	17.88±3.84	2.582	.011
Children:				
Before	11.48±3.71	10.14±2.53	3.036	.003
Immediately after	17.43±5.52	15.48±3.81	2.951	.004
After 4 months	15.38±5.00	13.76±3.57	2.676	.008

Table (26) and Figure (3) show that attitude of mothers and their schoolchildren before, immediately after and 4 months after the application of the health promotion program differed significantly according to child's gender. Female schoolchildren and their mothers had significantly higher scores for attitude than those for male schoolchildren.

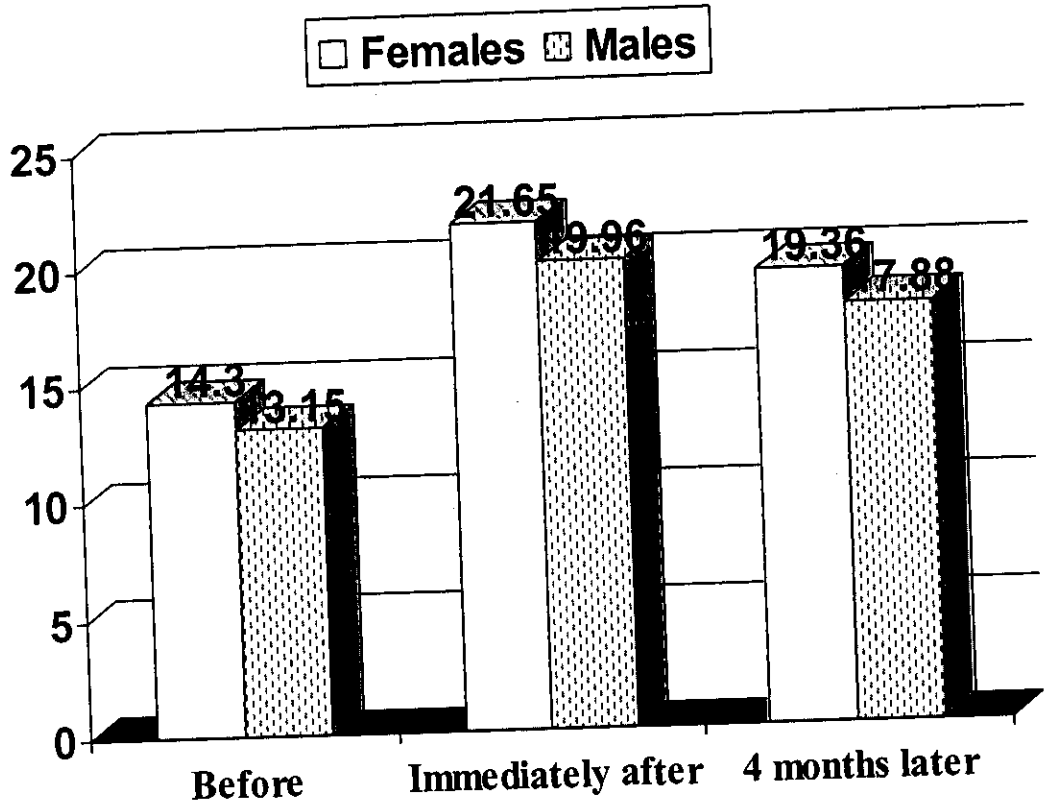

Figure (3): Attitude scores of mothers before, immediately after and 4 months after applying the health promotion nutritional educational program according to gender of schoolchildren

Table (27): Attitude scores of mothers and their schoolchildren before, immediately after and 4 months after applying the health promotion nutritional educational program according to mother employment

Attitude	Housewife Mean±SD	Employed Mean±SD	t-value	p-value
Mothers:				
Before	13.34±2.86	14.05±3.26	-1.627	.105
Immediately after	20.25±4.34	21.28±4.96	-1.564	.119
After 4 months	18.12±3.82	19.05±4.33	-1.603	.110
Children:				
Before	10.73±3.19	10.66±3.08	.155	.877
Immediately after	16.34±4.72	16.24±4.68	.141	.888
After 4 months	14.47±4.34	14.40±4.26	.103	.918

Table (27) shows that attitude of mothers and their schoolchildren before, immediately after and 4 months after the application of the health promotion program did not differ significantly according to mothers' employment.

Table (28): Attitude scores of mothers and their schoolchildren before, immediately after and 4 months after applying health promotion nutritional educational program according to family income

Attitude	<200 LE Mean±SD	200-399 LE Mean±SD	≥400 LE Mean±SD	F value	P value
Mothers:					
Before	12.04±2.41	13.65±2.96	15.40±2.81	26.197	<0.001
Immediately after	18.25±3.69	20.73±4.41	23.34±4.30	26.201	<0.001
After 4 months	16.40±3.21	18.56±4.01	20.80±3.70	25.273	<0.001
Children:					
Before	9.66±2.59	10.58±3.61	11.98±2.79	10.407	<0.001
Immediately after	14.75±3.96	16.10±5.27	18.23±4.21	10.438	<0.001
After 4 months	13.07±3.64	14.18±4.88	16.23±3.79	10.375	<0.001

Table (28) shows that attitude scores of mothers and their children who were within the highest income group (≥400 LE) were significantly better than those within the other two groups of lower income.

Part IV: Condition of home environment as regard nutrition

Table (29): Condition of home environment as regard nutrition

Observation	Urban (n=100) (%)	Rural (n=100) (%)	Z	P-value
Separate kitchen	86	54	5.269	<0.001
Proper ven tilation of the kitchen	68	32	5.547	<0.001
Availability of a basin at kichen	76	40	5.539	<0.001
Presence of a piece of soap by the basic	69	35	5.118	<0.001
Availability of running water	84	55	4.693	<0.001
Availability of sanitary sewage system	83	46	5.929	<0.001
Availability of enough pans for preparation of food	94	68	4.967	<0.001
Availability of enough plates to serve food for the family	73	58	2.260	0.0237
Availability of a special place to keep the kichen utensils	67	43	3.515	<0.001
Availability of a special cupboard/table to keep dry food	60	41	2.737	0.0061
Food pans are covered	80	65	2.409	0.0169
Availability of a stove for cooking	87	76	2.024	0.0429
Availability of a refrigerator to preserve food	85	64	3.510	<0.001
Presence of a special place for eating meals	69	47	3.233	0.0016
Proper ventilation of eating place	61	37	3.500	<0.001
Availability of a table on which food is served	92	76	3.162	0.0015
Availability of insects (flies/ants/cockroaches)	100	100	0.00	1.0000

Table (29) shows that the most frequently observed item related to home environment as regard nutrition in urban areas was availability of enough pans for preparation of food table on which food is served, followed by availability of a table on which food is served covering food pans (94% and 92%, respectively). In rural areas, the most frequently observed items were availability of stove for cooking and availability of a table on which food is served among more than three fourths of homes (76% for both). Insects were available in all homes (100%).

Part IV: Correlation between knowledge scores of mothers and their schoolchildren

Table (30): Correlation between knowledge scores of mothers and their children before applying health promotion nutritional educational program

		Importance of food	Nutrients	Daily nutritional requirements	Balanced diet
Imporance of food	r	.309			
	p	<0.001			
Nutrients	r		0.340		
	p		<0.001		
Daily nutritional requirements	r			.276	
	p			<0.001	
Balanced diet	r				.185
	p				.009

Table (30) shows that before the application of health promotion nutritional educational program, there were significant correlation coefficients between knowledge scores of mothers and their children as regard importance of food ($r=0.309$, $p<0.001$), nutrients ($r=0.340$, $p<0.001$), nutritional requirements ($r=0.276$, $p<0.001$) and balanced diet ($r=0.185$, $p=0.099$).

Table (31): Correlation between knowledge scores of mothers and their children immediately after applying health promotion nutritional educational program

		Importance of food	Nutrients	Daily nutritional requirements	Balanced diet
Imporance of food	r	.358			
	p	<0.001			
Nutrients	r		0.706		
	p		<0.001		
Daily nutritional requirements	r			-.048	
	p			.499	
Balanced diet	r				-.059
	p				.406

Table (31) shows that after the application of health promotion nutritional educational program, there were significant correlation coefficients between knowledge scores of mothers and their children in importance of food and nutrients ($p<0.001$ for both).

Table (32): Correlation between knowledge scores of mothers and their children 4 months after applying health promotion nutritional educational program

		Importance of food	Nutrients	Daily nutritional requirements	Balanced diet
Imporance of food	r	.507			
	p	<0.001			
Nutrients	r		.818		
	p		<0.001		
Daily nutritional requirements	r			.174	
	p			.014	
Balanced diet	r				.681
	p				<0.001

Table (32) shows that 4 months after the application of health promotion nutritional educational program, there were significant correlation coefficients between knowledge scores of mothers and their children as regard all components, i.e., importance of food ($r=0.507$, $p<0.001$), nutrients ($r=0.818$, $p<0.001$), daily nutritional requirements ($r=0.174$, $p=0.014$) and balanced diet ($r=0.681$, $p<0.001$).

Table (33): Correlation between total attitude scores of mothers and their children before, immediately after and 4 months after applying health promotion nutritional educational program

School children's Attitude	Mothers' Attitude					
	Before		Immediately after		Follow up after 4 months	
	r	p	r	p	r	p
- Before	0.295	<0.001	0.294	<0.001	0.290	<0.001
- Immediately after						
- After 4 months						

Table (33) shows that total scores for mothers' attitude correlated significantly with their corresponding schoolchildren's scores before, immediately after and 4 months after the application of the health promotion nutritional educational program ($p<0.001$ for all correlations).