ORIGINAL ARTICLES

The Impact of Social Status and School Meal on Psychosocial Behavior in Governmental Primary School Children in Egypt

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ABSTRACT

Background: Recent studies indicate that children in food-insecure households experience considerable psychological and emotional distress. Food hardship due to limited household resources is associated with greater numbers of behavior problems in children, Including hyperactivity and aggression as well as anxiety. *Objective:* to assess the effect of School Feeding Program (SFP) after five years of its implementation, on psychosocial behavior of primary school children at some governmental schools in relation to their socioeconomic status. *Methods:* A cross-sectional study was conducted in three governorates in Egypt. Intervention group consisted of **903** pupils in the 5th grade chosen randomly from schools have taken school meal for five years. The control group was **886** age and sex-matched pupils chosen randomly from schools have never taken school meal from the same district. The snack consists of a pie fortified with minerals and vitamins. Assessment of nutritional status, socio-demographic and dietary behavior was performed. Psycho social behavior was rated by school teachers using Pediatrics Symptom Check List-17 (PSC-17). *Results:* 4.7% of total sample had psychosocial problems. Externalizing behavior was rated among 19% of children, while 13.6% showed internalizing problems. Logistic regression analysis revealed that number of meals consumption /day is the strongest predictors of psychosocial behavior of children followed by maternal education and child order. As for attention deficits, the analysis showed that father income and maternal education level are the social factors, while having no school meals followed by breakfast skipping are the strongest nutritional predictors of attention problems. Externalizing behavior is better in children provided school meal in combination with number of meals consumed per day +/- breakfast. School meal was the most powerful predictor of internalizing behavior followed by family income and mother education. *Conclusion*: mother education, family income as well as nutritional factors (school meal, breakfast, number of meals) has the most impact on psychosocial behavior of children.

Key words: school feeding program - externalizing, internalizing, attention behavior - social factors

Introduction

Nutritional and health status are powerful influences on a child's well being and behavior as well as learning and performance in school. Children who lack certain nutrients in their diet (particularly iron, zinc and iodine), or who suffer from protein-energy malnutrition, hunger, parasitic infections or other diseases, do not have the same potential for learning as healthy and well-nourished children. Weak health and poor nutrition among school-age children affect their cognitive and behavioral development either through physiological changes or by reducing their ability to participate in learning experiences or both (Zaini, *et al*, 2005 and Zalilah *et al*, 2000).Food hardship often accompanies child poverty, which refers to the lack of food or money to buy food that a family needs. Malnutrition is the main problem in poor countries. Children who are stunted, anemic, experience hunger or have poorer dietary intakes tend to have poorer behavioral problems and lower cognition achievement levels. (Grantham, 2005).

Malnutrition disorders affect more than 30% of school children in Egypt. Iron deficiency anemia is by far the most common nutritional disorder. But subclinical vitamin A deficiencies and other micronutrient deficiencies are also present. Malnutrition disorders affect the cognitive and the behavioral development of these children (Bryan *et al*, 2004 and Wachs (2000)). The performance of the school meal program has been evaluated by a variety of authors in terms of nutrition (Grainger, Senauer, & Runge, 2007; Gleason & Suitor, 2003), health (Hofferth & Curtin, 2005). Slack & Yoo, (2005) have focused on the relationship between food hardship and the problem behaviors of children.

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Family socioeconomic status (SES) is related to children's cognitive &behavioral performance even before entry into formal schooling (Rhemtulla and Tucker-Drob, 2012). 20% of Egyptian children live in poverty. Child-poverty in Egypt is regional, with higher concentrations in rural areas and Upper Egypt; 30.5% of children in rural areas live in poor households, as compared with 12.6% in urban areas. (UNICEF, 2010). Poverty is associated with food insecurity, and poor sanitation and hygiene. Poverty is also associated with poor maternal education, increased maternal stress and depression and inadequate stimulation at home. All these factors detrimentally affect child development. (Grantham-McGregor *et al*., 2007)

School feeding offers an excellent opportunity for targeted intervention in primary school children in Egypt. School feeding is helping to eliminate hunger for millions of children around the globe and is contributing to their education, nutrition, health and future productivity as adults. (WFP, 2009). However, in Egypt, few researches have been carried out to explore the effect of school feeding program on children's neurobehavioral development. (Wahba *et al*, 1998 and Yunis, 1995).

The Ministry of Agriculture and Land Reclamation (MOLAR) in Egypt has realized the importance of supporting the cognitive, behavioral and physical development of children to ensure their future well-being. MOLAR had established School Feeding Program (SFP) since 1998 up till now. The idea of the establishment of SFP in Egypt is considered as a policy instrument for achieving the Millennium Development Goals of universal primary education and the reduction of hunger for Egyptian children in the school age group. The school snack in the form of pie provided by the program usually provides from one fifth, one-fourth, one third and one-half of the recommended daily allowance for energy, protein, folate and iron for the school-age group targeted by the program respectively. The snack consists of a low energy pie fortified with minerals and vitamins. Elements in the fortified flour are: Vitamin A, vitamin C, thiamin, riboflavin, vitamin B_6 andB_{12}, niacin, folate, calcium, iron, zinc and phosphorus. Although the school meal flour provides only 16.9 % of RDA for energy, 4.3% of RDA for vitamin C ; 5.5% of RDA for calcium ; yet it provides 35.8 % of RDA for iron and 41.7% of RDA for folate , and about 26.81% of RDA for protein . The pie contains either minced dry date or a jam to be more nutritious and acceptable. (MALR, 2009)

A research to evaluate the Nutrition and Health conditions of school children that are involved in the School Feeding Program run by the Agricultural Research Center was conducted by the collaboration between Agricultural Research Center and National Research Center in Egypt. The basic indicators for the evaluation would be looking at the cognitive and psychosocial functions of students as well as their physical growth.

The objective of this study was to assess the effect of school feeding after five years of implementation on psycho behavioral problems in relation to socioeconomic status and dietary behavior.

Subjects and methods:

Study design:

The static group comparison design was employed as there was no baseline data to apply Pretest- posttest control design; the ideal to achieve our objective (Trochim, 2006) Egypt's Ministry of education used a "poverty map" to determine which schools have the priority to receive school meals in each governorate. The evaluation covered a period of eighteen months starting from October 2009 till May 2011. This cross-sectional study was conducted in three governorates: Behara, Damietta and Fayoum representing rural, urban and Upper Egypt governorates respectively.

The intervention group consisted of 903 pupils in the 5th grade chosen randomly from schools have taken school meal for five years. The control group was 886 age and sex-matched pupils chosen randomly from schools have never taken school meal.

Inclusion criteria: apparently healthy prepubescent boys and girls in the 5th grade.

Exclusion criteria: Students proved to have any mental disorder, chronic disease, visual or auditory impairment, were excluded.

The study was approved by the Ethical Committees of the National Research Centre and Agricultural Research Centre. Permission to conduct the research in the selected schools was also obtained from the Egyptian Ministry of Education. Data were collected between March 2010 and May 2010.

Methods:

A well-structured questionnaire: was applied to each student through an interview to collect socio-demographic and nutritional data. The information collected included age, sex, number of family members, and birth order of the child under study, parental educational level, parental occupation, and household income.

Nutritional Status Assessment: was carried out through measurements of weight and height. All measurements were made according to techniques described in the Anthropometric Standardization Reference

Manual (Lohman *et al*., 1988). Weight-for-age z scores (WAZ), height-for age z-scores (HAZ) for all children were calculated based on the WHO growth standards (WHO, 2009) with the help of Anthro-Program of PC

Dietary pattern assessment: to evaluate dietary habits and behavior of children (skipping breakfast, number of meals consumed per day, eating the served school meal, source of other meals consumed through school day).

Behavioral Assessment By using The *Pediatric Symptom Checklist-17* (PSC-17); a psychosocial screen designed to facilitate the recognition of emotional and behavioral problems so that appropriate interventions can be initiated as early as possible; was filled out by the teachers. It is a highly reliable and valid tool for the assessment of behavioral problems of children between 4-16 years. It could be scored into three broad mental health problems, Internalizing subscale; Attention subscale, and Externalizing subscale. The PSC-17 consists of 17 items that are rated as "Never," "Sometimes, " or "Often" present a value of 0 is assigned to "Never", 1 to "Sometimes," and 2 to "Often". The total score is calculated by adding together the score for each of the 17 items. Items that are left blank are simply ignored (i.e., score equals 0). If four or more items are left blank, the questionnaire is considered invalid (Gardner W, Murphy, *et al*.1999). % of psychosocial problems among children are calculated according to standard cut-offs:

- Total Score 15 or more.
- Attention sub scale 7 or more.
- Internalizing sub scale 5 or more.
- Externalizing sub scale 7 or more.

Statistical analysis: Data were analyzed using Statistical Package for Social Sciences (SPSS) version 16. Quantitative Data were presented as means ±SD. The independent sample-t test was used to analyze mean difference. Qualitative data were summarized as percentages and comparison between groups was done using Chi square-test. For all tests, probability values (P) of less than 0.05 were regarded as statistically significant. ANOVA with Post-hoc test was used to study the association of behavioral function and the intake of school snack and breakfast eating pattern and number of meals. Multiple linear regression analysis was done to assess the contribution of each independent variable (SFP, socio-economic status, breakfast eating habit, and nutritional status) in explaining the variation in the dependent variables (PSL total score, internalizing subscale ; attention subscale ,and externalizing subscale)

Results:

The studied sample included 1789 children from 5th primary, 52% were males and 48% were females (table, 1). Studying background variables of the intervention and the control groups as shown in table (2), revealed that, the majority of the intervention group children were belonging to families with high percentage of low-educated mothers (74.8% in the intervention group vs. 44.1% in the control group, p<0.001), low-educated fathers (68.3% in the intervention group vs. 47% in the control group, p<0.001), low-income father's job (64.6% vs. 42.9%, p<0.001) and large –sized families (64.2% % in the intervention group vs. 35.8%% in the control group, p<0.001). The order of the child under the study being the 3rd or more was higher in the intervention group if compared to the control group (46.3% vs. 36.7%, p < 0.001).

Table 1: Distribution of the sampled school children per governorates.

			School type		Total
			Meal	No Meal	
Governorate	Domiat	Count	267	354	621
		% of Total	14.9%	19.8%	34.7%
	Behira	Count	60	299	359
		% of Total	3.4%	16.7%	20.1%
	Fayoum	Count	569	240	809
		% of Total	31.8%	13.4%	45.2%
Total		Count	896	893	1789
		% of Total	50.1%	49.9%	100.0%

Table (3) shows dietary behavior and indicators of nutritional status of the intervention and the control group. Dietary behavior assessment revealed that the percentage of children having breakfast regularly was higher in the intervention group (74.4%) than the control group (69.2%) with highly significant difference (p=0.008).On the other hand, there was no significant difference between the two groups as regard the number of received meals/day. Assessment of nutritional status revealed that the majority of children in the two groups were within normal height for their age (93%). However, the percentage of stunted children was more in the

intervention group (7.6%) versus (2.9%) of the control group with highly significant difference (p<0.001). Although, under-weight children (WAZ <-2) representing very small percentage in the two groups (7.9%), it was higher in the intervention group (1.1%) than the control group (0.3%) with highly significant difference (p<0.001).

Table 2: Socio-demographic variables of the intervention and control groups.

Variables	Control gr. (No School Meal) (n=886)	Intervention gr. (School Meal) (n=903)	X^2	p
Sex				
Male	476 (53.7%)	458 (50.7%)	1.618	0.110
Female	410 (46.3%)	445 (49.3%)		
Mother Education				
Low (Less than High School)	391 (44.1%)	675 (74.8%)	174.1	<0.001
High (High School or University)	495 (55.9%)	228 (25.2%)		
Father Education				
Low (Less than High School)	417 (47%)	617 (68.3%)	82.3	<0.001
High (High School or University)	469 (53%)	285 (31.6%)		
Father Job				
Low-income job	380 (42.9%)	583 (64.6%)	84.5	<0.001
High-income job	506 (57.1%)	320 (35.4%)		
Family Size				
Large	317 (35.8%)	580 (64.2%)	144.8	<0.001
Small	569 (64.2%)	323 (35.8%)		
Order of Birth				
Child 3rd or more	325 (36.7%)	418 (46.3%)	17.0	<0.001
Child 1st or 2nd	561 (63.3%)	485 (53.7%)		

Table 3: Dietary behavior and nutritional status of the intervention and control groups.

Variables	Control gr. (No school Meal) (n=886)	Intervention gr. (school Meal) (n=903)	X^2	p
Breakfast				
Irregular or skipped Breakfast	273 (30.8%)	231 (25.6%)	6.048	0.008
Took breakfast regularly	613 (69.2%)	672 (74.4%)		
Number of Meals/day				
Less than 3/day	108 (12.2%)	102 (11.3%)	0.345	0.304
3 or more Meals/day	778 (87.8%)	801 (88.7%)		
HAZ				
Stunted	26 (2.9%)	69 (7.6%)	22.090	<0.001
Not-stunted	860 (97.1%)	834 (92.4%)		
WAZ				
Underweight	3 (0.3%)	10 (1.1%)	36.788	<0.001
Not-underweight	883 (99.7%)	893 (98.9%)		

HAZ: Height/age Z score   WAZ: Weight/age Z score

Regarding psychosocial problems, table (4a) shows that: according to teachers' rating using Pediatrics Check List-17 (PSC-17), 4.7% of total sample had psychosocial problems (44.6% of the control group and 55.4% of the intervention group). Externalizing behavior was rated among 19% of children (54% of the control group and 46% of the intervention group), while 13.6% showed internalizing problems (28% of the control group and 71% of the intervention group). Attention deficiets was rated among 16% of total sample of children (39% of the control group and 71% of the intervention group.

Table (4-a): Effect of Dietary Behavior on Psychosocial behavior.

	n	Total score		Internalizing	
		≥15	<15	≥5	<5
School Meal					
No	885	38 (45.2%)	848 (49.7%)	69 (28.4%)	817 (52.8%)
Yes	902	46 (54.8%)	857 (50.3%)	174 (71.6%)	729 (47.2%)
		OR=0.83 (0.53-1.32)		OR=0.35 (0.26-0.48)	
Breakfast					
No	503	16 (19.0%)	488 (28.6%)	77 (31.7%)	427 (27.6%)
Yes	1284	68 (81.0%)	1217 (71.4%)	166 (68.3%)	1119 (72.4%)
		OR=0.59 (0.32-1.05)		OR=1.22 (0.90-1.64)	
Number of Meals					
<3	210	2 (2.4%)	208 (12.2%)	30 (12.3%)	180 (11.6%)
≥3	1577	82 (97.6%)	1497 (87.8%)	213 (87.7%)	1366 (88.4%)
		OR=0.18 (0.03-0.73*)		OR=1.07 (0.69-1.64)	
Breakfast+ School Meal					
No Breakfast+ No School Meal	273	11 (21.2%)	262 (29.4%)	23 (16.1%)	250 (31.3%)
Breakfast+ School Meal	669	41 (78.8%)	628 (70.6%)	120 (83.9%)	549 (68.7%)
		OR=0.64 (0.31-1.32)		OR=0.42 (0.26-0.69)	
School Meal + Number of Meal					
No School Meal + Number of Meals <3	108	0 (0.0%)	108 (12.5%)	5 (3.2%)	103 (13.7%)
School Meal + Number of Meals ≥3	800	44 (100.0%)	756 (87.5%)	149 (96.8%)	651 (86.3%)
		OR= 0.00 (0.00-0.79*)		OR=0.21 (0.07-0.55*)	
Breakfast + Number of Meal					
No Breakfast+ Number of Meals <3	115	0 (0.0%)	115 (15.5%)	20 (14.6%)	95 (14.8%)
Breakfast+ Number of Meals ≥3	665	40 (100.0%)	625 (84.5%)	117 (85.4%)	548 (85.2%)
		OR= 0.00 (0.00-0.67*)		OR=0.99 (0.56-1.71)	
Breakfast+ School Meal + Number of Meal					
No Breakfast+ No School Meal + Number of Meals <3		0 (0.0%)	62 (9.6%)	2 (1.7%)	60 (10.5%)
Breakfast+ School Meal + Number of Meals ≥3		39 (100.0%)	584 (90.4%)	113 (98.3%)	510 (89.5%)
		OR=0.00 (0.00-1.21*)		OR=0.15 (0.03-0.64*)	

Table (4-b): Effect of Dietary Behavior on Psychosocial behavior (whole sample).

	n	Attention		Externalizing	
		≥7	<7	≥7	<7
School Meal					
No	885	116 (39.6%)	770 (51.5%)	181 (54.0%)	705 (48.5%)
Yes	902	177 (60.4%)	726 (48.5%)	154 (46.0%)	749 (51.5%)
		OR=0.62 (0.47-0.80)		OR=1.25 (0.98-1.60)	
Breakfast					
No	503	90 (17.9%)	414 (27.7%)	111 (22.0%)	393 (78.0%)
Yes	1284	203 (15.8%)	1082 (84.2%)	224 (17.4%)	1061 (82.6%)
		OR=1.16 (0.87-1.54)		OR=1.34 (1.03-1.74)	
Number of Meals					
<3	210	31 (10.6%)	179 (12.0%)	34 (10.1%)	176 (12.1%)
≥3	1577	262 (89.4%)	1317 (88.0%)	301 (89.9%)	1278 (87.9%)
		OR=0.87 (0.57-1.33)		OR=0.82 (0.55-1.23)	
Breakfast+ School Meal					
No Breakfast+ No School Meal	273	40 (24.0%)	233 (30.1%)	66 (37.7%)	207 (27.0%)
Breakfast+ School Meal	669	127 (76.0%)	542 (69.9%)	109 (62.3%)	560 (73.0%)
		OR=0.73 (0.49-1.10)		OR=1.64 (1.14-2.36)	
School Meal + Number of Meal					
No School Meal + Number of Meals <3	108	7 (4.4%)	101 (13.5%)	19 (12.1%)	89 (11.9%)
School Meal + Number of Meals ≥3	800	152 (95.6%)	648 (86.5%)	138 (87.9%)	662 (88.1%)
		OR=0.30 (0.12-0.67*)		OR=1.02 (0.58-1.78)	
Breakfast + Number of Meal					
No Breakfast+ Number of Meals <3	115	22 (15.1%)	93 (14.7%)	23 (17.6%)	92 (14.2%)
Breakfast+ Number of Meals ≥3	665	124 (84.9%)	541 (85.3%)	108 (82.4%)	557 (85.8%)
		OR=0.98 (0.57-1.67)		OR=1.29 (0.76-2.18)	
Breakfast+ School Meal + Number of Meal					
No Breakfast+ No School Meal + Number of Meals <3	62	4 (3.2%)	58 (10.4%)	13 (11.0%)	49 (8.6%)
Breakfast+ School Meal + Number of Meals ≥3	623	122 (96.8%)	501 (89.6%)	105 (89.0%)	518 (91.4%)
		OR=0.28 (0.09-0.83*)		OR=1.31 (0.65-2.60)	

Tables (4a&4b), demonstrate the effect of school meal, breakfast, and number of meals separately and in combination on psychosocial behavior; as for the relation of school meal and the total score it was found that

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school meal, breakfast ,and number of meals separately or in combination were negatively statistically significant (OR=0.83,0.59, 0.18, 0.64, p=0.00, 0.00, 0.00&0.00 respectively). As regard the internalizing behavior score it was found that; school meal, breakfast + school meal, school meal+ number of meals as well as breakfast + school meal + number of meals were negatively statistically significant (OR=0.35, 0.42, 0.21, 0.15 respectively). Attention score was also negatively significantly correlated to combination of school meal + number of meals (OR=0.30), as well as to, breakfast+ school meal + number of meals (OR= 0.28). Combining school meal with breakfast; school meal with number of meals; school meal with number of meals and breakfast there was a positive high significance with externalizing scores. Tables (5-7) demonstrate distribution of social factors in combination with school meal. Maternal education has statistically significant effect on behavioral scores, where highly educated mother have positive effect on all scores; total score(OR=0.29(0.15-0.54) , p=0.000); internalizing score (OR=0.33 (0.18-0.16) ; p=0.000) ; externalizing score (OR=3.08 (1.75-5.44) ; p= 0.000) and attention score(OR= 0.38(0.17-0.86) , p=0.018) (Table, 5). 4.6% of children belonging to high mother education in combination with school meal have internalizing behavior, versus 13.2 % of children of low educated mothers.

Table 5: Effect of maternal education on Psychosocial Behavior.

		n	High education ++	Low education+
Total score meal		181	30 (12.4%)	151 (62.4%)
(≥15) No meal		61	25 (10.3%)	36 (14.9%)
OR= 0.29 (0.15-0.54) P=0.000				
Internalizing meal		173	33 (4.6%)	140 (13.3%)
≥5 no meal		67	28 (4%)	39 (3.8%)
OR= 0.33 (0.18-0.61) P=0.000				
Externalizing meal		120	22 (10.4%)	70 (33.0%)
≥7 no meal		92	52 (24.5%)	68 (32.1%)
OR= 3.08 (1.75-5.44) P=0.000				
Attention meal		86	14 (10.3%)	72 (52.9%)
≥7 no meal		50	17 (12.5%)	33 (24.3%)
OR= 0.38 (0.17-0.86) P=0.018				

Table 6: Effect of Child Order on Psychosocial Behavior.

		n	Child Order (1-2)	Child Order (≥3)
Total score meal		181	83 (34.3%)	98 (40.5%)
(≥15) No meal		61	38 (15.7%)	23 (9.5%)
OR= 0.51 (0.28-0.93) P= 0.026				
Internalizing meal		173	84 (35%)	89 (37.1%)
≥5 no meal		67	45 (18.8%)	22 (9.2%)
OR= 0.46 (0.26-0.83) P=0.009				
Externalizing meal		92	40 (18.9%)	52 (24.5%)
≥7 no meal		120	65 (30.7%)	55 (25.9%)
OR=0.51 (0.65-0.38) P= 0.123				
Attention meal		86	49 (36.0%)	37 (27.2%)
≥7 no meal		50	31 (22.8%)	19 (14.0%)
OR= 0.81 (0.40-1.66) P= 0.566				

Child Order ≥3:3rd or more
Child Order (1-2): 1st, 2nd

As regard the effect of child order, it has a significant effect on the behavioral total score (OR=0.51-0.93, p= 0.026); the distribution of total behavioral score among child order ≥3 is higher, as well as the internalizing behavior score (OR= 0.46 (0.26- 0.83), p=0.009). There was no significant effect of child order on both externalizing score and attention score (table, 6). Externalizing behavior was lower among 1st or 2nd born child than their peers with child order 3 or more, either those who goes to schools providing meals (15.5% versus 18.3%) or schools not providing meals (19.3% versus 22.5%; OR=1.58). Table (7) shows that total score in low

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income families (OR= 0.51(0.28-0.94), p=0.03) internalizing behavior was higher in low income than middle income families, combination with school meal shows unexpected result as 21.1% children who goes to school providing meals had internalizing behavior versus only 10.5% of children who had no meals (OR =0.52(0.29-0.93), p= 0.026).Also low income has a significant effect on externalizing scores (OR=0.45- 0.80) ,p= 0.006 , with higher percentage on those having the meal 23.3% of children with low family income in combination with school meal had attention deficits, versus 18.7% who has no meal. While 14.7% of children with middle family income, had school meal and showed attention deficits versus 8. 9 % of children who had no school meal and belong to middle income families. Tables (8, 9, 10, and 11) discuss logistic regression analysis. Table (8), discuss the factors that predict the total psychosocial score, it revealed that number of meals consumption /day are strong predictors of psychosocial behavior of children (p=0.024), followed by maternal education (p=0.027) and child order (p=0.049). As for attention deficiets, the analysis showed that maternal education level and family income are the social factors (p=0.000 &0.001 consequently) while absence of school meal & number of meals (p=0.007), followed by absence of school meal(p=0.011), then breakfast skipping(p=.046), are the nutritional predictors of attention problems (table,9), while externalizing behavior could be predicted by social factors that include mother education (p=0.019) followed by family size (p=0.03). Externalizing behavior is better in children provided school meal in combination with number of meals consumed per day +/- breakfast (p= 0.01, 0.014) (table, 10). Family income and maternal education were the dominant predictors of internalizing behavior (p=0.013& 0.027), (table, 11).

Table 7: Effect of Family Income on Psychosocial Behavior.

	n	High	Low
Total score meal	181	45 (18.6%)	136 (56.2%)
(≥15) No meal	61	24 (9.9%)	37 (15.3%)
OR= 0.51 (0.28-0.94) P= 0.030			
Internalizing meal	173	49 (20.4%)	124 (51.7%)
≥5 no meal	67	29 (12.1%)	38 (15.8%)
OR= 0.52 (0.29-0.93) P= 0.026			
Externalizing meal	92	26 (12.3%)	66 (31.1%)
≥7 no meal	120	56 (26.4%)	64 (30.2%)
OR= 0.45 (0.25-0.80) P= 0.006			
Attention meal	86	24 (17.6%)	62 (45.6%)
≥7 no meal	50	19 (14.0%)	31 (22.8%)
OR= 0.63 (0.30-1.32) P=0.222			

Low Income= Father is Unemployed, Day by day worker, Farmer & Laborer
Middle Income= Father is Employee, Professional & Employer or dealer

Table 8: Logistic Regression of Factors Affecting Psychosocial Behavior.

	B	S.E.	Wald	df	Sig.	Exp(B)
Breakfast	-.581-	.328	3.132	1	.077	.559
Number of Meals	-1.650-	.730	5.102	1	.024	.192
Breakfast & School Meal	.163	.089	3.393	1	.065	1.177
School Meal & Number of Meal	-.189-	.109	2.994	1	.084	.828
Child Order	.452	.230	3.880	1	.049	1.572
School Meal & Mother Education	.567	.326	3.018	1	.082	1.763
Mother Education	.635	.287	4.918	1	.027	1.888
Constant	5.892	1.670	12.449	1	.000	362.11

Dependent factor: total scale score

Table 9: Logistic Regression of factors affecting Attention behavior.

	B	S.E.	Wald	df	Sig.	Exp(B)
School Meal	-.490-	.193	6.432	1	.011	.613
Breakfast	.335	.168	3.971	1	.046	1.398
School Meal & Number of Meals	-.228-	.085	7.179	1	.007	.796
Breakfast & School Meal & Number of Meals	.139	.082	2.855	1	.091	1.149
Father Income	.494	.146	11.432	1	.001	1.639
Mother Education	.607	.159	14.512	1	.000	1.835
Constant	.563	.672	.703	1	.402	1.756

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Table 10: Logistic Regression of factors affecting externalizing behavior.

	B	S.E.	Wald	df	Sig.	Exp(B)
Breakfast	.423	.151	7.899	1	.005	1.527
School Meal & Number of Meals	-.178-	.069	6.679	1	.010	.837
Breakfast & Number of Meals	-.192-	.080	5.804	1	.016	.825
Breakfast & School Meal & Number of Meals	.273	.111	6.077	1	.014	1.315
Father Income	.256	.134	3.661	1	.056	1.292
School Meal & Family Income	.067	.036	3.535	1	.060	1.069
Family Size	.280	.129	4.710	1	.030	1.324
Mother Education	.337	.143	5.543	1	.019	1.401
Constant	-.470-	.439	1.146	1	.284	.625

Table 11: Logistic Regression of factors affecting internalizing behavior.

	B	S.E.	Wald	df	Sig.	Exp(B)
School Meal	-.870-	.159	30.096	1	.000	.419
Breakfast	.276	.153	3.270	1	.071	1.318
Father Income	.394	.158	6.202	1	.013	1.483
Mother Education	.379	.172	4.862	1	.027	1.460
Constant	1.712	.488	12.285	1	.000	5.541

Discussion:

Children in schools offering meals had lower socioeconomic characteristics; regarding maternal education, 74.8% of the intervention group mothers did not receive enough education versus 44.1% of the control group (P=0.001), family income 68.3% in the intervention group versus 47.7% in the control group belong to the low income group (p=0.001), they also have bigger family size   and higher child order that were statistically significant as well. The rate of the total psychological problems, internalizing and attention problems were found to be higher in the intervention group with significant difference whereas externalizing problems were less in the intervention group with a significant difference.

Assessing the relation of the school meal+_breakfast+- number of meals in comparison between the two groups, there was a significant positive effect on the externalizing score, whereas the total score, the internalizing and the attention scores were significantly higher among the intervention group. Our results found a profound statistically significant relation of behavioral problems to factors other than nutritional factors, where maternal education proved to have a significant effect on all behavioral scores, child order as well had statistically significant relation to total behavioral score (P=0.026) and internalizing subscale (P=0.00), family income is among the social factors that have its implementation on behavioral total score (p=0.003), internalization subscale (p=0.026) and externalization (p=0.006).

Applying logistic regression analysis to assess the psychosocial total score predictors, it was found that in order, child order (p=0.019), then number of meals (p=0.024), followed by maternal education (p=0.027) are the main predictors. As for the predictors of attention subscale, maternal education (p=0.000), family income (p=0.001), having school meals+- number of meals (p=0.007) and breakfast (p=0.046). Predictors of externalization include maternal education (p=0.019), family size (p=0.03), as well as school meals + number of meals +- breakfast (p=0.01&0.014). Predictors of internalization were family income and maternal education (p=0.013 & 0.027).

It is clear from all of the above that social factors are important predictors of psychosocial behavior especially maternal education.

Not all the findings in this study were in agreement with previous studies that assumed serious problem behaviors occur from those children already exposed to food hardship the focus of these studies was limited to children from low-income families (Dunifon & Lowaleski-Jones, 2004; Reid, 2002; Slack & Yoo, 2005). Our findings are in agreement with Hur (2012) and Reid (2002) who found that food hardship is not the only predictor of behavioral problems in elementary school children as there were behavioral problems due to causes other than food hardship these problem behaviors were present for all the children who can purchase their food or depend on the offered food by the school program. Interestingly, the problem behaviors of low-income children experiencing food hardship were lower than those of other children or those purchasing full-price lunches, Externalizing behavior problems were more extensively associated with food hardship than were internalizing behavior problems The group depending on school meal, showed a higher level of problem behaviors only for externalizing behavior and anxiety that agree with our results as regard anxiety (internalization) but not externalization that were higher among the control group this may be explained by skipping breakfast that was more predominant among the control group that may refer to less adaptation to

hunger. This result suggests that the tolerance of low-income children to food hardship is greater than that of children with a higher socioeconomic status what is called zone of tolerance.

Attention was also affected among both groups but significantly higher in intervention group children this could be explained on the basis that attention deficits is claimed to be due to food addidetives or high sugary meals. The children studied have the habit of consuming colored high sugar drinks (sharbat). In contrary Wesnes *et al*(2003) and Ns Gajre,*et al* (2008 found that breakfast reduces declines in attention and memory over the morning in school children. Regarding internalization poor maternal education is another factor that agrees with our previous work on the relation of depression and anxiety in school children to socioeconomic and nutrition variables (Monir *et al*, 2010).

Conclusion:

The findings of the analysis showed that all of the studied social factors play profound role on psychosocial performance in addition to the nutrition. School breakfast should be considered for both low-income children and children receiving little attention at home. Meanwhile, dietary behavior especially having breakfast beside meals is considered as enabling environment' supportive to having school meal. Accordingly, the ongoing process of the National School Feeding Program, should reach a sustainable mechanism of providing fortified school meals to all children thus helping extend the school feeding program to include the increasing number of families and their children now under threat of falling below the poverty line, who have been exposed to food hardship as a result of the recent high food prices. Care at home and school to ensure children's food security should be a potential focus, as researchers further examine the association between food hardship and problem behaviors in all school children. Awareness nutrition and health education programs are recommended to educate caregivers how to increase caloric and essential micro nutrients (food for the brain) of their children diets, using available food in their communities.

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