The Double Burden of Malnutrition in Egyptian Children

Malnutrition in children has for many years been a problem in the developing world and has been the theme of scholarly research, policy and interventions. At the onset of the malnutrition discussion, undernutrition was the main problem. As efforts were put into reducing undernutrition, the proportions of undernourished children decreased, and it is not as big a problem as it was before. However, as many developing countries began going through the development transition, changes in diets and lifestyle led to the rates of obesity rising, especially among women and children. Much work has been done on the risk factors associated with childhood obesity, and there are three main schools of thought on this issue. The first school attributes obesity to diet and inactivity; another attributes it to genetics, and the third to socioeconomic status (Galal and Hulett, 2005). In fairly recent years, another twist has been added to the story of malnutrition in developing countries. In some countries, many households have both undernourished (stunted) and obese members (Garrett and Ruel, 2003). These tend to be obese mothers who have stunted children. This is the case because many of these mothers were also malnourished as children, and research has shown that people undernourished as children are much more likely to be obese as adults and to suffer the metabolic effects of obesity. Also, short people very quickly become obese when they gain any weight, since body mass index (BMI) measures one's weight in comparison with his/her height in classifying obesity.

It has further been noticed in the past two decades that many stunted children are becoming overweight or obese, even in their childhood. This was first observed and studied amongst older children and adolescents. Amongst children in developing countries, simultaneous stunting and overweight or obesity has been explored by several researchers. Popkin *et al.* (1996) found an association between stunting and overweight in children aged 3 to 9 years in four countries (Russia, Brazil, the Republic of South Africa and China) undergoing transitions in development, with concomitant changes in nutrition and lifestyle. Similar patterns have been observed in Brazil (Sawaya *et al*., 1995) in Senegal (Benefice *et al*., 2001) and again by Faber *et al.* (2001) and Steyn *et al*. (2005) in South Africa

Egypt is typical of a country undergoing both the development and nutrition transitions. Officially, it is classified as a middle income country, even though there are still great inequalities in income and resource distribution (Population Reference Bureau, 2007). The overall levels of stunting in children reduced from 30% in 1995 to 18% in 2005 (El Zanaty *et al.,* 2006). On the other hand, obesity levels in children have been gradually rising. Between 1976 and 1995/96, the rate of obesity in children aged 0-5 rose from 2.2 to 8.6% (Ebbeling *et al*, 2002).

The focus of this paper is to investigate the levels of stunting, obesity and simultaneous stunting and obesity among children under five years of age in Egypt. The paper will further examine associations between demographic and socioeconomic characteristics and these conditions, and explore differences between the backgrounds of children in each of these groups.

Data and Research Methods

Data used in this paper are from the Egypt Demographic and Health Survey (EDHS) of 2005. The survey was primarily funded by the United States Agency for International Development (USAID) and implemented by Macro International. Data on the socioeconomic and demographic characteristics of mothers and households with children under age five, as well as anthropometric measurements and demographic characteristics of the children are used. The nutritional status of the children are measured using z-scores, which are obtained by comparing individual anthropometric measurements with standard growth reference curves of the United States Centre for Health Statistics, Center for Disease Control and World Health Organization (NCHS/CDC/WHO,1976). A child is regarded as stunted if his or her height-for-age z-score is less than two standard deviations from the median of the reference population for the relevant sex and age group. Conversely, a child is considered obese if his or her weight-for-height z-score is greater than two standard deviations from the median of the reference population for the relevant sex and age group. A wasted child is one who is

underweight (with a weight less than 2 sd from the median of the reference population) for his or her height. For this study, a normal child is one who has both a normal weight-for-height and height-for-age; or is tall-for-age, but has a normal weight- for-height.

After preliminary descriptive analysis, multinomial logistic regression is used to find the log odds and odds ratios of being in one of five groups- stunted and obese; obese only; stunted only; wasted; or normal- for children in categories of each of the independent variables. Children who are in the normal group are used as the reference. Only the final model is reported in this abstract for a lack of space, but it was arrived at after fitting a series of nested models. The first model was with the age of the child only, and fit in different ways- as a continuous variable; in aggregate groups of months of age (the final choice); and as a quadratic variable (mean deviation of age squared), and with the best fitting form chosen. Further, gender, birth order and preceding birth interval of children were added on to the first model. Next, the educational attainment of mothers and their work status in the year preceding the survey were added on; and finally, household wealth quintile and region of residence were added on to the model. Mothers' ages had no significant effect on the model and were therefore not controlled for. Also, rural-urban residence was not important in the model when added, but region of residence was, and so that was used instead of rural-urban residence in specifying the model. Most analysis is done with Statistical Package for Social Sciences (SPSS). The full paper will also look at the influence of birth weight, succeeding birth intervals and the extent and duration of breastfeeding on child nutritional outcomes in Egypt.

Expected Findings

Tables 1 and 2 below contain a brief overview of the expected findings of the study. Table 1 shows the children in each of the nutritional status groups, whilst Table 2 presents log odds and odds ratios for the final model fit to explore the variations in nutritional status amongst the children.

Table 1: Children in the various nutritional status groups, 2005 EDHS

Category	**Frequency**	**Percentage**
Stunted and Obese	431	3.5
Obese only	657	5.4
Stunted only	1738	14.2
Wasted	436	3.6
Normal	8938	73.3
Total	**12200**	**100.0**

Source: Computed by the author from the EDHS 2005 data

Overall, nearly 18% (2169) of the children are stunted and 8.9% (1088) are obese (not shown in table). Further, 3.5% (431)) of the total number of children are both stunted and obese. These 431 children make up 39.6% of all the obese children, indicating that two out of every five children who are overweight for their height, an indication of overnourishment in the relatively short term, have at some point in the past been chronically undernourished. The stunted and obese children also represent 19.9% of all stunted children.

Table 2. Multinomial logistic regression parameter estimates for children's nutritional status, 2005 EDHS

		Stunted and obese	Obese	Stunted	Wasted
		B (Exp β)	B (Exp β)	B (Exp β)	B (Exp β)
Age of Child	48-59 Months	-1.308 0(.270)**	-1.292 (0.275)**	0.269 (1.308)*	-1.311 (0.270)**
	36-47 Months	-0.718 (0.488)**	-1.278 (0.278)**	0.423 (1.527)**	-1.158 (0.314)**
	24-35 Months	-0.627 (0.534)**	-1.856 (0.156)**	0.602 (1.827)**	-0.767 (0.464)**
	12-23 Months	-0.266 (0.767)	-0.785 (0.456)**	0.932 (2.540)**	-0.401 (0.670)*
	6-11 Months	0.282 (1.325)	-0.678 (0.508)**	0.640 (1.897)**	-0.374 (0.688)*
	<6 Months(Ref)	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)
Sex of Child	Female	0.152 (1.165)	0.272 (1.313)**	-0.239 (0.788)**	0.018 (1.081)
	Male(Ref)	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)
Birth Order	4th or Higher Order Birth	-0.012 (0.988)	-0.183 (0.833)	0.121 (1.129)	0.259 (1.296)
	2nd and 3rd Birth	0.016 (1.016)	-0.212 (0.809)	0.188 (1.206)*	0.325 (1.384)*
	1st Birth(Ref)	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)
Preceding Birth Interval	<24 Months	-0.238 (0.788)	0.094 (1.098)	-0.177 (0.838)*	-0.416 (0.660)**
	24 months or more(Ref)	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)
Mother's Education	Higher Education	-0.598 (0.550)*	0.040 (1.041)	-0.301 (0.740)*	-0.019 (0.982)
	Secondary Education	-0.158 (0.854)	0.053 (1.054)	-0.143 (0.867)*	0.105 (1.110)
	Primary Education	-0.226 (0.798)	0.214 (1.239)	0.023 (1.023)	-0.213 (0.808)
	No Education(Ref)	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)
Mother's Work Status	Worked in last year	0.453 (1.574)**	0.264 (1.302)*	0.190 (1.209)*	0.100 (1.105)
	Not worked in last year(Ref)	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)
Household Wealth Quintile	Fifth(highest)	-0.181 (0.834)	0.145 (1.156)	-0.403 (0.668)**	0.127 (1.135)
	Fourth	-0.612 (0.542)**	-0.091 (0.913)	-0.413 (0.662)**	-0.325 (0.723)
	Third	-0.140 (0.869)	-0.268 (0.765)	-0.225 (0.799)**	-0.285 (0.752)
	Second	-0.381 (0.683)*	-0.183 (0.833)	-0.228 (0.796)**	-0.504 (0.604)**
	First(Ref)	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)
Region of Residence	Urban Governorates	0.338 (1.403)	0.413 (1.512)**	-0.172 (0.842)	0.751 (2.119)**
	Frontier Governorates	0.040 (1.041)	0.463 (1.589)	-0.631 (0.532)*	0.481 (1.618)
	Urban Lower Egypt	0.051 (1.052)	0.436 (1.546)**	-0.287 (0.750)*	-0.486 (0.615)*
	Rural Lower Egypt	-0.132 (0.877)	0.567 (1.764)**	-0.661 (0.516)**	-0.060 (0.941)
	Urban Upper Egypt	-0.186 (0.830)	0.003 (1.003)	-0.212 (0.809)*	.216 (1.241)
	Rural Upper Egypt (Ref)	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)

*- Significant at α = 0.05 **- Significant at α =0.01. The reference category for the dependent variable is the group of normally nourished children

Birth order loses its significance, and mother's education becomes only marginally significant in the final model when household wealth quintile and region of residence are controlled for. As children become older, they are significantly less likely to be both stunted and obese, or obese only. The likelihood of being stunted however, rises after six months of age, peaks at 12 -23 months and reduces with increasing age after that. The likelihood of being wasted also decreases with the age of the child but children under six months of age are less likely to be wasted, compared to all other age groups. Females are no more or less likely to be both stunted and obese or wasted, compared to males, but they are more likely to be obese only, and less likely to be stunted only. Shorter birth intervals increase the risks of stunting and wasting.

Having an educated mother reduces the likelihood of stunting only, and even then, only when the mother has been educated beyond secondary school. Mothers who worked in the year preceding the survey are more likely to have children stunted and obese, obese only, or stunted only, compared to mothers who did not work in the year preceding the survey. Household wealth had a variable effect on the likelihood of being both stunted and obese and no effect on that of being obese only. However, it had a significant effect on the likelihood of stunting. The region of residence has no significant effect on being both stunted and obese, but has an effect on the likelihood of being obese only, or stunted only, as well as some effect on wasting.

Implications of Findings

Further work needs to be done to explore the factors that are associated with children's nutritional status in Egypt. In the light of the changes in the economy, culture, lifestyles and practices, this should be looked at from a broad perspective to obtain meaningful explanations.