Relationship of Stunting and Overweight in Egyptian children under five years of age: Trends and associated risk factors

Shibani Ghosh[1], Grace Namirembe[1], Marwa Moaz[1,2], Ashish Pokharel[1,2], Elizabeth Marino- Costello[1], Jeffrey K Griffiths[1] and Patrick Webb[1]
[1] Tufts University, Boston, Massachusetts, USA, [2] Helen Keller International, Kathmandu, Nepal

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Background

- According to the Global Nutrition Report of 2014, the coexistence of many forms of malnutrition is the "new normal" worldwide (1)
- Egypt has had the biggest rise in overweight and obesity since 1980
- It is one of 10 countries that account for more than half of the world's obesity problem (in terms of absolute numbers affected) (2)

Objectives and Methods

- The objectives were to to examine and understand the trends and variability of malnutrition in all its forms (over and under nutrition) in Egyptian children under five, across time, regions and socio-economic status and examine associated factors.
- DHS data for Egypt from 1988 to 2014 were downloaded, cleaned and analyzed using SAS (Statistical Analysis Software).
- Anthropometric indicators for children under five were calculated using the WHO 2006 growth reference.
- Descriptive statistics of dependent variables (stunting, overweight, overweight in stunted children, wasting, Z-scores of HAZ, WAZ and WHZ) and independent variables (maternal BMI (Body Mass Index), occupation, education, birth size, birth order, maternal age at first birth, wealth index, infant and young child feeding practices) were computed.
- Bivariate analysis was conducted using logistic regression models. Multi-variate analysis utilized the log-binomial regression model (PROC GENMOD) to adjust for complex variation structures in the data.

Table 1: Number of data observations by DHS Year included in the analysis

	Prevalence of stunting (n)	Prevalence of **severe stunting (n)	Prevalence of overweight (n)	Prevalence of wasting (n)
1988	35.80(715)	16.47(329)	6.58 (132)	2.34(47)
1992	28.46(2025)	11.75(836)	13.50 (944)	3.53(247)
1995	33.43(2321)	15.77(1092)	12.45 (853)	6.45(442)
2000	23.09(1715)	9.34(694)	17.98 (1323)	2.95(217)
2005	27.10(3465)	12.78(1634)	16.09 (2048)	5.34(679)
2008	30.05(3013)	15.31(1535)	19.56(1925)	7.71(759)
2014	20.19(2945)	9.61(1402)	13.26(1881)	11.67(1656)

n= number of children in the column categories
**Severe stunting = HAZ score < -3 SD

Results

Table 2: Prevalence of co-existing malnutrition burdens

	Prevalence of stunted and overweight **(number)	Prevalence of overweight in stunted children*(number)	Prevalence of overweight in severely stunted children *** (number)
1988	3.27(65)	9.14(65)	13.85(45)
1992	4.18(290)	14.86(290)	20.03(159)
1995	6.34(430)	19.09(430)	26.12(273)
2000	6.91(505)	30.94(505)	44.11(277)
2005	9.07(1133)	34.24(1133)	51.80(778)
2008	10.88(1047)	37.63(1047)	49.89(670)
2014	6.74(933)	33.82(933)	48.81(613)

* = the denominator used is the number of stunted children, ** = the denominator used is the total number of children
***= the denominator used is the number of severely stunted children

- Rates of stunting steadily decreased from 36% in 1988 to 20% in 2014. Severe stunting reduced from 16.5% to 9.6%. Overweight went from 7 % in 1988 to 13% in 2014 (Table 1).
- The percentage of stunted children who are overweight went from 9% in 1988 to 34% in 2014 (Table 2).
- Stunting across wealth categories changed over time with rates being higher in the low socio-economic categories until 2005 while 2008 and 2014, the data show a flat line across wealth index.
- Multivariate analysis shows that boys were more likely to be stunted (Prevalence ratio PR= 1.11, p <0.001) (Table 3)
- Factors associated with stunting were birth order (PR =1.02, p<0.05) and number of children under five (Table 3). Factors protective against stunting included location (rural PR=0.86, p<0.001), secondary school education in the mother (PR=0.90, P<0.001), obese BMI category (obese mother compared to underweight), birth size (very large to smaller than average compared to very small), and household size (p<0.05).
- Factors that were protective against being overweight as a stunted child included being a boy (PR=0.88, p<0.001) and age of the child (PR=0.995, p<0.0001). Factors that increased the risk of being overweight as a stunted child included secondary education in mothers (PR=1.11, p<0.05), maternal occupation (PR=1.01, p<0.001), BMI category (all categories compared to underweight), household size, very large to normal birth size compared to very small birth size and ever being breast fed.

Conclusions

- In Egypt, there are clear trends in stunting and overweight in a stunted child.
- Stunting has decreased but overweight has increased in the population. More concerning is the increased prevalence of overweight in a stunted child.
- Wealth was not associated with either stunting or being overweight in a stunted child.
- Key factors such as birth size and maternal BMI that have traditionally been used in policy initiatives, as markers of reducing stunting on the other hand are associated with increased overweight.

Table 3: Prevalence Risk Ratios of the risk of being stunted, being overweight or being a stunted child that this overweight (Pooled)

	Stunting		Overweight		OVERWEIGHT IN STUNTED	
	Prevalence Ratio	SE	Prevalence Ratio	SE	Prevalence Ratio	SE
Gender						
Male	1.11***	0.105	1.03	0.021	0.88***	0.027
Female	Reference					
Age of child	1	-0.001	0.99***	0.001	0.995***	0.001
Birth order	1.02**	0.02	0.99***	0.007	0.98	0.009
Regions						
Lower Egypt Rural	1.34***	0.296	1.48**	0.109	1.44**	0.15
Lower Egypt Urban	1.28***	0.25	1.33**	0.045	1.15**	0.059
Upper Egypt Rural	1.64***	0.496	1.22*	0.109	1.16	0.149
Upper Egypt Urban	1.44***	0.362	1.11**	0.046	1	0.058
Frontier%	1.19***	0.17	1.12*	0.066	1.1	0.086
Urban	Reference					
Location						
Rural	0.86***	-0.154	0.9	0.105	0.85	0.143
Urban	Reference					
Maternal Education						
Primary	0.99	-0.012	1.01	0.04	0.96	0.051
Secondary	0.90***	-0.11	1.01	0.033	1.11**	0.04
Tertiary	0.95	-0.049	0.96	0.049	1.08	0.06
No education	Reference					
Maternal Occupation	1.01	0.005	1.009**	0.003	1.01***	0.002
Maternal age at first birth	1	0.001	1.001**	0.003	1	0.004
Maternal BMI Category						
Normal	0.96	-0.041	2.05***	0.205	2.28***	0.257
Overweight	0.89	-0.115	2.26***	0.205	2.77***	0.257
Obese	0.77**	-0.266	2.36***	0.205	2.67***	0.258
Underweight	Reference					
Wealth Index						
Poorest	1.07*	0.068	1.06	0.039	0.99	0.047
Poorer	1.05*	0.053	0.97	0.038	0.94	0.045
Richer	0.98	-0.019	1.02	0.037	1.02	0.044
Richest	0.93	-0.072	1.09	0.043	1.03	0.053
Middle	Reference					
Breast Feeding Status						
Ever breastfed	1.17***	0.16	1.02	0.052	1.16*	0.077
Inconsistent	1.17	0.16	1.17	0.262	0.73	0.528
Never breastfed	Reference					
Birth Size						
Very large	0.69**	-0.366	1.70**	0.145	1.75**	0.204
Larger than average	0.75***	-0.285	1.35***	0.081	1.39**	0.105
Average	0.80***	-0.219	1.19***	0.063	1.37**	0.078
Smaller than average	0.93*	-0.079	1.05	0.071	1.12	0.087
Very small	Reference					
Number of children under five	1.03***	0.03	1.006**	0.014	0.98	0.017
Household Size	0.99***	-0.008	0.99***	0.005	0.99	0.006
Survey Year	0.99***	-0.012	0.994**	0.002	1.01***	0.002
Number of observations	46520		45804		11352	

* p<0.01, ** p<0.05, *** p <0.001, % includes only those survey years that can be merged

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