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## **The Prevalence of Under-Nourished Child Obese Mother Phenomenon in Rural Areas: Evidence from Central Province of Kenya**

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### **Abstract**

Attainment of nutritional security is a major focus of the Millennium Development Goals. Despite efforts, Sub-Saharan Africa countries are yet to make significant progress in becoming nutritionally secure. Over the years, maternal obesity and child under-nutrition have concurrently been on the increase. The rise in obesity and child under-nutrition is attributed to, among others, urbanization-driven shifts in eating habits and lifestyle, changes in purchasing power, food assistance and stress-related medical conditions. Studies in Asia and Latin America have associated co-existence of adult obesity and child under-nutrition with urban areas. In this paper we examine the prevalence of child under-nutrition and mother obesity in rural Kenya. We find that 22 per cent of households with undernourished children have mothers that are obese. The paper also find a positive association between wealth, education and woman status and the existence of undernourished child obese mother phenomenon in the same household. The policy implication of this double burden problem is that interventions aimed at solving child malnutrition need to be targeted.

Keywords: Child, Kenya, Mother, Nutrition,

### **Introduction**

The first Millennium Development Goal identifies nutritional status of children under five as one of the key indicators of a country's attainment of food and nutritional security. Yet child malnutrition remains one of the biggest problems in developing countries (Malnutrition is defined as a range of problems associated with insufficient dietary energy and/or nutrient intake). Although many developing countries have realized a decline in cases of child malnutrition, these gains have been marginal. In Sub-Saharan Africa, for instance, the proportion of malnourished children has declined only from 35.0 per cent in 1970 to 31.1 per cent in 1995. In Kenya, the proportion of undernourished children declined by just 4 percentage points (from 22.3 per cent to 19.1 per cent) in the last one decade. At the same time, however, the numbers of overweight and obese mothers have continued to rise globally, with men, women and children being affected. Obesity has become an epidemic in the developed countries, especially USA and Europe. Although it was originally thought of as problem of developed countries where it is associated with lifestyle changes, increasing cases of obesity are emerging in developing countries as well. In Sub-Saharan and Northern Africa countries, about 15 per cent and 45 per cent women living in urban areas are obese while in Kenya, the prevalence of obesity in

major cities is 35 per cent (KDHS, 2003; Martorell, 2001). These trends have been associated, in both developed and developing countries, with lifestyle changes arising from increased incomes and less activity that characterize white collar jobs and city life (Popkin, 2002; Popkin, 2006; Garrett and Ruel, 2005).

Studies that examine the existence of obesity among women in rural areas of developing have been scanty. However, recent work by IFPRI (see Garrett and Ruel (2005) and Smith et al, (2001)) find evidence of obesity in rural areas of developing countries as well. In some cases, rural households with obese mothers have been found to have undernourished child, a phenomenon that has come to be called Double-Burden (The term double burden arises from the fact that a household has the twin burden of dealing with malnutrition and obesity in the same household) in the literature (Garrett and Ruel, 2005). Contrary to these findings, other studies have usually associated the existence of undernourished child obese mother (UNCOM) phenomenon with urban areas (see for example Darlene et al (2005) and Doak et al (2000) for studies in Haiti, Russia, China and Brazil. However, little is known about the prevalence of the phenomenon in rural areas and the factors driving its existence in rural areas. This paper addresses the following research questions: i) What is the prevalence of UNCOM phenomenon in rural areas of developing

countries? ii) What are the characteristics of households with UNCOM phenomenon?

The paper focuses on Central province of Kenya. The province has approximately 3.6 million people, with 90 per cent living in the rural areas (GOK, 1999). Approximately 27 per cent of the children are malnourished. The province is agriculturally productive and scores highly in many of the human development indicators such as relatively low poverty levels, high literacy levels and low child malnutrition levels. The high agricultural potential of the area translates into higher household incomes, one of the factors linked to prevalence of the UNCOM phenomenon. It therefore makes a suitable case to study.

### Theoretical and Empirical Methods

Malnutrition and obesity affect human health and hence individuals functionality. Early childhood malnutrition has long lasting effects on child height and on adult health and productivity (Barker, 1990; Scrimshaw, 1997). Obesity, on the hand, has been linked to diabetes and hypertension in adults (Garrett and Ruel, 2005). In this paper we model the UNCOM phenomenon as a household behavior in which nutritional outcomes emanate from household decisions (see Strauss and Thomas, 1995).

These decisions are constrained by time, income and a physical or biological production function. Following Penders and Staatz (2001), we specify household utility function as:

$$U = U(C_i, L_i, H_i, \alpha) \quad (1)$$

Where  $C_i$  is consumption of goods and services,  $L_i$  is leisure;  $H_i$  is the health and nutrition of all household members; and,  $\alpha$  are the tastes and preferences of the household.

The reduced form equation for the Equation (1) yields mother, child and household characteristics. Household variables include wealth (Wealth is measured by permanent or lifetime income (Freidman, 1957).), parental education, child characteristics, and other background characteristics known to, but not influenced by, the household (Pitt and Rosenzweig, 1984). In other words the health characteristic of the mother and child is influenced by income (and the associated woman status, in the case of mother), parental education, and other household characteristics. The household variables likely to affect its health outcomes include its endowments with fixed

and quasi-fixed capital and other institutional variables that affect the household.

This paper uses the standard weight-for-age index as a measure of malnutrition. The weight-for-age index is a composite of height-for-age and weight-for-height indices and consequently does not distinguish between wasting and stunting. Based on this index we classify children whose Z scores are below minus two standard deviations (-2SD) from the median of the reference population as being undernourished. On the other hand, we define obesity following FAO (2002) as a body-mass index (BMI) greater than or equal to 30. Following Darlene et al (2005), we then classify the households' nutritional outcomes as: (1) undernourished child-obese mother; (2) undernourished child-normal mother; (3) normal child-obese mother; (4) normal child-normal mother.

We use data from the 2003 Kenya Demographic and Health Survey (KDHS). The survey used a two stage cluster sampling design. The first stage involved selection of 400 clusters, consisting of 129 urban and 271 rural. The second stage involved systematic sampling of households from a list of all households. The total country sample size was 9,865 households out of which 8,561 usable responses were obtained (hence response rate of 96.3 per cent). 720 of these households were located in Central province (our focal region). Table 1 provides some of the key variables used in this paper. The table indicates that households with UNCOM phenomenon comprise of women in the 15 – 49 year age bracket with a body-mass index more than 30. Underweight children have Z-score less than 1.99 and fall in the 1 to 5 year age bracket.

### Results and Discussion

Figure 1 and Table 2 present the child-mother malnutrition by socio-economic characteristics of the sample. The table shows that 31 households in Central Province have underweight child living with a mother that is obese.

The total number of underweight children in the sample is 140; hence roughly 22 percent of underweight children in Central Province live with obese mothers. These results therefore corroborate the findings of Garrett and Ruel (2005) that UNCOM phenomenon exists in rural areas of Kenya. Using national level data, they find that 35 per cent of the households with malnourished children have obese mothers.

One factor that affects the incidence of UNCOM phenomenon is wealth. We therefore constructed an index of wealth to examine the relation between wealth and UNCOM phenomenon. The results show that 32.6 per cent of the UNCOM households are in the richest household category and none in the poorest category. Hence, as posited by theory, household wealth affects the prevalence of UNCOM phenomenon. Central province has high agricultural potential. It produces coffee and tea and many areas of the province grow fresh export vegetables. Hence households are likely to have higher incomes than most other rural households, giving obese mothers access to more calories than they actually need (The under-nutrition in the children in such households may be caused by poor quality (in terms of micronutrient content) of such food (see Garrett and Ruel, 2005)). This may be the underlying factor in the prevalence of UNCOM in the Province. In addition, as the table shows, we find evidence that families with year round employment opportunities had higher incidence of UNCOM (65 per cent). This reinforces our finding above that household income may be driving the incidence of UNCOM.

Women participation on household's decisions about use of money has been used as proxy for status of women (Smith, 2002). We therefore examined the relationship between decision-making regarding use of money in the household and the prevalence of UNCOM. The results indicate that in 25 per cent of the UNCOM households, the mother of the undernourished child decided how money is spent - indicating that mother's status likely affects the prevalence of UNCOM in rural areas. However, money spending decisions had greater effect in families with normal mother and malnourished child.

Another factor that has been associated with prevalence of UNCOM phenomenon is the education of the mother (Garrett and Ruel, 2005; Doak, 2000). We were unable to get from our sample a variable that could capture this effect due to the way the data was collected. We therefore used the partner's education instead. Our results indicate a roughly negative relationship between education and the occurrence of UNCOM. We also examined the association between UNCOM phenomenon and other environmental factors likely to affect its prevalence. These included accesses to potable water, and toilets. As Table 2 shows, majority of UNCOM households (45.7 per cent) consume piped water. This level is only

comparable to the normal child-obese mother category at 40.9 per cent. Although the use of pit latrines in rural Kenya is prevalent, the UNCOM households have a comparatively higher access to flush toilets (14.6 per cent) when compared with other categories.

### Conclusions

This paper presents preliminary results of a broader study that aims at analyzing the prevalence of UNCOM in rural Kenya. Time did not allow more rigorous analysis using quantitative techniques to isolate drivers of UNCOM. Nevertheless, we obtain interesting results using descriptive analysis.

The paper finds evidence of existence of UNCOM phenomenon in rural areas of Kenya. UNCOM phenomenon is found in 27 per cent of households with malnourished children in the province. The results further show that wealth endowment (especially from incomes from agriculture and other forms of employment) is associated with existence of UNCOM. Other factors found to be associated with existence of UNCOM are education and who makes household decisions on how money is spent. The presence of both obesity and malnutrition in the same household presents a major challenge to policy makers. It implies that interventions targeting child malnutrition must be targeted.

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**Table 1:** Description of some of the key variables used

Variable	Description
Mother's age	15-49 years
Child's age	1 year < age < 5 years
Obesity	Body Mass Index (BMI) =30 and above
Underweight child	Z -score < -1.99
Respondent currently working?	0 = No 1= Yes
Who decides how to spend money	1 = respondent alone; 2 = respondent and husband/partner; 3 = respondent and other person; 4 = husband/partner alone; 5 = someone else;
Partner's occupation	Refers to the job the partner is engaged in. For example: teacher, accountant, sales worker etc

**Table 2:** Child-Mother malnutrition by socio-economic characteristics

Variable	Attributes	Child mother nutrition status			
		Undernourished child mother	Undernourished child obese	Normal child obese mother	Normal child normal mother
Number of households in sample		31	140	125	342
Sex of hh head	Male	70.7%	67.3%	75.6%	71.4%
	Female	29.3%	32.7%	24.4%	28.6%
Mean household size		2.65	2.61	2.61	2.57
Mean BMI		28.50	20.99	28.36	21.55
Age category of household head	< 24 yrs (youth)	6.9%	8.1%	1.1%	5.9%
	24-54 (mid-age)	86.7%	80.3%	90.8%	82.6%
	54+ (elderly)	6.4%	11.6%	8.2%	11.5%
Wealth index	Poorest		9.9%		1.3%
	Poorer	15.0%	16.0%	5.8%	18.1%
	Middle	31.1%	31.4%	31.7%	31.7%
	Richer	21.3%	36.9%	35.5%	33.8%
	Richest	32.6%	5.9%	27.0%	15.1%
Who decides how to spend money	Respondent alone	25.0%	52.2%	45.4%	50.7%
	Respondent and husband/partner	30.6%	42.8%	47.6%	37.0%
	Husband/partner alone	44.3%	5.0%	7.0%	11.5%
Partner's education level	No education/preschool	3.9%	4.5%		1.3%
	Primary	53.7%	69.2%	37.0%	53.4%
	Secondary	32.8%	20.5%	36.8%	34.5%
	Higher	9.6%	3.3%	23.1%	8.5%
	Don't know		2.5%	3.0%	2.3%
Employment year/seasonal	all All year	65.3%	71.6%	82.7%	64.1%
	Seasonal	19.2%	20.0%	8.9%	24.5%
	Occasional	15.5%	8.4%	8.4%	11.5%
Source of water	Piped water	45.7%	25.6%	40.9%	32.0%
	Well		6.7%	3.7%	8.2%
	River, stream etc	34.5%	48.9%	32.4%	46.0%
	Rain water	10.0%	8.1%	14.9%	5.2%
	Other	9.8%	10.7%	8.2%	8.5%
Type of toilet	Flush toilet	14.6%	.6%	12.1%	5.8%
	Pit latrine	85.4%	99.4%	87.9%	94.2%

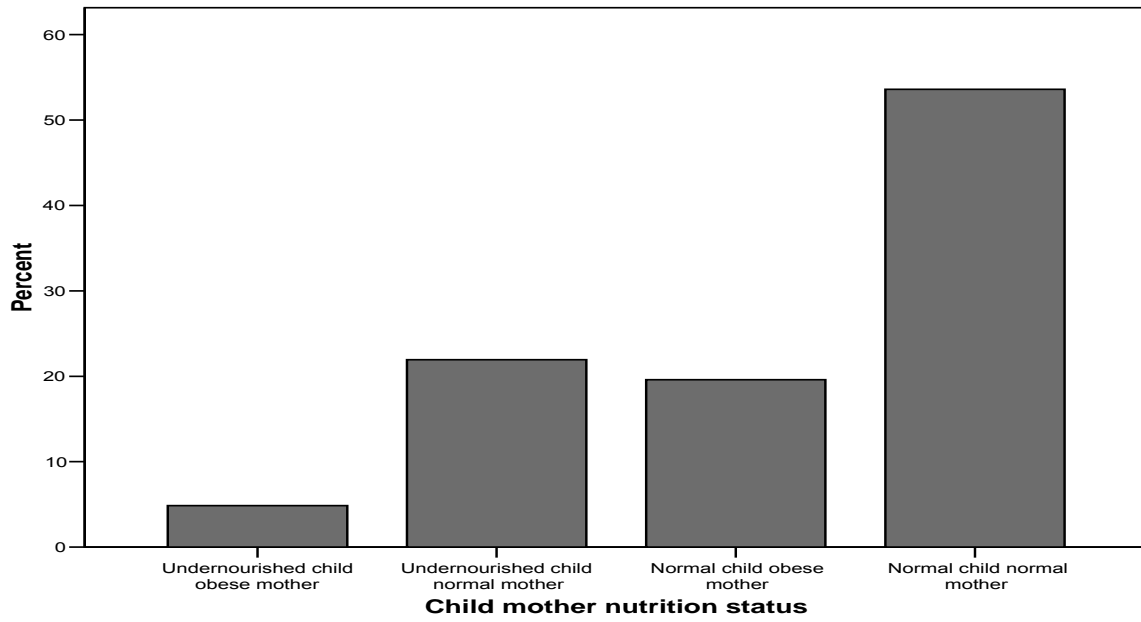


Figure 1: Prevalence of UNCOM in rural Kenya