WOMEN'S POSITION IN THE FAMILY AND CHILD NUTRITIONAL STATUS
in several Asian and African countries

by
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I. Introduction and theoretical focus

There is no doubt that the nutritional status of children is closely related to the economic conditions of their family, which are a determining factor for both food consumption and health care. However the present scientific debate seeks the verification to the hypothesis that other family-related factors may also have important influences. This is because the nutritional status of children can be considered as a marker of long-term resource allocation decisions made by families, household wealth being equal (Desai and Johnson, 2005). On the other hand, the household structure and the relationships between the members are intuitively important in decision-making concerning the allocation of the available resources.

Hierarchies based on gender and generation determine intra-household relationships and decision-making processes in many societies (Mason and Smith, 2003; Blumberg, 1991; Bruce, Lloyd, and Leonard, 1995; Presser and Sen, 2000). In particular, the economic and non-economic resources which are invested in children's growth may be differentiated according to the position which they and their mother hold in the family (relationship with the head of the family who may or may not be a parent of the child; children living with both, or only one, or none of their parents; number of brothers and sisters; presence of authoritative persons outside the family nucleus; etc.). From another point of view, it can be argued that in families in which the mother plays a role in decision-making and has more autonomy of action, "maternal altruism" influences positively the proportion of family resources destined to children. Or, from another standpoint**,** the resources allocation is more efficient and adequate if the roles of carer and decision-maker are played by the same person. To what extent do women's lack of autonomy, i.e. of power of choice, hinder the capacity of mothers to act in the interest of their children's growth and well-being? A low status of the mother within the household could be such as to favour children's malnutrition?

An interesting question to note is the fact that in several South Asian countries the child malnutrition rate is decidedly higher than in Sub-Saharan Africa (Smith et al., IFPRI, 2003). Considering that Asian countries are often in a better – or at least similar - position concerning many determinants of the phenomenon (national income, food supplies, health services, and education) this is an enigma, requiring some explication. Might differences in

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women's status and in the level of mothers' autonomy within the family be at least partially responsible for the comparative Asian-African situation ?

Many researchers have argued that women's empowerment is closely linked to positive outcomes for families and society (Presser and Sen, 2000; Smith and others, 2003), but empirical demonstrations have to tackle the difficulty of clearly defining the elusive notion of "empowerment" and elaborating a method of measuring it, in its multiple dimensions. Desai and Johnson (2005) provide evidence of the influences of the general status of women in society on children's nutrition, but the effects of mother's status in the family are less clear. Other studies succeed in demonstrating the effects of one or another aspects of the mother's status on children's health care, but not specifically on their nutritional status. One of the most recent and complete studies on the topic clearly demonstrated the strong influences of women's status on children's outcomes in a broad worldwide perspective, using DHS[1] data (Smith et al., 2003). But the status of women was measured by a complex index primarily based on education and the husband-wife relative position: while these are very important factors of women empowerment, they do not directly express power and autonomy.

Despite the growing conviction of the pervasive influence of most mother- related variables, the available empirical evidence is far from being conclusive. Conceptual problems in defining indicators and strategies of investigation, variety of categorization of indicators, not to speak of data comparability, hinder an overall evaluation of the issue.

This paper is an attempt to elucidate two different but connected aspects of the relationships between the children's nutritional status and the family: the impact of structural family factors and that of the mother's status in terms empowerment (particularly intra-household empowerment), with special emphasis on the role of some direct indicators of this aspect.

II. Data and Methods

II.1 Data source

Demographic and Health Surveys provide good internationally comparable data that offer the possibility of exploring various aspects of the relationships between children's nutritional status and the family. These surveys obtained anthropometric measurements on children's height and weight that make possible the construction of internationally accepted indicators of nutritional status. DHS also gathered a wealth of information on the structure of households and asked questions about the decisional power of women and their perception of gender societal inequality [2].

In our analyses - which refer to children aged 1 to 5 in India (DHS, 2005/06), Bangladesh (DHS, 2007), Burkina Faso (DHS, 2005), Ethiopia (DHS, 2005) and Ghana (DHS, 2003), we try to disentangle the effects of the different factors of interest on children's nutritional status carrying out a risk factors analysis, by means of binary logistic regression models. Findings for the five countries are only broadly comparable, because of non-uniform chronological reference and other possible differences that may have occurred, despite the reference to a unified survey strategy, a common core questionnaire and common definitions.

However, it is important to stress that our goal is not to compare the levels of nutritional deprivation in the five countries, but to analyse separately in each of them the relationships between children's nutritional deprivation and family factors. On the basis of

[2] The Demographic and Health Surveys (DHS) have been performed in a large number of developing countries with technical assistance from Macro International Inc., and major funding from USAID. These surveys furnish comparable cross-national data concerning not only demographic behaviour and health, but also many spheres of social life.

these autonomous analyses a comparative discussion about the system of relations existing in each country can nevertheless be developed, at the price of cautious interpretations.

II.2 Defining and operationalizing analytical concepts

For an understanding of the relationships of interest, four sets of indicators must be constructed, one of which concerning the dependent variable, that is children's nutritional status, and the others concerning the independent variables whose explicative power is explored here : *a*) status of mothers and, particularly, maternal decisional autonomy; *b*) family characteristics and organization; *c)* variables of known influence on child nutrition, that must be controlled in order to detect the relationships of interest here (confounding factors).

Children's nutritional status

Among the different indicators that can be drawn from DHS anthropometric measurement – each of which reflecting a particularity of the nutritional history – the height-for-age index appears to be the most useful for the identification of the contribution which the usual food consumption behaviour and the intra-household allocation of resources make to children's undernutrition (WHO, 1995). To ensure that this indicator can really assess the adequate physical development of the child, it must be expressed as standardized deviation units (Z-scores) from the median of a reference population, that serves as a point of comparison[3]. Children who fall below –2 or -3 standard deviation (SD) from the reference median are regarded as stunted or severely stunted respectively (Zuguo and Grummer-Strawn, 2007).

This indicator is not exempt from biological influences. In particular, the height of infants, especially but not only if they are breast-fed, is likely to measure primarily their genetic constitution and health conditions (i.e. prematurity), while behaviour factors have not yet had time to express their influence. In order to minimize the action of aspects that in our perspective assume the role of confusing factors, children less than 12 months old were excluded from the analysis.

Status of the mother

Women's status can be defined in terms of access to, and control over resources – be they economic, human, or social – within the family and in the society at large (Mason, 1986). Control over resources enhances the ability to exercise choices and translate them into action. Education and participation in the labour-force partially reflect control over resources and are often reductively used as proxies for this multidimensional concept. Resources available to women can be considered the "building block" of power, directly expressed by autonomy in decision-making.

In this study, mother's education and occupation were retained as explicative factors, considering both their conceptual relevance as "building block" of power and the relative simplicity of use and interpretation. In addition three indicators of mother's status were constructed: decisional autonomy, status relative to husband and women's status in society (level of societal gender equality).

Decisional autonomy is considered the dimension of the "status of woman" that more directly reflects empowerment, especially intra-household empowerment. To directly measure women's autonomy, DHS respondent women were asked about their participation in

[3] The use of a reference population is based on the finding that well-nourished children in all population groups for which data exist follow reasonably similar patterns of growth, and thus exhibit similar age- and sex-specific distribution of height and weight. The reference population used in DHS for the studied countries is the U.S. National Center for Health Statistics (NCHS) standard, that is recommended by the World Health Organization and is the one which is most commonly used.

household decision-making concerning several items (women's own health care, purchases, visits to relatives, food to be cooked, etc.)[4]. Combining these variables, a "mother decision-making autonomy" index was constructed, assigning higher scores for answers indicating greater autonomy. Then, a three category classification was adopted (more, intermediate, and less autonomy). Albeit quite rough (it assigns equal weight to each component and does not take into account their interrelations), this method has the advantage of isolating the cases of full autonomy in all the considered items at one extreme and the complete lack of autonomy at the other, so that interpretation is clear and straightforward.

Women's status in the society at large. The opinion of women on wife beating, an item of information that is part of the DHS core questionnaire, is a powerful indicator of the position of women in society that is available at the individual level: women's acceptance of values and norms that invest husbands with a corrective power over their wives clearly indicates the level of gender inequality in the community.

Surveyed women were asked their opinion on wife beating in different situations (wife goes out without permission, neglects children, argues with husband, refuses sex, or burns the food). From these dichotomous variables (possible answers: yes, no) a composite measure was created following a procedure that is quite similar to that adopted for the index of decision-making autonomy and has the same advantages and drawbacks.

Wife's relative status. The understanding of the intra-household woman's status is enhanced if we consider her position relative to her husband, in terms of education and occupation. Wife's better education and occupation tend to improve spousal communication, wife's bargaining ability and, consequently, decisional autonomy. An index of "Women's relative status" was constructed combining the wife-husband differences both at the educational level and in the social prestige of occupation. It is to be noted that the establishment of an ordering is straightforward for education, but inevitably quite arbitrary for occupation. We considered this order: professional, clerical, sales, skilled manual, domestic services, non-skilled manual and agricultural, not working[5] Then the two variables were combined in the following classification: "higher woman's status" (both education and occupation were of higher level, relative to the husband; "lower woman's status" the opposite cases (both variables were of lower level); "medium woman's status" all the remaining situations. Also this variable clearly isolates the extreme situations.

Family characteristic and organization

Because women's lives are rooted in the domestic sphere, family and kinship are key factors in defining the parameters of their status (Dyson and Moore, 1983; Das Gupta, 1996; Bloom and other, 2001). The panorama of family and marital systems in the studied countries is extremely varied and an accurate examination of these aspects is beyond the scope of this paper. However, it is known that in Bangladesh and in the Indian subcontinent – beyond the great regional and ethnic/confessional differences – the status of women in the household is generally very low. A bride cannot rely upon her natal kin and is subject to her in-laws authority. Selective discrimination against girls has been repeatedly reported (Das Gupta, 1987). Women's mistreatment is common and well documented by DHS country reports. As for the three African countries, they are in general characterized by the pre-eminence of the extended over the nuclear family, but profound differences can distinguish the family

[4] Only items that were common to all examined countries were included in the analysis, for purposes of formal comparability.

[5] The "occupation" variable is classified according to a criterion which, though with some inevitable arbitrariness, highlights the degree of professional prestige. The non-working persons – a category encompassing a great variety of situations - were included in the less prestigious category. This apparently incongruous decision was taken considering that in the context of the subsequent regression analysis, the wealth of family and the educational level being controlled, the effects of the "occupation" variable reflect essentially the impact of social resources (i.e. access to social networks) that are not available to non-working persons.

systems of their main ethnic groups (patrilinearity or matrilinearity, polygamy or monogamy, etc.). The particular economic arrangements that regulate family life, above all, but not exclusively, in matrilineal regimes (Goode, 1963; Caldwell, 1996), which often clearly separate between mother and father the responsibility and the economic burden for bringing up children, can in some way guarantee to the mother a certain independence of judgement and of action (Gage, 1997).

We attempted to capture at least some aspects of these complex and multifaceted situations through several classical proxies: the relationship of the mother with the household head, which is of obvious interest because it defines the position she and her children occupy in the family; the sex of the family head, which may be useful to test the aforementioned hypothesis of "maternal altruism"; the number of persons in the family, a complex factor which has multiple causes and implications (high fertility, presence of in-laws, perhaps less time and attention for child care); the sex of the child, to detect possible gender discrimination; the presence or absence of the husband in the household, which, among its many effects, has that of significantly influencing the woman's autonomy.

Controlling for confounders

For the purpose of investigating the impact of the family organization and the mother's position on the nutritional status of children, it is necessary to take into consideration other relevant variables, whose effects are known, which could produce confusing effects, and conceal the relationships which we are interested in here. Only holding all these variables at a constant value can we pursue our goal.

The factors that were controlled for are: wealth of the household, partner's education and occupation, urban/rural residence. As indicators of the household's wealth we adopted those that were constructed by national experts in each country on the basis of a wide range of housing characteristics and the possession of durable goods. We felt it was preferable to use these indicators rather than to forsake the merely formal comparability which would have derived from a uniform method of construction.

II.3 Analytical approach

After exploring bivariate associations of children's nutritional status with the family and mother's characteristics, binary logistic regression models[6] were fitted to data, in order to verify the hypothesis that the probability for a child to be stunted (-2SD) is significantly influenced by aspects of the family structure and organization, and of the mother's status, when other relevant factors are controlled. The regression was performed creating nested models with three blocks of independent variables. This strategy allows to appreciate the explicative power of the variables that are successively added. The first model included only background variables as explicative factors; in the second model women's status variables were added, while in the third model also family variables were incorporated. This procedure permitted to verify that generally the addition of both the block of women-related variables and the block of family variables significantly improves the model, therefore confirming the relevance of these aspects for children's nutritional outcome.

For the sake of simplicity, we present here only the results of the complete model with the three blocks of explicative factors.

[6] Logistic regression can be used to predict a dependent variable on the basis of continuous and/or categorical independents and to determine the percent of variance in the dependent variable explained by the independents; to rank the relative importance of independents; to assess interaction effects; and to understand the impact of covariate control variables. Binomial (or binary) logistic regression is a form of regression which is used when the dependent is a dichotomy and the independents are of any type. In the present case the binary form was chosen because the independent explicative factors are a mix of continuous and categorical variables and they are not regularly distributed.

It should be noted that, as an important dimension of the status of women in the household is defined by comparing their education and occupation with those of their husbands, the models presented here only apply to married women[7].

III. Results

Descriptive statistics for each variable entering the logistic regression are presented in Table 1-3, which show the number of examined cases, the distributions of dependent and explanatory variables, and the proportion of stunted or severely stunted children in correspondence with each category of the explanatory variables.

TAB. 1 Surveyed children and prevalence of stunting, by country

COUNTRIES	TOTAL	Aged 12- 59 months	Included in regression analysis*	Prevalence of stunting	
				-2SD	-3SD
INDIA (2005/06)			26,309	48.2	22.8
BANGLADESH (2007)			3,565	41.5	14.3
GHANA (2003)			1,900	34.3	12.6
ETHIOPIA (2005)			2,873	53.1	28.5
BURKINA FASO (2005)			5,565	46.7	23.9
* Only children with married mother					

The five observed countries are, as expected, very diverse from each other (Tab. 2). The degree of socio-economic development as measured both by the level of male education, the employment structure and the proportion of urban population is quite similar in India (2005/06), Bangladesh (2007) and Ghana (2003), while Ethiopia (2005) and Burkina Faso (2005) are distinguished by a higher rurality and a lower educational level. As for wealth distribution, all countries are characterized by a concentration on the extreme classes, to the detriment of the middle classes: a feature that poses questions about the limits of validity of such an indicator[8]. Concerning women's status and family organization, India and Bangladesh show similar patterns, with fair educational levels that are similar to those of Ghana, but a structure of female employment with very high proportions of non-working women that are more similar to that of Ethiopia. Burkina and Ethiopia are both at an earlier stage of development and exhibit the lowest levels of woman empowerment in terms of decisional autonomy and social gender equality (but they greatly differ for the family system and women employment: larger families and women employment are much more frequent in Burkina). Ghana presents a partly contradictory picture, with high female educational levels, the highest proportion of female headed families and of working women (especially in medium and high level professions), the highest status of mothers relative to husband, an acute perception of gender inequities in the society at large, but only very modest levels of

[7] Another set of regression models was performed with severe stunting (-3SD) as dependent variable, in order to test the hypothesis that different levels of nutritional deprivation could have different set of explanatory factors. Additional models were performed to test the relations between dependent and explanatory variables separately in the groups of male and female children, and in the lower and higher socio-economic classes, since, in a resource-constrained context, the magnitude of the impact of the behavioral factors could be greater.
An initial model was also applied to all children whatever the mother's marital status, so as to verify the effect of this last factor, which has a clear potential interest, but was necessarily excluded from the subsequent models, having defined the relative status of women by comparing their education and profession with those of their spouses. All these models will not be discussed in detail in this paper, as in fact great disparities were not observed in the modalities of action of the explicative factors.

[8] The DHS Wealth Index is based on the goods' possession and housing conditions, and "by counting certain forms of wealth more then others - and by negatively weighting traditional forms of wealth - the index also measures involvement with the modern cash-oriented sectors of sub-Saharan economies" (Rutestein and Johnson, 2004). In particular, it exaggerates both urban wealth and rural poverty and, probably, the implication for nutrition. Therefore, the use of that index requires a cautious appreciation of its drawbacks.

mother's decisional autonomy. It seems that a better women's position in terms of available resources is not entirely reflected in a corresponding level of power and autonomy. But as the indicator of mother's decisional autonomy is based on the woman's subjective perception and opinion, the differences between countries are possibly determined more by unequal degrees of awareness than by real empowerment. It must also be stressed that the possibility exists – and is very concrete in Sub-Saharan contexts – that mothers can exercise more freedom of choice and decisional autonomy in the field of children nutrition than in those on which they were interviewed.

TAB. 2 Distribution of children aged 12-59 months, by background, family, and mother's variables entering in the logistic regressions

		CATEGORIES	INDIA 2005/06	BANGLA 2007	ETHIOPIA 2005	GHANA 2003	BURKINA 2005
BACKGROUND	TYPE OF PLACE OF RESIDENCE	Urban	26.1	21.0	7.4	33.3	13.5
		Rural	73.9	79.0	92.6	66.7	86.5
	FAMILY WEALTH INDEX	Poorer/ Poorest	47.1	44.4	44.9	47.9	38.9
		Middle	19.8	19.3	20.8	19.2	27.0
		Richer/ Richest	33.1	36.3	34.3	32.9	34.1
	PARTNER'S EDUCATION	No Education	29.5	35.5	59.3	33.1	88.5
		Primary	14.9	29.2	30.0	9.2	7.0
		Secondary/Higher	55.5	35.3	10.7	57.7	4.4
	PARTNER'S OCCUPATION	Not Working	.9	1.3	0.7	0.0	.0
		Low level	72.5	49.1	90.2	61.4	85.4
		Intermediate	18.0	40.8	7.5	30.3	11.1
		High level	8.6	8.8	1.6	8.3	3.5
FAMILY ORGAIZ.	SEX of CHILD	Male	52.7	49.8	50.0	51.5	51.9
		Female	47.3	50.2	50.0	48.5	48.1
	NUMBER OF HOUSEHOLD MEMBERS	<= 3	6.1	10.1	7.2	12.4	6.4
		4-6	48.4	55.1	50.6	53.1	27.6
		7 and more	45.4	34.8	42.3	34.4	66.0
	PARTNER'S RESIDENCE	In house	87.3	87.4	89.4	69.8	89.5
		Elsewhere	11.2	10.6	4.5	20.8	7.4
		No partner	1.4	2.0	6.0	9.4	3.0
	MOTHER'S RELATION to HOUSEHOLD HEAD	Household Head	5.6	4.0	9.8	17.3	3.4
		Wife	56.3	12.8	85.1	67.2	83.2
		Daughter	7.5	9.7	2.9	11.5	2.4
		Daughter-in-law	26.4	68.1	1.2	1.3	6.3
		Other	4.2	5.3	1.0	2.6	4.7
	SEX of HOUSEHOLD HEAD	Male	88.8	91.0	87.9	74.3	95.1
		Female	11.2	9.0	12.1	25.7	4.9
MOTHER'S STATUS	AGE	Under 20	4.3	12.6	3.7	2.1	3.3
		20-35	86.2	76.1	67.7	66.1	68.1
		More than 35	9.5	11.2	28.6	31.8	28.5
	EDUCATION	No Education	59.9	27.9	79.0	39.6	88.0
		Primary	13.9	31.9	16.7	22.7	8.1
		Secondary/Higher	36.2	40.3	4.2	37.7	3.8
	OCCUPATION	Not Working	61.3	69.5	67.5	8.9	7.2
		Low level	33.9	23.1	21.2	48.7	76.8
		Intermediate level	2.9	6.4	10.7	40.0	14.9
		High level	1.9	1.0	0.6	2.4	1.1
	DECISION-AKING AUTONOMY	Less autonomy	19.6	16.8	11.2	21.7	53.7
		Intermediate	67.6	71.1	78.4	57.3	38.6
		More autonomy	12.8	12.1	10.4	20.9	7.6
	SOCIETAL GENDER EQUALITY	Lower	15.1	11.6	54.0	19.4	33.4
		Medium	21.8	20.8	24.4	23.2	33.3
		Higher	63.1	67.6	21.6	57.5	33.3
	RELATIVE STATUS TO PARTNER	lower status	24.5	17.1	20.3	7.4	2.0
		Intermediate	75.0	81.9	79.2	90.3	97.1
		higher status	0.5	1.0	0.6	2.4	0.9
	TOTAL		100.0	100.0	100.0	100.0	100.0

The nutritional status of children, as described in Tab. 1, is by far the best in Ghana, followed in order by Bangladesh, Burkina, India, and Ethiopia: a discrepancy is evident between this classification and that of development degree. The cross-tabulations in Tab. 3 show that all the variables describing mother's status are clearly related to the children's

nutritional outcome. Practically without exception, a more resourceful and autonomous mother or a mother who is better educated than the father, implies a better nutrition of the children. A non-working mother has in general better nourished children than a mother working in a low level employment, but the contrary occurs in the case of medium and higher level employments.

TAB. 3 Prevalence of stunted or severely stunted among children 1-5 years old, by background and mother's characteristics.

	CHARACTERISTCS	IN 05/06		BA 2007		ETH 2005		GH 2003		BU 2005	
		-2SD	- 3SD	-2SD	- 3SD	-2SD	- 3SD	-2SD	- 3SD	-2SD	- 3SD
BACKGROUND	PLACE OF RESIDENCE										
	Urban	38.6	16.7	35.2	10.7	36.5	12.1	23.2	8.0	23.6	8.0
	Rural	51.5	24.8	43.1	15.4	55.1	30.3	39.7	14.9	50.4	26.4
	FAMILY WEALTH-INDEX										
	Poorer and poorest	58.7	30.8	51.1	19.6	57.5	31.8	42.9	17.0	53.9	29.7
	Middle	48.7	22.1	41.1	13.3	55.1	33.7	36.3	12.3	46.4	25.7
	Richer and richest	32.8	11.6	30.1	8.7	47.8	22.6	20.4	6.5	36.5	15.8
	PARTNER EDUCATION										
	No education	59.5	32.5	50.0	19.9	57.4	31.9	45.5	18.1	49.7	25.9
	Primary	53.3	24.3	45.1	15.0	51.8	27.4	37.4	15.5	32.8	15.2
	Secondary/higher	40.9	17.2	30.0	8.5	39.8	19.2	27.2	9.2	17.2	4.8
	PARTNER OCCUPATION										
	Not working	48.2	15.7	14.8	4.4	56.5	42.8	-	-	100.0	--
	Low level	52.0	25.4	48.6	17.7	55.2	30.4	39.9	16.1	49.9	25.9
	Medium level	41.5	17.6	38.4	12.8	42.1	17.1	26.4	7.7	32.5	14.5
	High level	30.6	11.5	20.8	4.4	27.0	5.9	24.7	7.1	20.5	9.2
MOTHER'S STATUS	AGE OF THE MOTHER										
	<20	57.4	27.1	41.1	13.9	51.8	31.3	44.8	20.5	51.3	26.9
	20-34	47.3	21.8	40.8	13.7	53.4	28.2	33.5	12.3	46.1	24.5
	35 and more	53.0	29.5	46.4	19.3	54.6	30.3	35.0	12.8	47.5	23.2
	MOTHER EDUCATION										
	No education	58.3	31.1	49.4	21.4	56.6	31.7	44.8	18.0	49.5	25.8
	Primary	47.8	20.7	47.3	16.2	46.5	22.2	28.5	10.1	32.8	12.6
	Secondary/higher	34.5	12.0	31.3	8.1	29.7	6.5	27.1	8.8	13.2	3.9
	MOTHER OCCUPATION										
	Not working	44.9	20.4	40.1	14.3	52.9	29.1	37.2	13.7	32.3	15.3
	Low level	55.2	27.8	46.7	15.2	59.2	32.7	39.7	15.6	51.1	26.8
	Medium level	49.9	23.6	40.3	12.4	48.6	22.4	27.9	9.0	32.7	14.2
	High level	24.1	6.7	16.6	8.9	34.9	4.3	14.6	6.9	19.7	8.6
	MOTHER DECISIONAL AUTONOMY										
	Less autonomy	50.5	24.3	49.1	18.8	54.2	35.4	35.3	14.1	49.5	25.3
	Intermediate	49.3	23.6	41.0	14.5	54.1	28.4	34.3	11.7	45.6	23.1
	More autonomy	46.5	22.2	38.9	13.4	48.4	26.8	30.6	12.0	38.2	20.6
	PERCEPTION OF WOMEN STATUS IN SOCIETY										
	Lower	52.8	26.7	49.9	20.7	55.8	28.7	43.2	16.5	50.8	26.6
	Intermediate	50.8	24.0	42.9	14.8	53.0	30.5	37.8	15.4	43.9	22.0
	Higher	46.2	21.4	39.5	13.2	48.9	27.8	29.9	10.3	45.4	23.0
	MOTHER'S RELATIVE STATUS										
	Lower status	50.0	24.0	32.5	13.9	50.4	27.1	28.4	8.5	20.1	8.1
	Intermediate	47.4	22.5	42.3	14.4	54.1	29.4	35.2	13.2	47.8	24.7
	Higher status	44.9	18.3	42.5	13.1	15.7	7.0	18.9	8.9	31.1	8.9
CH	SEX of CHILD										
	Male	46.7	21.5	40.5	13.1	54.1	28.2	36.6	14.3	47.9	24.2
	Female	49.9	24.1	42.4	15.7	52.0	28.8	31.8	10.9	45.4	23.5
	ALL CASES	48.2	22.8	41.5	14.3	53.1	28.5	34.3	12.6	46.7	23.9

Note:. Indices are expressed in standard deviation units (SD) from the median of the NCHS/CDC/WHO International Reference Population. Children are considered "stunted" or "severely stunted" when they are respectively more than two

The logistic regressions will allow us to verify whether these findings may be driven by the possible relationship between mother's status and family social class, or exert an independent influence.

TAB. 4 BINARY LOGISTIC REGRESSION
Odds Ratio [Exp(B)] of the probability of being stunted (-2SD)
and Wald chi-square, for children 1-5 years old, with married mother

INDEPENDENT VARIABLES	INDIA		BANGLA		GHANA		ETHIOPIA		BURKINA	
	Wald	Odds ratio	Wald	Odds ratio	Wald	Odds ratio	Wald	Odds ratio	Wald	Odds ratio
TYPE PLACE OF RESIDENCE Urban - ref. Rural	6.02	1.083**	0.61	0.935	0.75	0.859	12.47	0.529***	28.73	0.593***
FAMILY WEALTH INDEX - ref. Richer and richest.	285.42	***	24.18		8.35	**	0.22		19.59	***
Poorer and poorest	283.80	2.000***	24.17	1.666***	8.35	1.818**	0.19	1.045	19.51	1.270***
Middle	120.51	1.531***	8.30	1.373**	4.31	1.517**	'0.01	1.010	8.69	1.184**
FATHER's EDUCATION - ref. Secondary / higher	28.37	***	12.23	**	2.85		11.96	**	4.88	*
No education	27.72	1.256***	8.30	1.466**	2.85	1.290*	10.91	2.055***	0.50	1.131
Primary	9.09	1.126**	11.71	1.451***	0.62	1.159	10.59	1.751***	0.14	0.934
FATHER's OCCUPATION - ref. High level	60.90	***	26.74	***	4.08		097		4.21	
Not working	9.50	1.579**	0.67	0.689***	--	--	--	---	--	----
Low level	56.25	1.445***	19.40	2.105***	0.03	1.052	0.26	0.864	1.74	1.272
Medium level	18.75	1.255***	20.02	2.043***	1.39	0.681	0.80	0.766	0.26	1.102
MOTHER's EDUCATION - ref. Secondary / higher	77.11	***	8.58	**	16.29	***	1.21		39.6	***
No education	76.96	1.475***	4.75	1.324**	5.36	1.454**	1.05	1.323	23.4	2.747***
Primary	24.25	1.251***	8.50	1.353**	2.08	0.784	0.52	1.204	7.6	1.809 *
MOTHER's OCCUPATION - ref. High level	10.99	**	1.34		4.48		5.77		10.26	**
Not Working	3.59	1.194**	0.08	1.124	2.89	2.815*	1.30	0.588	0.01	0.974
Low level	5.92	1.264**	0.01	1.050	1.30	1.914	0.53	0.713	0.10	1.106
Medium level	8.32	1.366**	0.28	1.255	1.37	1.925	0.30	0.776	0.13	0.892
MOTHER's DECISIONAL AUTONOMY - ref. More autonomy	3.45		2.37		0.28		2.15		2.82	
Less autonomy	1.16	1.053	0.50	1.113	0.14	0.934	2.10	1.251	1.39	1.117
Intermediate cases	3.39	1.073	0.07	0.967	0.01	0.992	1.20	1.136	0.28	1.052
WOMAN's STATUS in SOCIETY (perception) - ref. Higher	0.06		5.47	*	5.38	*	0.05		11.96	**
Lower	0.05	1.009	5.43	1.289**	5.24	1.344**	0.00	1.001	1.56	1.065
Medium	0.01	1.003	0.09	1.026	1.34	1.158	0.03	1.020	4.16	0.902 **
MOTHER's RELATIVE STATUS - ref. Higher	6.40	**	0.49		1.12		1.63		1.71	
Lower	3.04	1.367*	0.42	1.320	0.64	1.565	0.11	1.214	1.67	0.643
Medium	1.59	1.239	0.49	1.316	1.10	1.592	0.00	0.992	0.69	0.817
MOTHER's AGE - ref. More than 35	17.71	***	0.39		0.53		2.46		1.37	
Under 20	16.91	1.471***	0.36	1.109	0.29	1.265	0.32	1.152	1.33	1.172
20-35	1.11	1.046	0.07	1.032	.38	1.081	2.46	1.174	0.32	1.027
HOUSEHOLD HEAD's AGE - ref. More than 50	24.61	***	1.65		0.52		1.46		8.06	**
Under 31	9.80	1.250**	1.31	0.812	0.36	1.132	1.18	0.838	6.88	1.248 **
31-50	1.07	1.069	1.63	0.820	0.50	1.116	0.25	0.936	0.17	1.021
SEX OF THE CHILD Male - ref. Female	5.52	0.941**	0.94	0.933	3.80	1.218**	0.985	1.079	14.30	1.165***
NUMBERS of HOUSEHOLD MEMBERS - ref. 7 +	57.82	***	2.65		0.67		0.30		2.34	
1-3	49.23	0.671***	0.95	0.864	0.10	0.936	'.23	0.918	1.62	1.148
4-6	34.17	0.830***	2.62	0.864	0.66	0.907	0.20	0.960	0.21	0.977
HUSBAND RESIDENCE - Co-resident ref. Non co-resident	0.04	0.985	9.38	2.053	0.37	1.180	0.21	0.905	1.92	1.209
RELATIONSHIP to HOUSEHOLD HEAD - ref. Household head	7.44		5.94		1.55		8.48	*	12.44	**
Other	5.92	0.727**	3.54	0.465*	0.44	0.708	2.26	0.346	0.00	0.999
Daughter	2.94	0.809*	2.78	0.523*	0.23	1.294	1.60	1.887	2.75	1.717
Daughter in law	3.70	0.793*	2.19	0.591	0.25	1.192	0.99	0.642	2.54	1.841*
Wife	1.89	0.856	1.06	0.683	0.01	0.946	0.11	1.193		1.430
SEX of HOUSEHOLD HEAD Male - ref. Female	0.18	1.030	0.65	0.808	0.01	0.983	0.01	1.037	0.60	0.801
Constant	57.64	0.218***	11.43	0.146***	14.19	0.064***	0.51	0.614	18.1	0.156***
Model chi-square										

*** p<= 0.001 ** p <= 0.05 *p<=0.1

To facilitate the interpretation of the findings, the results are presented as odds ratios, calculated by exponentiating the ß coefficients (Tab. 4). The Wald chi-square statistics, which tests the unique contribution of each predictor in the context of the other predictors, is

also presented, albeit it has been criticized for being too conservative (i.e. lacking adequate power).

After controlling for all the other factors, a number of the independent variables show the same impact in all three countries. In general, even when the impacts are of the same magnitude and direction, the result is more statistically significant in India than in the other countries, probably as a result of a sample survey that is by far the largest (Tab.1). Other variables (sex of child, relationship to the household head, father's education and occupation) shows country specific patterns, that are more or less clearly justified by the different cultural and socio-economic contexts.

Given the high number of determinants taken into account, many of which may be to some extent correlated with each other, the problem arises of multicollinearity, which does not change the estimates of the coefficients, but poses the question of their reliability, therefore challenging the consistency of the interpretations. However, very large samples like that of India guarantee in themselves trustworthy results. Moreover the systematic patterns shown by many associations between dependent and independent variables, which do not change across countries and reference groups and subgroups of children (analyses not shown here), enhance the solidity of the interpretations beyond their strictly statistical significance[9].

III.1 Impact of socio-economic and background conditions.

As expected, family wealth – despite the definitional problems -is confirmed as a very relevant factor of children nutritional status. The odds of a child being stunted steadily increase with the family poverty in all countries. In India the risk of malnutrition is almost double in the poorest subgroup compared to the richest one, holding all the other variables at their sample mean. In Ethiopia, the impact of this factor appears to be somewhat lesser and not statistically significant, albeit the odds ratios do exhibit the same pattern and magnitude as in the other countries. A reason for this is probably the imperfect fit of the wealth indicator to the Ethiopian society[10]. The family wealth is therefore a determinant which it is essential to control, since its predominant impact might conceal the action of the factors linked to family organization and the status of the mother which are explored here.

Father's education and occupation[11] can be considered in many societies as variables indicative of the social collocation of the family. Economic conditions being equal, these variables should reflect respectively the "human resources" (knowledge, skills) and the "social resources" (access to kin and other social networks) available to the father. Either of these factors appears to have large and highly significant impact in India and Bangladesh, where having a non-educated father multiplies the risk of undernutrition by the factor 1,5-1,6, compared with having a father with secondary/higher education; and a father with a low level occupation worsens the child nutritional status by an even higher factor (1,5-2.0). A quite different result is found in the three African countries, where these factors appear to be somewhat less incisive. In particular, the occupational level of Ethiopian fathers even seems to produce an effect in the opposite direction. The divergent results for Asian and African countries is likely to be due to differences in family organization. The father's position may be less influent on children's nutrition in family systems specially based on maternal kin's support.

Another key factor is that of urban/rural residence. In most cases, living in an urban area raises the children's nutritional status compared to rural residence. This is what happens

[9] "Statistical significance only provides information about whether the relationship exists at all, often a question of trivial scientific interest…The level of statistical significance reflects the sample size, incidental features of the design, the sampling of cases, and the nature of the measurement of the dependent variable; it provides only a very pale reflection of the effect size." (Cohen et al., 2003, p.5).

[10] We have already discussed the limitations and ambiguity of the DHS Wealth Index in describing the situation of Sub-Saharan countries.

[11] This more precisely refers to the mother's husband/partner.

in all the countries, with the exception of India. This effect is particularly intense and significant in Ethiopia and Burkina. Better medical and health care and sanitation (water, etc.) environment are probably the urban characteristics which have positive effects on the children's growth, after controlling for wealth and education. But in India this factor acts in the opposite direction. In effect, urban residence does not always have a positive effect everywhere: it is known that the particularly unsanitary and crowded living condition that are found in major South Asian cities tend to reduce the children's long-term nutritional conditions (IFPRI, 2003).

III.2 Impact of family organization and structure

After controlling for all the other factors in the analyses, the probability of male children being stunted turns out to be slightly higher than that of female children in the three African countries. In Bangladesh and India we find the opposite situation and this result is statistically significant.

It should be noted that even a small advantage of male children with respect to female in the measure of the long-term nutritional deprivation is a very significant fact: it is well known that "for biological reasons girls tend to cope with less adequate food supply better than boys do from the standpoint of bodily development; as a consequence, boys generally tend to exhibit less favourable nutritional outcomes, if there is not a pro-male or anti-female bias in intra-household food allocation" (Agnihotri 1999). That the opposite situation applies for India and Bangladesh proves the existence of a gender discrimination in those countries, while confirming for Burkina, Ethiopia and Ghana the conclusions of a recent international review of intrahousehold food distribution, which stated that the evidence of gender biases in food intake is scarce, at least among preschool children (Marcoux, 2002).

Generally the risk of a child being stunted is considerably increased if he or she belongs to a large family. In India, but not in the other countries, this effect is highly significant from a statistical standpoint. Such a result - that applies when all other factors, and among them economic conditions, are controlled - cannot but reflect an effective factor. But the mechanism of its action is not clear, however. A family may be numerous because there are many children, and the children of higher birth orders are notoriously more at risk of being malnourished than children of lower birth orders, whatever may be the explication for this pattern. On the other hand, any type of numerous family (nuclear with many children, or extended to other relatives) may imply both a tendency to invest less in bringing up the children, and an objective reduced availability of time and resources for children's care. An exception to this pattern is to be found in Burkina Faso, where children of very small households show a nutritional disadvantage: an explication of this exception is likely to lie in the family system of that country, where large families are prevalent in high social classes and where belonging to very small families is often a sign of social exclusion and isolation.

The other family variables – sex of the family head, father's residence in the household or elsewhere, mother's and child's relationship to the household head - do not show any uniform pattern across the examined countries. The divergences may result from problems of data reliability (only rarely does the mother occupy a position other than that of "wife of the household head"), but it is also possible that different underlying family systems can modify the action of these variables. For example, in Burkina having a mother who is family head considerably reduces the risk of being stunted, and this finding is statistically significant; the reasons why this factor does not have the same type of impact in the other countries are not clear. As for the variable "sex of the family head", in past analyses concerning India DHS 1998/99 and Bangladesh DHS 2003, living in a female-headed family was found to reduce children's malnutrition, other factors being controlled, and this finding was statistically highly significant (Maffioli *et al*., 2007). Hopefully, the new results are the fruit of both an enhanced female authority within the household, and accrued male attention to children care.

The overall variables used as proxies to determine the position of the mother and child in the family context do not lead to a coherent body of results. They provide only some evidence of gender discrimination in the two Asian countries and some suggestions about the impact that could be exerted by an influential position of the mother in the family. This unsatisfactory conclusion is probably mainly linked to the fragmentary nature of the indicators, which are not able as a whole to capture all the aspects included in the complex notion of "position in the family", while being at the same time quite ambiguous because each of them embraces many meanings and aspects. Thus, the operazionalization of indicators for the empirical investigation of this issue requires further reflection.

III.3 Impact of women's status in the family and in the society at large

Among the components of the mother's status, we also included age: a relevant factor from the point of view of the family position, having also biological significance. It is known that the children of younger (under 20 years old) or older mothers (over 35) are more at risk from health problems. But the children of the oldest mothers can benefit from the greater maternal experience and authority within the family. Consistently with these considerations, the odds ratios show a systematic, albeit moderate, nutritional disadvantage of the children of the youngest and oldest mothers compared to those of mothers aged 20-35 (highly significant effects in India).

Turning to more exclusive aspects of the mother's status, we explored the two classical indicators, education and occupation, and the three synthetic indicators based on wide arrays of elementary component variables: decisional autonomy, status relative to husband, women's status in society (or societal gender equality). These variables – each of which is designed to capture a different aspect of the woman's status – are to some extent correlated with each other; not however in such a way that their simultaneous inclusion in the regression analysis creates great risks of multicollinearity. In particular the indicator of decisional autonomy is only slightly linked to the education and occupation of the woman or her husband, or to the status of the former in relation to the latter (data not presented here). Evidently a number of other personal, emotional and situational factors (uncontrolled by analysis) can intervene in the spousal relationship to determine the degree of woman's autonomy.

The mother's education appears to be a major determinant of the nutritional status of children. Its effects are generally strong and highly significant. For a child of a non-educated mother the risk of being stunted is multiplied by 1.3-1.5, and even by almost 3 in Burkina, compared to the risk of the child of a highly educated mother. This is not surprising: the effect of the mother's education on children's health and well-being, and even on infant and child mortality, is widely recognized all over the world and is clearly demonstrated at micro and macro level[12].

The mother's participation in the workforce and her professional level are as important as her education in India, Bangladesh and Ghana: in these countries the advantage on nutritional status is very marked for the children of women in high level professions, compared both with the children of non-working mothers and of low and mid-level working mothers. This result was expected, because the participation in the labour force not only gives women the opportunity to earn income, but also permits them to acquire independence, awareness and autonomous judgement. However, in Ethiopia and Burkina, the impact of this factor is smaller, and even in the opposite direction. An explanation for this finding may be found employment structure in these countries, where the agricultural sector largely prevails.

[12] The effect of this variable is so pervasive that it generally drives that of the maternal status in general, if this is defined on the basis of indicators that include it. The studies with this approach are those which find the most certain confirmation of the influence of maternal status on nutrition and on the health and growth of the child in general (Smith et al, 2003).

In the fact the empowering effects of employment are likely to be linked to the social context of work and are hardly associated to the traditional work in agricultural sector.

The mother's education and occupation are important for her autonomous judgement and behaviour, in that they are potential sources of power, in terms of knowledge, access to or control of resources, confidence, self-esteem, and bargaining ability. They can be considered the "building blocks" of power. But they do not directly measure power. The indicator which does this, however imperfectly, is that of "mother decision-making autonomy". This indicator has evident drawbacks: it is founded on the women's answers regarding their decisional capacity in different areas of family life, thus it may be at least partially affected by their subjective – and possibly unstable - perception of the real situation. Moreover, the decisional areas which were taken into consideration do not include specifically the areas of children's nutrition. This is a possible source of error in the case of most African countries, where very low level of women's empowerment may not impede women in exercising very large or even complete autonomy concerning their children nutrition, within the confines of economic constraints.

Nonetheless, in most cases, the indicator really captures an important dimension of the woman's status, which is otherwise inaccessible. Its impact on the children's long-term nutritional deprivation is moderate, but is in the expected direction: the odds of a child being malnourished decline, more or less steadily, with the increasing of the mother's autonomy index. Only in Ghana, where - as we have seen - women report a quite low degree of decisional autonomy contrasting with other indices of a better women's status comparative to the other countries, this factor does not appear to exert a clear impact nor is it statistically significant. An explanation accounting for this result could perhaps reside in the particular context of the Ghanaian gender system: it is very possible that the women's autonomy in the area of child care and nutrition could be more accentuated than in the other domains, so helping to determine a relatively low level of children malnutrition.

A high mother's status relative to husband have positive effects on child nutrition in India, Bangladesh and Ghana, inducing the consideration that the theory of "maternal altruism" may not be groundless in these countries. But the positive impact of this factor is less marked in Ethiopia and is even negative in Burkina. These last results are likely to be produced by the particularity of educational and occupational structures with very high concentrations on agricultural employment and absence of formal education, causing very unbalanced distribution by relative status (almost all spouses present the same status).

Turning to the female status in society, we found that this indicator has a moderate but clearly positive impact in all the countries. This effect is even more important than that which was theoretically expected. It is particularly significant in Ghana and Bangladesh, where the proportion of stunted children steadily increases with the mother's acceptance of gender inequities. As this pattern of data is valid independently of all the other characteristics of the parents and the family, the result is very important for its implications in policy terms. Contrary to what was found in previous research on this issue (Maffioli et al., 2007), the women empowerment at the societal level shows larger and more significant effects than empowerment within the household.

IV. Conclusions

The overall results of the regression analysis confirm to a greater or lesser extent the validity of the initial hypotheses: the position of children and/or their mothers in the household and the mother's decisional capacity influence the children's long-term nutritional deprivation as measured by the percentage of children who are more than two standard deviation below the median of the International Reference Population ("stunted" and "severely stunted"). This influence is independent of other socio-economic factors of already known incisiveness, such as family wealth.

The variables describing the family structure and organization do not lead to a consistent overall picture, but they suggest that a woman's influential position within the household (i.e. when she is the household head) has beneficial repercussions on children's nutritional status, be it thanks to maternal altruism, or to the decision-maker's greater competence in child care. A gender discrimination is evident in India and Bangladesh, where girls are clearly penalized in terms of nutrition relative to boys.

The mother's status indicators proved to be especially effective. Although the variables which best capture the degree of female empowerment differ from country to country, the relationships between this factor and the children's nutritional status are clear, statistically significant, and independent from other socio-economic and demographic factors. Mother's education and occupation, societal gender inequality, mother's relative status and decisional autonomy, are in that order the most important aspects of woman's status for their implications on children's nutrition. Concerning decisional autonomy, more precise and conclusive findings would probably be obtained, if autonomy in the area of children's nutrition were specifically considered.

All this means that current inequalities between women and men have large costs in terms of child malnutrition and illustrates the possibility that improvements in the status of women will lead to a substantial decline of the phenomenon. This situation is particularly critical in India, where the level of socio-economic development is not paralleled by an adequate improvement in children's nutritional deprivation. As for Ethiopia, a crucial point seems to be represented by the role of the fathers. Does the limited impact on children outcomes of father's occupational position indicates that there is here an area of concern? Do the cultural norms regulating the network of duties and rights of fathers and mothers, maternal and paternal kin, toward children care justify this result?.

While more complete data and a more nuanced definition of the concept of "women autonomy", together with a deeper contextual knowledge, are probably needed for a better understanding of the overall question, we believe that the results obtained justify the conclusion that socio-economic development must be accompanied by policies which aim to improve women's status, in order to produce significant benefits for children of both sexes.

References

Balk, D. 1994, Individual and Community Aspects of Women's Status and Fertility in Rural Bangladesh, *Population Studies* 48:21-45

Balk, D. 1997, Defying gender norms in rural Bangladesh: A social demographic analysis, *Population Studies*, Vol.51, n°2, July 1997.

Basu, A.M. 1989, Is discrimination in food really necessary for explaining sex differentials in childhood mortality? *Population Studies*, 43 (2), 193-210.

Basu, A.M. 1992, *Culture, the status of women and demographic behaviour: Illustrated with the case of India*. Oxford: Clarendon Press.

Basu, A.M. 1993, How pervasive are sex differentials in childhood nutritional levels in South Asia? *Social Biology*, 40(1-2), 25-37

Basu, A.M. et al. 1986 Sex bias in intra-household food distribution: Roles of ethnicity and socio-economic characteristics, *Current Anthropology*, 27(5) 536-539.

Behrman J.R. 1998, Intra-household allocation of resources: Is there a gender bias? In United Nations (Ed.), *Too young to die: Genes or gender?* (pp.223-242). New York.

Bingenheimer, J.B. 2007, Wealth, Wealth Indices and HIV Risk in East Africa, *International Family Planning*, Vol. 33, n°2.

Bloom, S.S., Wipji, D. and Das Gupta, M., 2001, Dimensions of women autonomy and the influence on maternal health care utilization in a North Indian city, *Demography*, Vol.38, n°1.

Blumberg, R.L.(ed.) 1991, *Gender, family and economy: The triple overlap*, Sage Publications, Newbury Park, California.

Brahman, G.N., Sastry, J. G. and Rao, N.P. 1988, Intra-family distribution of dietary energy – an Indian experience. *Ecology of Food and Nutrition* 22, 125-130.

Bruce, J., Lloyd, C., and Leonard, A., 1995, *Families in focus: New perspectives on mothers, fathers, and children*, The population Council, New York.

Caldwell J.C., Reddy P.H. and Caldwell, P. 1996, The family in South India: Past, present and future. *Social Change* 26(2) 116-129

Castle, S.E. 1993, Intra-Household Differentials in Women's Status: Household Function and Focus as Determinants of Children's Illness Management and Care in Rural Mali*, Health Transition Review* 3:137-157

Chaudhury, M. 1984, Sex bias in child nutrition. *Social Change*, 14(3) 50-52

Chen L.C., Huq, E. and D'Souza S. 1981, Sex-biased behaviour in the intra-family allocation of food and the use of health care services in rural Bangladesh. *Population and Development Review*, 7(1) 55-70

Cleland J.G. and Van Ginneken, J.K. 1988, Maternal education and child survival in developing countries: The search for pathways of influence. *Social Science & Medicine*, 27(12) 357-368.

Cohen, J., [et al.] 2003, *Applied Multiple Regression/ Correlation Analysis for the Behavioral Sciences*, 3rd ed., Lawrence Erlbaum Associates, Publisher, Mahwah, New Jersey.

Das Gupta, M. 1987, Selective discrimination against female children in rural Punjab, India. *Population and Development Review*, 13(1), 77-100.

Das Gupta, M. 1996, Life Course Perspectives on Women's Autonomy and Health Outcomes *Health Transition Review* 6:213-31

Deon, F. and Pritchett, L.H. 2001, Estimating wealth effects without expenditure data – or tears. An application to educational enrolments in States of India, *Demography*, Vol.38, n°1, February 2001.

Desai, S. and Johnson, K. 2005, "Women's decision-making and child health: familial and social hierarchies", in USAID, *A focus on gender. Collected papers on gender using DHS data,* ORC Macro, Calverton, Maryland, USA.

Doan, R.M. and Bisharat, L. 1990, Female autonomy and child nutritional status: The extended-family residential unit in Amman, *Social Science & Medicine*, 31(7) 783-789

Dyson, T. and Moore, M. 1983, On kinship structure, female autonomy and demographic behaviour in India. *Population and Development Review* 9(1), 35-54.

Gage, T.B. and Zansky, S.M. 1995, Anthropometric indicators of nutritional status and level of mortality. *American Journal of Human Biology* 7(6) 679-691.

Gage, Anastasia J. 1997. "Women's and men's status in African families: Continuity, evolution and possible revolutions," in *Proceedings of the IUSSP International Population Conference*, Vol.3, Bejing, IUSSP, Liège, pp. 1113-1137.

Gittelsohn, J. 1991, Opening the box: Intra-household food allocation in rural Nepal. *Social Science & Medicine* 33(10) 1141-1154.

Goode, W.J. 1963, *World Revolution and Family Patterns*, The Free Press, New York.

Griffith, P., Matthews, Z. and Hinde, A., 2002, "Gender, family and the nutritional status of children in three culturally contrasting states of India", *Social Science and Medecine*, 55, (5), 775-790.

Haddad, L., Hoddinott, J. and Alderman, H. eds 1997, *Intra-household resource allocation in developing countries: Models, methods, and policy*, Johns Hopkins, Baltimora, Maryland.

Hill K. and Upchurch, D.M.1995, Evidence of gender differences in child health from the Demographic and Health Surveys. *Population and Development Review* 21(1) 127-151.

Hindin, M.J. 2005, "Women's autonomy, status, and nutrition in Zimbabwe, Zambia, and Malawi", USAID, *A focus on gender. Collected papers on gender using DHS data,* ORC Macro, Calverton, Maryland,USA.

Jeffery, R. and Jeffery P. 1993, A Woman Belongs to Her Husband: Female Autonomy, Women's Work and Childbearing in Bijnor. Pp.66-114 in Clark, A.W. ed. *Gender and Political Economy: Explorations of South Asian Systems*, Delhi and London: Oxford University Press.

Kurian, G. ed. 1974, *The family in India: A regional view, Studies in the social sciences, Vol., 12* (pp. 205-231), Paris: Mouton.

Laslett, P., 1972, "Introduction: The history of the family", in: Laslett, P. (ed), *Household and Family in the Past Time,* Cambridge.

Malhotra, A.R., Vanneman and Kisbor S, 1995 Fertility, Dimensions of Patriarchy and Development in India*, Population and Development Review* 21:281-305

Maffioli, D. 2001, Family and Household Structure and Fertility Change, in: Farina, P., Gurmu, E., Hasen A. and Maffioli, D. *Fertility and Family Change in Ethiopia*, Central Statistical Authority of Ethiopia and IRP-CNR, Addis Ababa, Roma, pp. 51-110.

Maffioli, D., *et al.* 2007, "Nutritional Status of Children and the Family in India and Bangladesh", Annali Dipartimento Scienze Statistiche, Vol.IV, Bari, pp 237-277.

Mason, K.O. and Smith, H.L. 2003, *Woman's empowerment and social context: results from five Asian countries*, The World Bank, Washington D.C.

Mhloyi, M.1994, *Status of Women, Population and Development*, IUSSP, Distinguished Lecture Series on Population and Development, Liège.

Miles-Doan, R. and Bisharat, L. 1990, Female Autonomy and Child Nutritional Status: The Extended Family Residential Unit in Amman, Jordan, *Social Science and Medicine* 31:783-89

Murthi, M., Guio A.C. and Dreze, J. 1995, Mortality, Fertility, and Gender Bias in India: A District-Level Analysis, *Population and Development Review* 21:745-82

Oppong, C. and Wery, R., 1994, *Women's Roles and Demographic Change in Sub-Saharan Africa,* IUSSP, Policy and Research Papers, Liège.

Pinstrup-Andersen, P. Pelletier D, and Alderman (Eds), *Child growth and nutrition in developing countries: Priorities for action.* New York: Cornell University Press

Presser, H. B. and Sen G. eds 2000, *Women's empowerment and demographic processes: moving beyond Cairo*. Oxford University Press, New York.

Rutstein, S.O. and Johnson, K. 2004, *The DHS Wealth Index*, DHS Comparative Reports, n.6, ORC Macro, Calverton, MD, USA,

Smith, C. L., et al. 2003, "The importance of women's status for child nutrition in developing countries", IFPRI (International Food Policy Research Institute), Research Report 131.

USAID, 2005, *A focus on gender. Collected papers on gender using DHS data,* ORC Macro, Calverton, Maryland, USA.

Vignikin, K. 1997, "Structures familiales en Afrique et conséquences démographiques et socio-economiques", IUSSP Population Conference, Beijing.

Wall, R. ed. 1983, *Family Forms in Historic Europe,* Cambridge University Press, London.

WHO (1995) Physical status: The use and interpretation of anthropometry, Technical Report Series, N.854, Geneva.

Zuguo, M. and Grummer-Strawn, L.M.*2007,* Standard Deviation of anthropometric Z-scores as a data quality assessment tool using the 2006 WHO growth standards: a cross country analysis*, Bulletin of the World Health Organization Vol. 85, 2007, Number 6, 421-500.*