

NUTRITIONAL STATUS OF CHILDREN AND THE FAMILY

ASIA-AFRICA COMPARISONS

by

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(provisional paper)

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1. Introduction

Nutritional status is a major determinant of the health and well-being of children. Child malnutrition and undernutrition is steadily declining in many African and Asian countries, but is still a widespread problem requiring the attention of policy makers and public health. An interesting question to note is the fact that in many South Asian countries the child malnutrition rate is decidedly higher than in those of Sub-Saharan Africa (IFPRI, 2003). Considering that Asian countries are often in a better – or at least similar - position concerning many determinants of the phenomenon, such as national income, food supplies, health services, and education, we have here an enigma, requiring some explication.

Poor nutritional status is associated with inadequate or unbalanced diets and it is among the determinants as well as the consequences of chronic illnesses. Obviously, 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. But recent research suggests that other family-related factors may also have important consequences. On one hand, household wealth being equal, the nutritional status of children can be considered as a marker of long-term resource allocation decisions made by families. On the other, the household structure and the internal relationships between the members of the family is 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, 1985; Mason and Smith, 2003; Thomas, 1990; 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 (Desai and Johnson, 2005). Or, from another standpoint, the resources allocation is more efficient and adequate if the role of carer and decision-maker is 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? Might differences in the level of mother's autonomy within the family be responsible for the comparative Asian-African situation?

Despite the interest of these topics, the empirical evidence that has been gathered so far is quite scarce, owing to the paucity of data and the conceptual problems in defining indicators and strategies of investigation. Moreover, the variety of definitional criteria and categorization of indicators which were adopted in the different analyses hinder an overall evaluation of the issue.

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 their 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 on their nutritional status. One of the most recent and complete studies on the topic clearly demonstrated the existence and the strength of the influences of women's status on children's outcomes in a broad worldwide perspective, using DHS¹ data (Smith et al., 2003). Nonetheless the results were statistically significant only at the level of continents, while significant relationships were not found at country level. Moreover, the status of women was measured by an 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.

Demographic and Health Surveys provided good internationally comparable data that offer the possibility of exploring at least some aspects of the relationships between children's nutritional status and the family: DHS obtained anthropometric measurements on children's height and weight that make possible the construction of internationally accepted indicators of nutritional status – weight by age, height by age and weight by height or BMI (Body Mass Index) – each of which illuminate a particular nutritional aspect. DHS also gathered a wealth of information on the structure of households, contained in the "household data sets", and asked questions about the decisional power of women (women data sets).

Our analyses, which refer to Ethiopia (DHS 2005), Ghana (DHS 2003), and India (DHS 1998-99), are part of a wider research programme which includes numerous African, Asian and Latin American countries. They are 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). To try to disentangle the effects of the different factors of interest we carried out a risk factors analysis, by means of binary logistic regression. The results which are presented here are not yet definitive. Further specifications are programmed of the concepts of "mother

¹ 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 furnished comparable cross-national data concerning not only demographic behaviour and health, but many spheres of social life.

status” and “family system” and of the relative indicators, in order to improve the comprehension of their meaning and of the ways in which they act.

2. Defining and operationalizing analytical concepts

For an understanding of the relationships between children’s growth, family organization and structure, and maternal autonomy, all these three aspects must be clarified : 1) the concept and meaning of children’s growth and nutritional status; 2) the concept and meaning of family system; 3) the concept and meaning of maternal autonomy; with a view to identifying the indicators that could represent different dimensions of these multiform concepts.

2.1 Children’s nutritional status

This is the main variable of focus. It is the result of complex interaction between food consumption and the overall status of health and care practices. It provides indications of susceptibility to diseases and chances of survival. Once one or more indicators which express this aspect of child growth have been constructed, the problem remains of interpreting the variations of level in terms of feeding practices or of health conditions.

As already said, on the basis of the measurements of children’s height and weight it is possible to calculate three indicators of nutritional status: weight by age, height by age and weight by height or BMI (Body Mass Index). To ensure that these indicators make it possible to assess the adequate physical development of the child, and therefore of his or her nutritional state, they must be expressed as standardized deviation units (Z-scores) from the median of a reference population, that serves as a point of comparison. 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 (Zuguo, Grummer-Strawn, 2007). The reference population used in DHS for Ethiopia, Ghana, and India 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. Children who fall below –2 standard deviation (SD) from the reference median are regarded as malnourished, whereas children with deviations below -3 SD are regarded as severely malnourished.

Each of the three aforementioned indexes reflects a particularity of the nutritional history. The height-for-age index is a measure of linear growth. In this case, deviations below – 2SD or –3SD from the median of the NCHS reference population indicate that a child is “stunted” or “severely stunted”: a condition reflecting the cumulative effects of chronic malnutrition, or caused by recurrent and chronic illnesses. The weight-for height index measures body mass in relation to body length and negative deviations from standard indicate the presence of wasting or severe wasting. Wasting results from inadequate nutrition during the period immediately before the survey, due to acute illness or food shortage. Weight-for-age is a composite index which combines height-for-age and weight-for-height; negative deviation from standard defines the “underweight” condition, which may depend on multiple causes.

Among these three indicators, the height-for-age Z-scores is the most useful for the identification of the contribution which the usual food consumption behaviour and the intrahousehold allocation of resources make to children’s undernutrition. This indicator, which can assume the aspect of a dummy, constitutes the dependent variable in the binary logistic regression. However, this variable not being exempt from biological influences², caution is

² Although numerous variables of a bio-sanitary nature are available, it is not easy to obtain from them a synthetic indicator to characterize the overall state of health of the child to include as a control variable in the analysis. On the

required in interpretation. 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. In fact, the height of infants, specially but not only if they are breast-fed, is likely to measure primarily their genetic constitution and health conditions (particularly prematurity), while behaviour factors have not yet had time to express their influence.

2.2 Status of the mother

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). Theoretical explanations have been given for this assertion, that indicate direct and indirect pathways through which children's nutritional well-being can be influenced, 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. Mason (1986) defines women's status operationally in terms of access to, and control over, resources – be they economic, human, or social – within the family and in the society at large. 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 (the former in terms of knowledge, and the latter in terms of material goods and social network) and are sometimes reductively used as proxies for this more complex concept. Resources available to women can be considered the "building block" of power, directly expressed by autonomy in decision-making.

In this study we consider the three following indicators of mother's status. Each of them is constructed in such a way that a higher indicator's value is associated with a higher mother's status.

a. Autonomy, understood as the ability to make and realize choices: it is considered the dimension of the "status of woman" that best reflects empowerment, especially intra-household empowerment (Desai and Johnson, 2005). To directly measure women's autonomy, DHS respondent women were asked about their participation in household decision-making concerning the following items : women's own health care, large household purchases, purchases for daily needs, visits to relatives, in Ethiopia and Ghana; woman's own health care, purchase of jewellery, contacts with woman's family, food to be cooked in India)³. On this basis, a "mother decision-making autonomy" index was constructed in a way in which women are assigned points (either -1, 0, +1) for each component variable, using higher scores for answers indicating greater autonomy, and then totalling the points. Then, a three category classification was adopted (more, intermediate, and less autonomy). This method has some disadvantages: it assigns equal weight to each component and does not take into account their interrelations, but it has the advantage of being straightforward and of clear and easy understanding; it isolates perfectly the cases of full autonomy in all the considered items on one side and the complete lack of autonomy on the other.

b. Women's status in the society at large. A wide array of indicators can be and has been used in research to capture this social construct: indicators that are generally measured at the community level (for example, the difference in years of education between adult women and men, the difference in vaccination score of girls and boys, and similar: human capital investment

other hand, their exclusion may be acceptable on the basis of the not unfounded supposition that genetic constitution and chronic morbidity are largely independent of economic and behavioural variables.

³ In India DHS addressed also other very important aspects of women's autonomy, freedom of movement and access to money, that we excluded from the analysis, for purposes of comparability.

differences in favour of males indicate that they are valued more than females in a community). 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. Customs based on deeply held beliefs and attitudes often dictate differential roles, acceptable behaviour, rights, duties and privileges. 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: whether they think it is justified for a husband to beat his wife if she goes out without permission, neglects children, argues with him, refuses sex, or burns the food. From these dichotomous variables (possible answers: yes, no) a composite measure was created. Women were scored 1 for answers indicating a higher level of women's status, otherwise they were scored 0. Then, the sum was performed of this equally weighted binary input. The construction of this index follows a procedure that is quite similar to that adopted for the index of decision-making autonomy and has the same advantages and disadvantages.

c. Women'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. 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 establishing the wife-husband differences both at the educational level and in the social prestige of occupation. Note 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.

Then the two variables were combined in the following classification:

- "higher woman's status", if both education and occupation of wife were of higher level, or one of the two were of higher level and the other of the same level, relative to the husband;
- "lower woman's status" the opposite cases, in which both variables were of lower level, or one of the two were of lower level and the other of the same level, relative to the husband;
- "medium woman's status" all the remaining situations.

In addition to these three indicators - autonomy, women's status in society, women's relative status - mother's education and occupation were also retained as explicative factors, considering both their conceptual relevance across diverse cultures, and their general availability.

2.3 *Conceptualisation and meaning of family system*

Because women's lives are rooted in the domestic sphere, family and kinship are the key factors defining the parameters of their status (Dyson and Moore, 1983; Das Gupta, 1996; Bloom and other, 2001).

An examination of the extremely varied panorama of family and marital systems in the regions of study reveals the main sensitive points for an understanding of the condition of women and children. In the Indian subcontinent great regional differences, extensively described and analysed by anthropologists, contrast the north and the south of the country with regard to Hindu kinship and marriage practices. Additionally, Muslim customs are different from those of Hindus, and various ethnic groups of the central, mountainous north, and eastern regions follow a variety of other practices. Broadly, in the Indo-Aryan-speaking north, the kinship system is patrilineal and, with very few exceptions, patrilocal. Marriage arrangements are clan-exogamous and generally take place between families that are unknown to each other, and who may live far afield. In sharp contrast, in the Dravidian-speaking south, a family seeks to strengthen existing

kin ties through marriage, preferably with blood relatives. Among Muslims, of both the north and the south, marriages are usually arranged between families that have known each other for years and live not far from each other. In many communities a dowry has traditionally been given by a bride's kin at the time of her marriage and a bride's treatment in her marital home can be affected by the value of her dowry. Power hierarchies in the household are rigidly established on a gender and generational basis.

These practices have important repercussions on married women's lives. In many cases a bride goes to live with strangers in an unknown home. She cannot rely upon her natal kin: they are often geographically distant and contacts with them are mediated by her affines' decisions. She is always subjected not only to the authority of her husband, but also to that of the older members of her husband's family, especially her mother-in-law, and her position improves only with the passage of the years and the birth of children, above all if they are males. It is, in fact, well known that males are traditionally preferred because of the role they occupy in society and in the family. Selective discrimination against girls and particularly girls of higher birth order has been reported⁴ (Das Gupta, 1987). Women's mistreatment is common and is well documented by DHS data (IIPS and ORC Macro, 2000; NIPORT and ORC Macro, 2005).

There are profound differences between the marital systems of the ethnic groups in the two African countries. The Oromo (Ethiopia) and the Ewe (Ghana) are patrilinear and patrilocal, while the Amhara (Ethiopia) and the Akan (Ghana) are patrilocal, but their lineage can be either patrilinear or matrilinear (Murdock, 1967). Matrilinear societies recognize matrilinear descent which gives women special status because the line of rule and inheritance passes through them. In this case authority is generally held by maternal family men (confusion must be avoided between matriliney and matriarchy) and the ties with the paternal family can be tenuous.

Clearly, when family systems are as radically dissimilar as patrilinear and matrilinear systems, there are completely different problems concerning marital arrangements, family life, relations between relatives, cohesion of the family nucleus, marriage formation and dissolution. It is the common view that African family systems are characterized by the especially marked pre-eminence of *lineage*, the enlarged family⁵ and its interests with respect to the biological family (parents and their children) and the couple. The explanation for this characteristic is thought to lie as much in the culture and customs developed in the framework of traditional religions as in the particular economic arrangements that regulate family life, above all, but not exclusively, in matrilinear regimes (Caldwell, 1987; Goody, 1963; etc). These arrangements, which often clearly separate between mother and father the responsibility and economic burden for bringing up their children, are not favourable to dialogue and understanding within the parental couple, but they can in some way guarantee to the mother a certain independence of judgement and of action.

It is evidently almost impossible to design indicators which are able to comprehend and adequately encapsulate the whole family system in the three countries. We attempted to capture at least some of the influences of these complex and multifaceted situations through several 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 the "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

⁴ But not always clearly proved on the basis of objective data. It is sometimes argued that the discrimination is concealed by sex-selective abortion that resolves at the roots the cases of irremediable rejection of female births.

⁵ P. Laslett classified 'enlarged families' in two categories: extended (lineally) and expanded (laterally). LASLETT, P., editor (with the assistance of R. Wall), 1972, *Household and Family in the Past Time*, Cambridge University Press, London. Many authors, however, use the term 'extended families' to indicate both categories, as a synonym for 'enlarged families'.

autonomy. It should be noted that, having defined the status of women relative to their husbands, the analysis was restricted to married women.

2.4 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 also necessary to take into consideration other significant variables, whose effects are known, which could produce confusing effects, and conceal the relationships which we are interested in here. The controlled factors are: wealth of the household, partner's education and occupation, age of mother (a factor of a mainly biological meaning), urban/rural residence. The synthetic indicators of the household's wealth are those that have been constructed on the basis of a wide range of housing characteristics and the possession of durable goods by national experts in each country. 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.

3. Analytical approach

After exploring bivariate associations of children's nutritional status with the family and mother's characteristics, logistic regression models⁶ were fitted to data, in order to establish the predicting value of each explanatory variable and to provide knowledge of the relationships and reciprocal strengths among determinants. We also conducted tests for relevant interactions. To facilitate the interpretation of the findings, the results of the logistic models are presented as odds ratios, calculated by exponentiating the β coefficients.

Specifically we wanted to verify the hypothesis that the probability for a child to be stunted (-2SD) or severely stunted (-3SD) is significantly influenced by aspects of the family structure and organization, and of the mother's status. It was decided to test separately the existing relations in the case of stunting and of severe stunting (long-term nutritional deprivation), as it is possible that the explanatory factors have different effects on one and the other level of malnutrition.

An initial model was applied to all children more than 12 months old, whatever the mother's marital status, so as to verify the effect of this factor, which has a clear potential interest, but which is excluded from the subsequent models. As we have defined the status of women in the household by comparing their education and profession with those of their husbands, we were obliged to restrict the further analyses to married women, and more specifically to the women living with their husbands.

Other models were performed to test the relations between dependent and explanatory variables separately in the group of female children and that of male children, in order to verify whether or not those relations were of the same type in both cases. A further model was dedicated to the less favoured socio-economic group, since, in a resource-constrained context, the magnitude of the impact of the behavioural factors could be greater. These models will not be discussed in detail in this work, as in fact great disparities were not observed in the modalities of action of the 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.

Findings for the three countries are only broadly comparable, because of different chronological reference. In addition, in India the analysis was possible only for children under three years old, while in the two African countries data are available for children of less than five. Though at some cost to comparability, we did not want to abandon the possibility of extending the examination to this wider age segment for which the eventual behavioural effects on nutritional status should be more visible.

4. Results and discussion

Descriptive statistics for each variable entering the logistic regression are presented in Table 1-4, which show the number of examined cases, the distributions of dependent and independent (explanatory) variables, and the proportion of children over 12 months of age who are stunted or severely stunted in correspondence with each category of the explanatory variables.

Table 5 and 6 presents the results of the logistic regressions using in turn, as dependent variable, the probability of a child being stunted or severely stunted (respectively, more than two or three standard deviation below the median of reference population). Graphs 1-6 give general pictures of the most important results concerning the impact of the women's status indicators on children's nutritional status.

TAB. 1 Surveyed children in Ethiopia (2005), Ghana (2003) and India (1998/99)

	TOTAL	More than 12 months	In regression analysis
ETHIOPIA (children under 5 yrs)	4,455	3,414	2,812
GHANA (children under 5 yrs)	3,400	2,677	2,000
INDIA (children under 3 yrs)	18,872	18,118	12,055

The three 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 and the employment structure, and the proportion of urban population is quite similar in Ghana and India, while Ethiopia is distinguished by a higher rurality and a lower educational level. As for wealth distribution, India is characterized by a concentration on the middle classes, that is not observed in the other two countries. Concerning family organization and women's status, India shows the largest families, the youngest mothers, and a structure of female employment that is more similar to that of Ethiopia than of Ghana, with very high proportion of non-working women. Ghana presents a quite contradictory picture, with the highest proportion of female headed families and of working women, the highest female educational levels, the highest status of mothers relative to husband, a more acute perception of gender inequities in the society at large, but the lowest levels of mother's decisional autonomy. It seems that a better women's position in terms of available resources is not 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 an unequal degree of awareness than by real empowerment.

In general we can say that some aspects of the level of development of India are comparable to Ghana, while Ethiopia is at an earlier stage. But the women's status is more similar in India and Ethiopia, and at a lower level than it is in Ghana. The nutritional status of children is by far the best in Ghana, followed by Ethiopia and, last, by India (Tab.4).

The cross tabulations (Tab. 3 and 4) show, among other things, 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, a mother who is better educated than the father, implies a better nutrition of the children. A particularity is represented by the fact that 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. 2 Children more than 1 year old, by background, family, and mother's variables entering in the logistic regressions

		CATEGORIES	ETHIOPIA	GHANA	INDIA
B A C K G R O U N D	TYPE OF PLACE OF RESIDENCE	Urban	7.4	33.3	27.0
		Rural	92.6	66.7	73.0
	FAMILY WEALTH INDEX	Poorer and Poorest	44.9	47.9	36.1
		Middle	20.8	19.2	47.2
		Richer and Richest	34.3	32.9	16.8
	FATHER'S EDUCATION	No Education	59.3	33.1	28.2
		Primary	30.0	9.2	17.8
		Secondary/Higher	10.7	57.7	53.9
F A M I L Y O R G A N I Z.	SEX of CHILD	Male	50.0	51.5	51.4
		Female	50.0	48.5	48.6
	NUMBER OF HOUSEHOLD MEMBERS	<= 3	7.2	12.4	6.1
		4-6	50.6	53.1	43.4
		7 and more	42.3	34.4	50.5
	MOTHER'S MARITAL STATUS and HUSBAND'S RESIDENCE	Married /husband lives in house	89.4	69.8	93.9
		Married /husband live elsewhere	4.5	20.8	5.4
		Never married, widowed and divorced	6.0	9.4	.7
	MOTHER'S RELATION to HOUSEHOLD HEAD	Household Head	9.8	17.3	1.4
		Wife	85.1	67.2	53.4
		Daughter	2.9	11.5	9.7
		Daughter-in-law	1.2	1.3	29.4
		other	1.0	2.6	6.2
	SEX of HOUSEHOLD HEAD	Male	87.9	74.3	93.4
		Female	12.1	25.7	6.6
M O T H E R' S S T A T U S	MOTHER'S AGE	Under 20	3.7	2.1	8.0
		20-35	67.7	66.1	84.3
		More than 35	28.6	31.8	7.7
	MOTHER'S EDUCATION	No Education	79.0	39.6	52.0
		Primary	16.7	22.7	16.3
		Secondary/Higher	4.2	37.7	31.7
	MOTHER'S OCCUPATION	Not Working	67.5	8.9	66.8
		Low level occupation	21.2	48.7	26.8
		Intermediate level occupation	10.7	40.0	4.8
		High level occupation	0.6	2.4	1.6
	MOTHER'S DECISION-MAKING AUTONOMY	Less autonomy	11.2	21.7	10.0
		Intermediate	78.4	57.3	67.2
		More autonomy	10.4	20.9	22.8
	WOMEN'S STATUS IN SOCIETY (perception)	Lower	54.0	19.4	55.5
		Medium	24.4	23.2	27.0
		Higher	21.6	57.5	17.5
	EDUCATIONAL LEVEL DIFFERENCES	Woman lower level	28.7	28.8	36.6
		Woman same level	64.9	62.6	56.9
		Woman higher level	6.4	8.6	6.6
	PROFESSIONAL LEVEL DIFFERENCES	Woman lower level	68.1	21.8	71.1
		Woman same level	23.6	61.6	26.2
		Woman higher level	8.4	16.6	2.7
	MOTHER'S RELATIVE STATUS	Woman lower status	69.5	39.0	69.4
		Intermediate Level	23.4	42.7	25.7
		Woman higher status	7.1	18.3	4.4
	TOTAL		100.0	100.0	100.0

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.

After controlling for confounding factors, a number of the observed variables show the same impact in all three countries (see odds ratios in Tab.5 and 6). In general, even when the impacts are the same, the result is more statistically significant in India than it is in Ethiopia and Ghana. This perhaps is explicable considering that the survey sample was by far larger in India than in the two other countries (Tab.1).

Given the high number of determinants taken into account, many of which are 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, enhance the solidity of the interpretations beyond their strictly statistical significance.

Other variables (sex of child, relationship to the household head, father's education and profession) shows country specific patterns, that are more or less clearly justified by the different cultural and socio-economic contexts.

The impact of the explored determinants of children's nutritional status will be described considering the overall results of all the logistic regression models (included those not presented here).

4.1 Socio-economic conditions and background conditions.

As expected, family wealth is confirmed as a very relevant factor of children nutritional status. The odds of a child being stunted or severely stunted steadily increase with the family poverty in all three countries. In Ghana, as well as 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. But this is probably only a consequence of the imperfect fit of the wealth indicator to the Ethiopian society⁷. The family wealth is therefore a determinant which it is essential to control, since its predominant impact might conceal the action of factors linked to family organization and the status of the mother which are explored here.

Father's education and profession⁸ can be considered in many societies as variables indicative of the social collocation of the family. The "Father's education" variable should grasp the influence exerted on the child's nutritional status by the "human resources" available to the father (knowledge, skills), economic conditions being equal. The "Father's occupation" variable is classified according to a criterion which, though with some inevitable arbitrariness, highlights the degree of professional prestige. The wealth of family and the educational level being controlled, this variable includes what are presumably the aspects linked to the family's collocation in the community and to the availability of "social resources" (i.e. membership of groups and access to kin and other social networks). But neither of these factors appears to have an impact in the two African countries, contrary to what happens in India where having a non-educated father multiplies the risk of undernutrition by the factor 1,2-1,7, compared with having

⁷ The DHS Wealth Index is mainly based on the goods' possession and housing conditions. But, by counting certain forms of wealth more than others - and by negatively weighting traditional forms of wealth - the index also measures involvement with the modern cash-oriented sectors of sub-Saharan economies. Then, it should be used cautiously and with a full appreciation of its ambiguities and limitations.

⁸ This more precisely refers to the mother's husband/partner.

a father with secondary/higher education; and a father with a low level occupation worsens the child nutritional status by a factor of the same order. The divergent results in the three countries may 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. But, before accepting such a conclusion, a deeper examination of the criteria which were adopted to register and codify father's education and profession is required.

TAB. 3 Prevalence of stunted or severely stunted among children 1-5 years old by background characteristics.

	CHARACTERISTICS	ETHIOPIA		GHANA		INDIA*	
		-2SD	- 3SD	-2SD	- 3SD	-2SD	- 3SD
B A C K G R O U N D	<u>TYPE OF PLACE OF RESIDENCE</u>						
	Urban	36.5	12.1	23.2	8.0	43.3	19.8
	Rural	55.1	30.3	39.7	14.9	58.4	32.3
	<u>FAMILY WEALTH-INDEX</u>						
	Poorer and poorest	57.5	31.8	42.9	17.0	66.4	39.2
	Middle	55.1	33.7	36.3	12.3	56.5	29.7
	Richer and richest	47.8	22.6	20.4	6.5	35.4	14.2
	<u>PARTNER EDUCATION</u>						
	No education	57.4	31.9	45.5	18.1	69.7	42.0
	Primary	51.8	27.4	37.4	15.5	60.2	34.1
	Secondary/higher	39.8	19.2	27.2	9.2	48.8	23.6
	<u>PARTNER OCCUPATION</u>						
	Not working	56.5	42.8	-	-	55.9	28.9
	Low level	55.2	30.4	39.9	16.1	62.3	34.9
	Medium level	42.1	17.1	26.4	7.7	52.9	27.6
	High level	27.0	5.9	24.7	7.1	38.1	17.2
	<u>ALL CASES</u>	49.4	26.3	35.8	13.1	54.8	29.3

* For India, children 1-3 years old

Note: The table is based on children living in the household with their mother. Each of the indices is expressed in standard deviation units (SD) from the median of the NCHS/CDC/WHO International Reference Population. The percentage of children who are more than two standard deviation below the median of the International Reference Population are considered "stunted". Among them, those who are more than three standard deviation below the median of the International Reference Population are considered "severely stunted".

Another key factor is that of urban/rural residence. Living in an urban area raises the children's nutritional status compared to rural residence, in all three countries. This effect is particularly intense and significant in Ethiopia. Better medical and health care environment is probably the urban characteristic which has positive effects on the children's growth, after controlling for wealth and education. It is to be noted that 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).

4.2 Family organization and structure

After controlling for all the other factors in the analyses, the probability of male children being stunted or severely stunted turn out to be slightly higher than that of female children in both Ethiopia and Ghana. In 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 meaning fact: it is well known that for biological rather than behavioural 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 intrahousehold food allocation (Agnihotri 1999). That the opposite situation applies for India proves the existence of a gender discrimination in that country, while

confirming for Ethiopia and Ghana the reassuring 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).

TAB. 4 Prevalence of stunted or severely stunted among children 1-5 years old by family and mother's characteristic

	CHARACTERISTICS	ETHIOPIA		GHANA		INDIA*	
		-2SD	- 3SD	-2SD	- 3SD	-2SD	- 3SD
F A M I L Y O R G A N I Z A T I O N	<u>SEX OF CHILD</u>						
	Male	50.4	26.7	37.9	14.5	53.2	28.1
	Female	48.4	25.9	33.5	11.7	56.5	30.7
	<u>NUMBER OF HOUSEHOLD MEMBERS</u>						
	0-3	50.4	24.9	31.2	12.2	49.8	24.0
	4-6	52.0	29.0	31.1	10.4	52.6	27.2
	7 and more	56.1	29.5	40.4	16.4	56.2	30.9
	<u>SEX OF HOUSEHOLD HEAD</u>						
	Male	54.1	29.3	35.3	12.8	54.8	29.2
	Female	50.7	26.0	31.4	12.0	46.2	23.9
	<u>HUSBAND RESIDENCE</u>						
	Husband lives in household	53.8	29.3	35.5	12.9	54.3	28.7
	Husband live elsewhere	48.9	24.6	29.9	12.5	53.1	30.4
	<u>RELATIONSHIP TO HOUSEHOLD HEAD</u>						
	Household head	49.5	25.6	31.0	12.3	64.2	42.9
	Wife	54.1	29.4	35.1	12.4	58.8	32.1
	Daughter	49.8	25.7	33.1	14.4	52.6	27.6
	Daughter in law	68.5	33.6	56.8	19.6	53.3	28.2
	Other	46.8	24.6	29.1	9.0	57.6	30.2
M O T H E R' S S T A T U S	<u>AGE OF THE MOTHER</u>						
	<20	51.8	31.3	44.8	20.5	61.3	33.1
	20-34	53.4	28.2	33.5	12.3	53.3	28.0
	35 and more	54.6	30.3	35.0	12.8	57.3	33.7
	<u>EDUCATION OF THE MOTHER</u>						
	No education	56.6	31.7	44.8	18.0	68.4	42.1
	Primary	46.5	22.2	28.5	10.1	55.8	26.9
	Secondary/higher	29.7	6.5	27.1	8.8	38.3	15.6
	<u>OCCUPATION OF THE MOTHER</u>						
	Not working	52.9	29.1	37.2	13.7	53.8	28.1
	Low level	59.2	32.7	39.7	15.6	64.7	37.9
	Medium level	48.6	22.4	27.9	9.0	57.7	30.9
	High level	34.9	4.3	14.6	6.9	31.8	10.3
	<u>MOTHER DECISIONAL AUTONOMY</u>						
	Less autonomy	54.2	35.4	35.3	14.1	55.8	32.0
	Intermediate	54.1	28.4	34.3	11.7	58.8	32.3
	More autonomy	48.4	26.8	30.6	12.0	54.0	28.6
	<u>PERCEPTION OF WOMEN STATUS IN SOCIETY</u>						
	Lower	55.8	28.7	43.2	16.5	60.9	33.7
	Intermediate	53.0	30.5	37.8	15.4	56.8	30.4
	Higher	48.9	27.8	29.9	10.3	54.9	29.6
	<u>MOTHER'S RELATIVE STATUS</u>						
	Lower status	52.7	29.4	31.0	10.9	58.3	31.7
	Intermediate	55.7	29.3	38.2	14.6	53.1	29.2
	Higher status	57.1	27.5	32.4	12.6	49.8	21.7
	<u>PROFESSIONAL LEVEL DIFFER. WOM-PARTNER</u>						
	Woman lower level	52.6	28.7	30.7	10.6	54.2	28.5
	Woman same level	57.0	31.7	36.2	13.5	63.5	36.3
	Woman higher level	53.6	26.1	33.0	13.3	52.7	28.7
	<u>EDUCATIONAL DIFFERENCES WOM-PARTNER</u>						
	Woman less education	51.1	28.3	30.5	11.6	62.9	35.7
	Woman same education	55.5	30.3	36.6	13.3	52.7	27.7
	Woman more education	48.1	21.4	27.8	11.2	54.3	27.1
	<u>ALL CASES</u>	49.4	26.3	35.8	13.1	54.8	29.3

* For India, children 1-3 years old

Note: See Table 3

In all countries 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 two African countries, this effect is highly significant from a statistical standpoint. Such a result, that is similar in three very different countries, cannot but reflect an effective factor. However, it is not well clear how to interpret it, bearing in mind that it applies when all other factors, and among them economic conditions, are controlled. 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 are, 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.

TAB. 5 BINARY LOGISTIC REGRESSION - Odds Ratio [Exp(B)] of the probability of being stunted (-2SD)
- Children 1-5 years old^a, with married mother

VARIABLES	ETHIOPIA	GHANA	INDIA
TYPE PLACE OF RESIDENCE Urban - ref. Rural	***,545	,847	,924
FAMILY WEALTH INDEX - ref. Richer and richest.		**	***
Poorer and poorest	1,069	***1,957	*** 1,954
Middle	1,045	**1,535	*** 1,611
SEX OF THE CHILD Male - ref. Female	**1,078	*1,192	,917
NUMBERS of HOUSEHOLD MEMBERS - ref. 7 +			***
1-3	,909	,936	*** ,742
4-6	,946	,895	*** ,853
SEX of HOUSEHOLD HEAD Male - ref. Female	1,183	1,097	***1,410
RELATIONSHIP to HOUSEHOLD HEAD - ref. Wife	*		
Household Head	*1,024	1,084	1,477
Daughter	** ,667	1,184	,859
Daughter_in_law	**1,822	1,498	,961
Other	,297	0,775	,940
HUSBAND RESIDENCE - Co-resident ref. Non co-resident	,964	*1,122	1,055
MOTHER's AGE - ref. More than 35			***
Under 20	1,306	1,303	**1,252
20-35	1,180	1,116	1,021
MOTHER's EDUCATION - ref. Secondary / higher	***	**	***
No education	***6,157	1,693	***1,728
Primary	**2,256	,990	***1,496
FATHER's EDUCATION - ref. Secondary / higher	**		***
No education	,456	,978	***1,511
Primary	1,036	1,092	1,057
MOTHER's OCCUPATION - ref. High level		**	
Not Working	2,231	**7,517	1,018
Low level	1,287	2,725	1,097
Medium level	1,240	2,194	* 1,170
FATHER's OCCUPATION - ref. High level			**
Low level	,719	,503	**1,345
Medium level	,640	,564	**1,275
PROFESSIONAL LEVEL DIFFERENCES - ref. Wom. Higher			
Woman lower level	,861	,612	*1,459
Woman same level	1,317	1,019	1,269
EDUCATIONAL LEVEL DIFFERENCES - ref. Wom. Higher	*		**
Woman lower level	** ,256	1,357	**1,681
Woman same level	,524	1,373	***1,396
MOTHER's RELATIVE STATUS - ref. Higher	*		
Lower	** ,444	,578	,985
Medium	,672	,799	1,117
MOTHER's DECISIONAL AUTONOMY - ref. More autonomy			**
Less autonomy	1,228	,889	**4,352
Intermediate cases	1,135	,955	***1,736
WOMAN's STATUS in SOCIETY (perception) - ref. Higher		*	*
Lower	,969	**1,317	**1,256
Medium	992	1,127	1,145
Constant	,267	,173	,124

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

^a For India, children 1-3 years old

Also the variable “sex of the family head” shows a very similar pattern in all countries: living in a female-headed family reduces children’s malnutrition, other factors being controlled. The impact of this factor is stronger in India, where it is also statistically highly significant. This finding suggests that the hypothesis of the mother’s “altruism” may not be empirically groundless⁹.

The other family variables – 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 and subgroups. The divergences may result from problems of data reliability (only in few cases does the mother not occupy the position 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 Ethiopia the situation of the children of the family head’s daughter appears to be far better than that of the family head’s daughter in law in all the analysed subgroups, and this finding is statistically significant: we cannot exclude that the positions of daughters and daughters-in-law within the household are really different.

The overall variables used as proxies to determine the position of the mother and child in the family context do not lead to clear and coherent results. They provide only some evidence of gender discrimination in India and an interesting suggestion about the impact that can be exerted by an influential position of the mother. 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 operationalization of indicators for the empirical investigation of this issue requires further reflection.

4.4 Women’s status in the family and in society

Among the components of the mother’s status, we can include also her age: a relevant factor from the point of view of the family position, but also one with a 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 not highly significant, nutritional disadvantage of the children of the youngest mothers compared to those of mothers aged 20-35. The children of the oldest mothers are also penalized in Ghana and Ethiopia, but not in India, where the biological disadvantage is probably counterbalanced by the above mentioned positive behavioural factors.

⁹ We obtained a similar result from an analogous study in Bangladesh (2003)

TAB. 6 BINARY LOGISTIC REGRESSION - Odds Ratio [Exp(B)] of the probability of being severely stunted (-3SD) - Children 1-5 years old ^a, with married mother

VARIABLES	ETHIOPIA	GHANA	INDIA
TYPE PLACE OF RESIDENCE Urban - ref. Rural	** ,491	1,139	*** ,831
FAMILY WEALTH INDEX - ref. Richer and richest.			***
Poorer and poorest	1,083	1,440	*** 1,984
Middle	* 1,313	1,132	*** 1,557
SEX OF THE CHILD Male - ref. Female	** 1,023	1,125	* ,914
NUMBERS of HOUSEHOLD MEMBERS - ref. 7 +			***
1-3	1,002	,933	*** ,687
4-6	1,058	,811	*** ,808
SEX of HOUSEHOLD HEAD Male - ref. Female	1,096	1,532	** 1,452
RELATIONSHIP to HOUSEHOLD HEAD - ref. Wife			
Household Head		*	1,575
Daughter			,993
Daughter_in_law		*	,968
Other			1,000
HUSBAND RESIDENCE - ref. Non coresid.	1,134		
MOTHER's AGE - ref. More than 35			
Under 20	1,044	1,221	1,042
20-35	1,132	1,244	,992
MOTHER's EDUCATION - ref. Secondary / higher	**		**
No education	** 6,020	1,703	*** 1,491
Primary	** 2,656	,983	1,161
FATHER's EDUCATION - ref. Higher / higher			***
No education	,546	,942	*** 1,732
Primary	,901	1,044	* 1,128
MOTHER's OCCUPATION - ref. High level			
Not Working	2,250	1,876	1,687
Low level	1,054	1,288	* 1,792
Medium level	,771	,879	* 1,762
FATHER's OCCUPATION - ref. High level			
Low level	,688	1,270	* 1,215
Medium level	,591	,755	* 1,260
PROFESSIONAL LEVEL DIFFERENCES - ref. Wom. Higher			
Woman lower level	,447	1,079	,971
Woman same level	,868	,966	,896
EDUCATIONAL LEVEL DIFFERENCES - ref. Wom. Higher			**
Woman lower level	,321	1,128	*** 1,977
Woman same level	,582	1,132	** 1,396
MOTHER's RELATIVE STATUS - ref. Higher			
Lower	,798	,598	1,180
Medium	,893	,916	1,277
MOTHER's DECISIONAL AUTONOMY - ref. More autonomy	**		
Less autonomy	** 1,511	,928	* 2,383
Intermediate cases	1,148	,926	* 1,654
WOMAN's STATUS in SOCIETY (perception) - ref. Higher		**	*
Lower	* ,808	** 1,412	** 1,354
Medium	,945	** 1,512	* 1,319
Constant	,119	,016	,030

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

^a For India, children 1-3 years old

Turning to more exclusive aspects of the mother's status, we explored two classical indicators, education and occupation, and three synthetic indicators based on wide arrays of elementary component variables: decisional autonomy, status relative to husband, perception of women's status in society. 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 profession 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 in Ethiopia and in India. Its effects are strong and highly significant in both countries. For a child of a non-educated mother the risk of being stunted is multiplied by 1.5-1.7 in India and even by 6 in Ethiopia, compared to the risk of the child of a mother with a high level of studies. 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 already widely recognized all over the world and is clearly demonstrated at micro and macro level.¹⁰ The impact of this factor is somewhat less marked in Ghana, where education, and particularly female education, is quite widespread (about 40% of women are not educated, in comparison with 52% in India and 79% in Ethiopia). A potential explanation for this result is a phenomenon that has already been observed: when education is relatively generalized, it produces a sort of community effect with benefits that in some way also the non-educated.

The mother's participation in the workforce and her professional level are even more important than her education, particularly in Ghana and in Ethiopia. The advantage on the nutritional status is extremely 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 exposes them to the outside world, permitting them to acquire independence, awareness and autonomous judgement. However, in India, the impact of this factor is more limited, albeit of the same type. An explanation for this finding may be found in the fact that the workforce participation of Indian women is very low (18%) and is often strictly motivated by necessity. Thus, in the all-encompassing group of non-working women it is possible to find situations that are differentiated from every point of view. On the other side, the empowering effects of employment are likely to be linked to the social context of women's work.

The mother's education and profession 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 are in some way 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 an evident drawback: 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. Nonetheless, at least in the case of Ethiopia and India, it 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 even more

¹⁰ 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).

important than that which is theoretically expected, in these two countries. In all the regression models which were applied to these countries the indicator of “mother decision-making autonomy” is the more highly significant among the mother’s status indicators and it indicates an extremely marked disadvantage of the children whose mothers enjoy less autonomy. The odds of a child being malnourished steadily decline with the increasing of the mother’s autonomy index. 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, to which the large sample size of the Indian survey gives even greater solidity. In Ghana, where - as we have seen - women report a very 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 possible that the women’s autonomy in the area of child care and nutrition could be different (and probably more accentuated) than in other domains about which they were interviewed.

Turning to the perception of female status in society, we found that this indicator has a clearly positive and significant impact in Ghana and India, where the proportion of stunted children steadily increases with the mother’s acceptance of gender inequities, but not in Ethiopia.

The differences of professional and educational level with the spouse, as well as the overall indicator of the mother’s status relative to her husband, are neither significant nor consistent across subgroups and countries. This result is evidently driven by the weight in these indicators of the father’s education and profession, variables that, especially in the two African countries, do not show any clear impact.

5. Conclusions and implications

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 or three standard deviation below the median of the International Reference Population (“stunted” and “severely stunted”). This influence is independent from other socio-economic factors of already known incisiveness, such as family wealth.

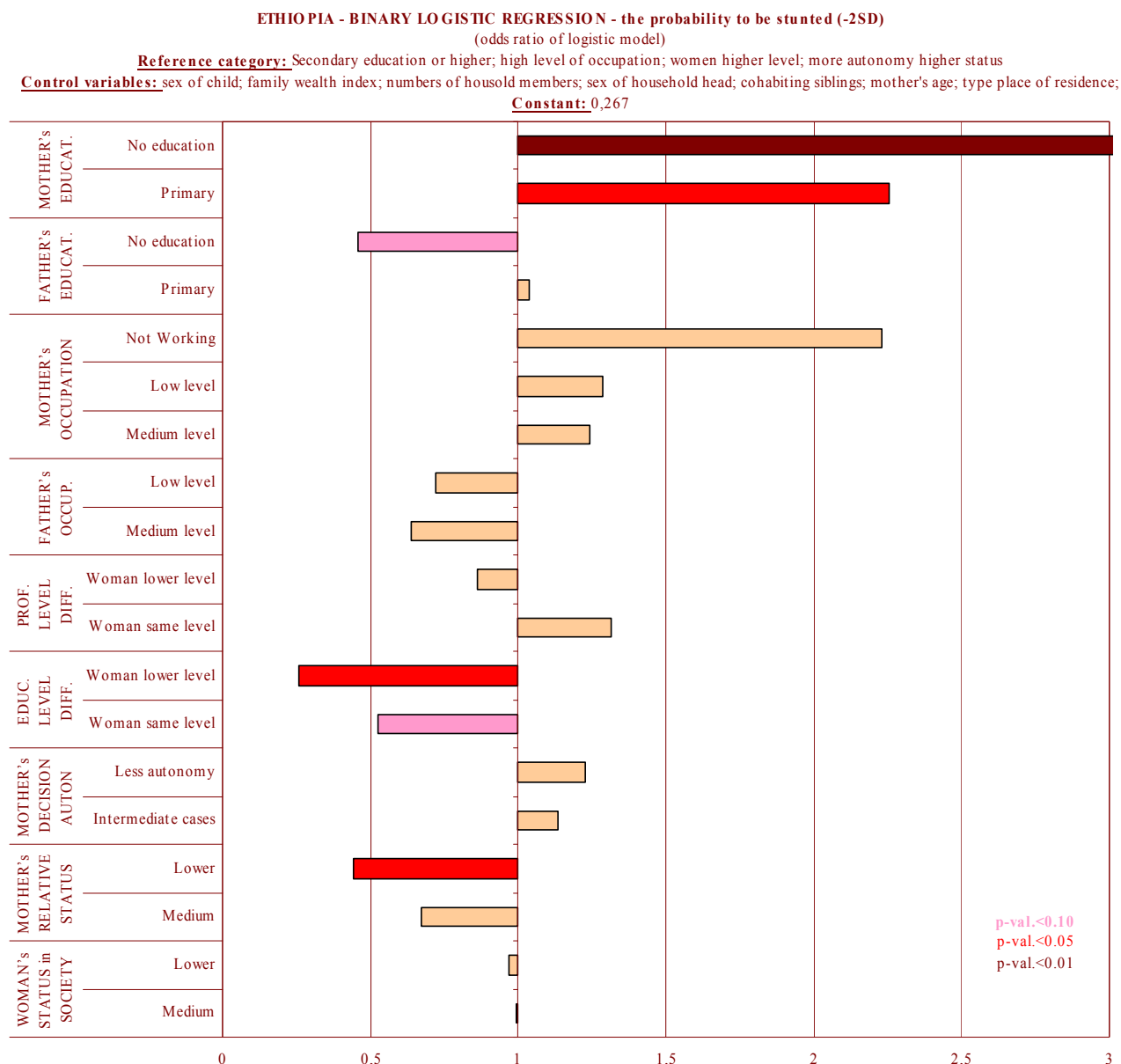
The variables describing the family situation do not lead to a consistent overall picture, but they do provide evidence that a woman’s influential position within the household (i.e. when she is the household head) has beneficial repercussions on children’s nutritional status, be it thanks to maternal altruism, or to the decision-maker’s greater competence in child care.

A gender discrimination is evident in India, 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, decisional autonomy, and gender inequities acceptance are in that order the most important aspects of woman’s status for their implications on children’s nutrition.

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 the two African countries, a crucial point seems to be represented by the role of the fathers. The very limited impact on their children outcomes of their position in terms of education and profession indicates that there is here an area of concern.

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.



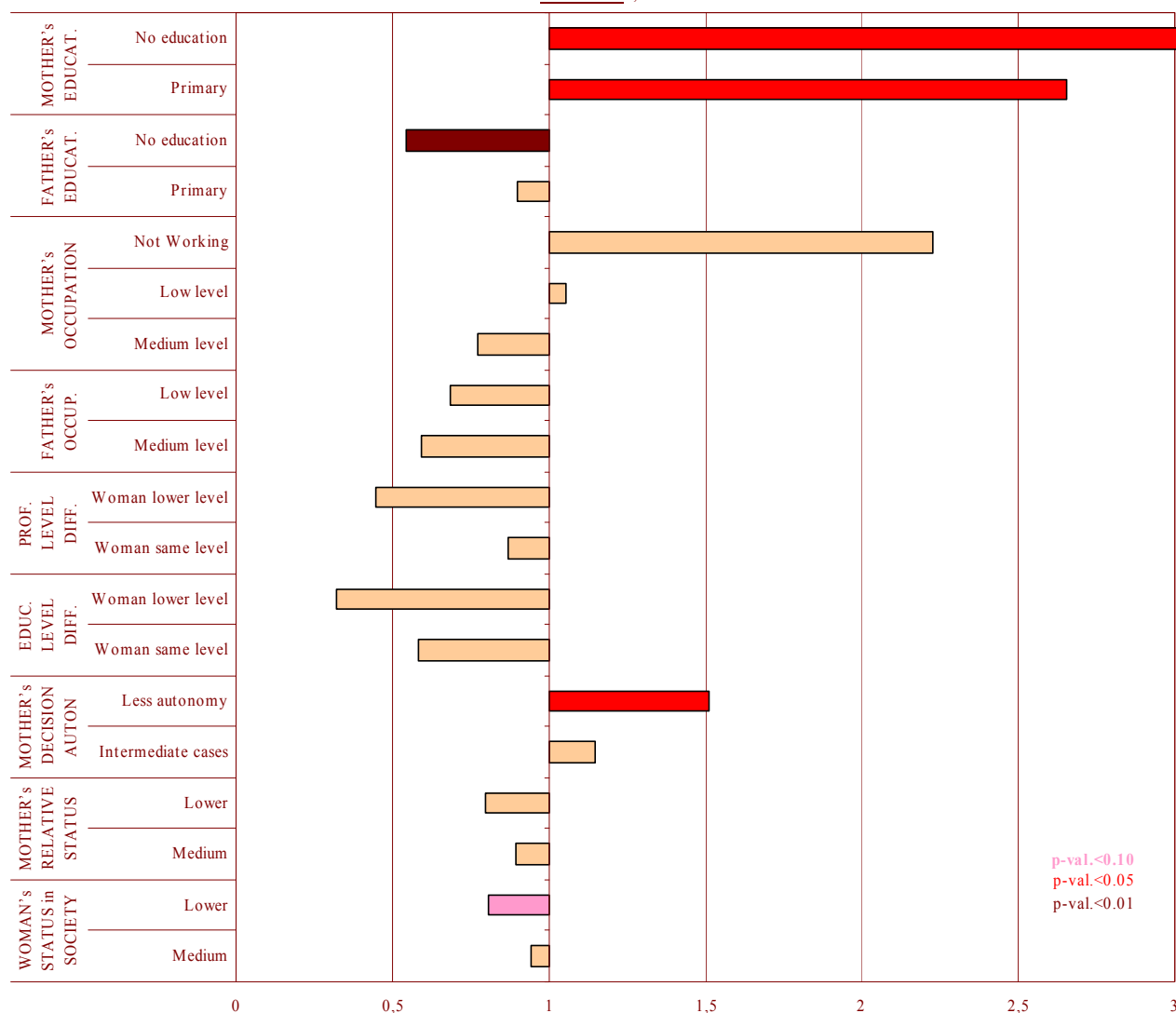
ETHIOPIA - BINARY LOGISTIC REGRESSION - the probability to be sseverely stunted (-3SD)

(odds ratio of logistic model)

Reference category: Secondary education or higher; high level of occupation; women higher level; more autonomy higher status

Control variables: sex of child; family wealth index; numbers of housold members; sex of household head; cohabiting siblings; mother's age; type place of residence;

Constant: 0,119



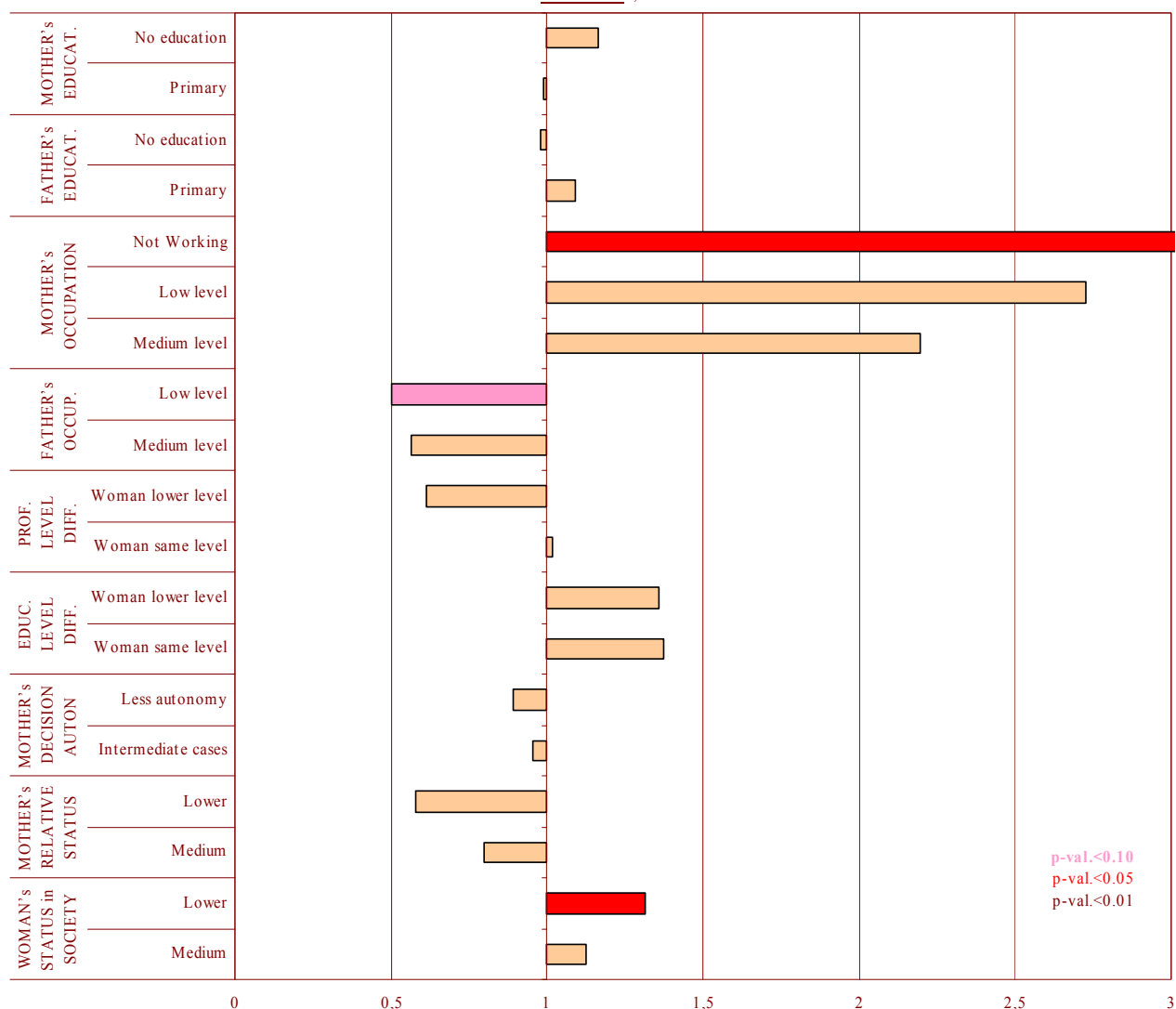
GHANA - BINARY LOGISTIC REGRESSION - the probability to be stunted (-2SD)

(odds ratio of logistic model)

Reference category: Secondary education or higher; high level of occupation; women higher level; more autonomy higher status

Control variables: sex of child; family wealth index; numbers of housold members; sex of household head; cohabiting siblings; mother's age; type place of residence;

Constant: 0,173



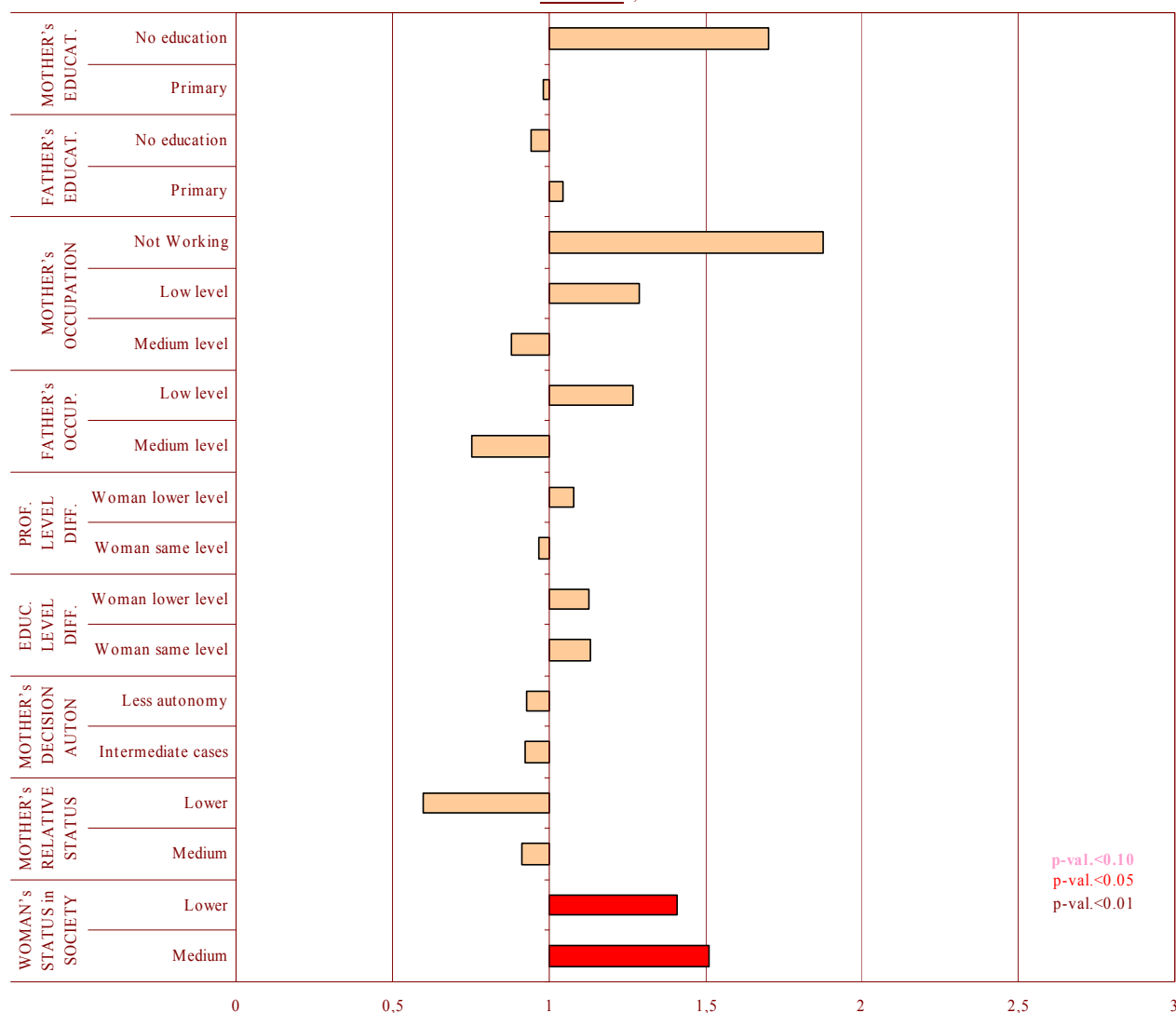
GHANA - BINARY LOGISTIC REGRESSION - the probability to be sseverely stunted (-3SD)

(odds ratio of logistic model)

Reference category: Secondary education or higher; high level of occupation; women higher level; more autonomy higher status

Control variables: sex of child; family wealth index; numbers of housold members; sex of household head; cohabiting siblings; mother's age; type place of residence;

Constant: 0,016

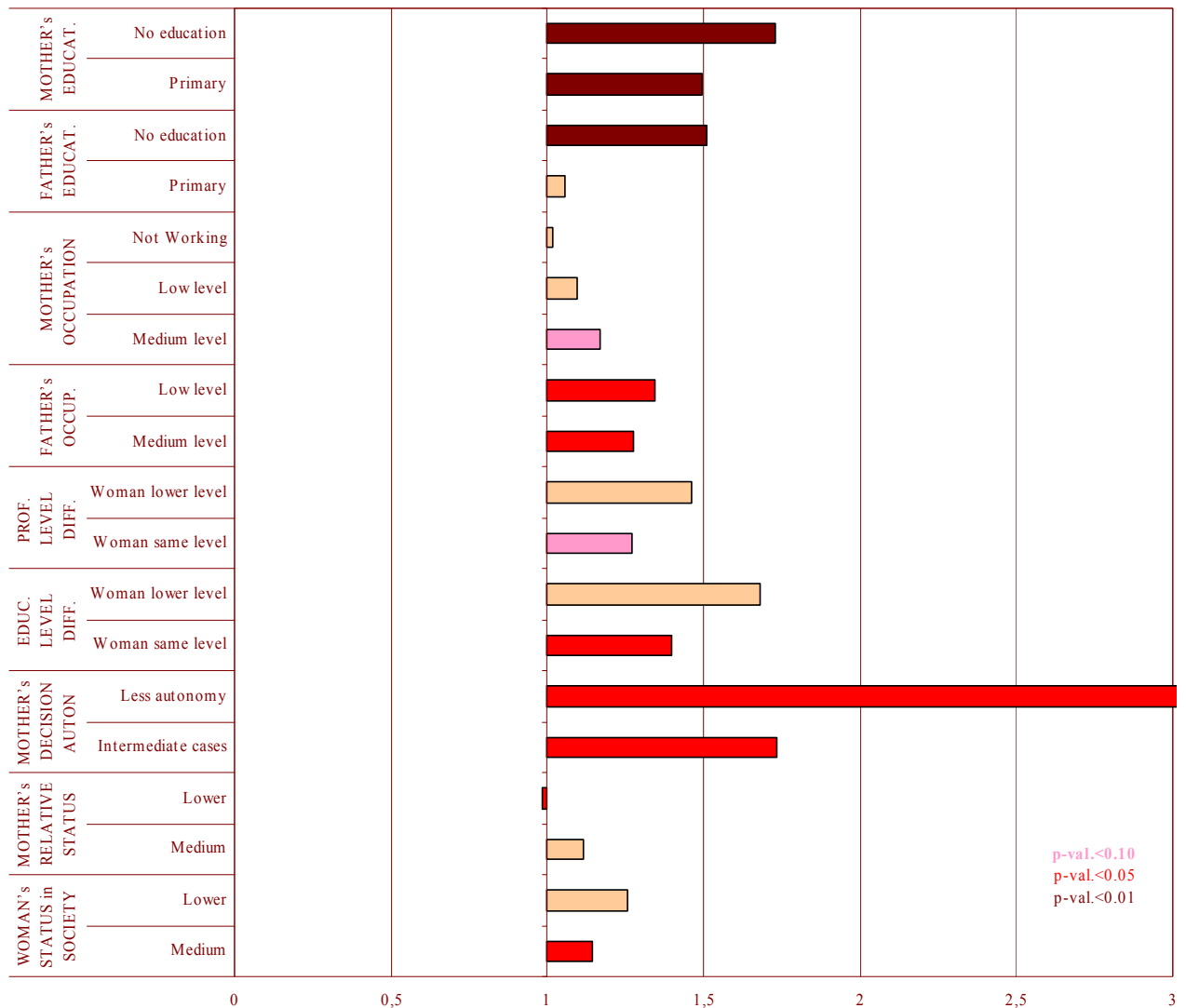


INDIA - BINARY LOGISTIC REGRESSION - the probability to be stunted (-2SD)
(odds ratio of logistic model)

Reference category: Secondary education or higher; high level of occupation; women higher level; more autonomy higher status

Control variables: sex of child; family wealth index; numbers of housold members; sex of household head; cohabiting siblings; mother's age; type place of residence;

Constant: 0,124



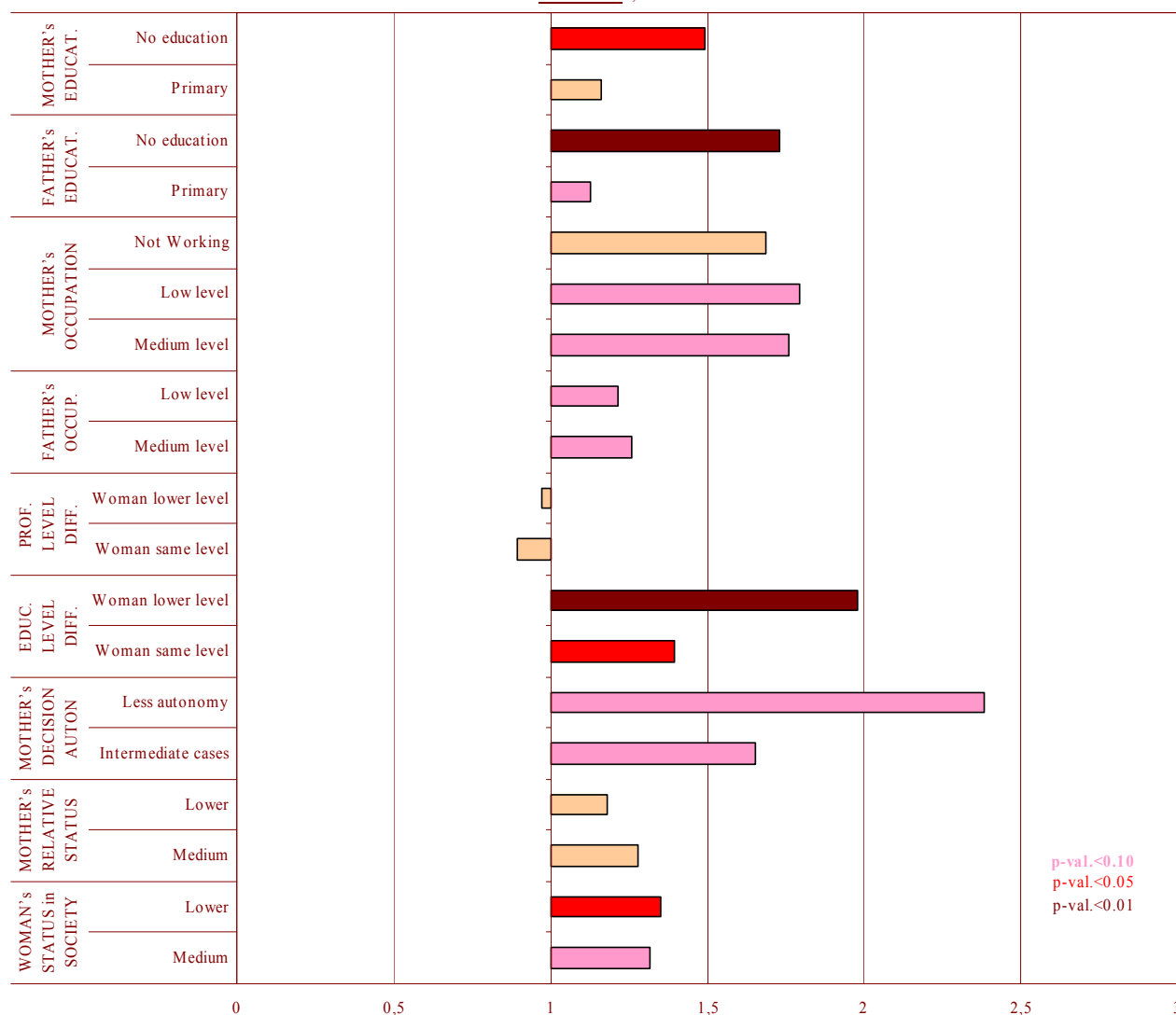
INDIA - BINARY LOGISTIC REGRESSION - the probability to be sseverely stunted (-3SD)

(odds ratio of logistic model)

Reference category: Secondary education or higher; high level of occupation; women higher level; more autonomy higher status

Control variables: sex of child; family wealth index; numbers of housold members; sex of household head; cohabiting siblings; mother's age; type place of residence;

Constant: 0,030



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