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Women's Empowerment, Maternal Nutrition and Chronic Poverty: Further Evidence from Bangladesh

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This paper analyses the link between women's decision-making power and maternal nutritional status through which women's "voice and agency" can indirectly influence child nutrition and thus future prospects for escaping chronic poverty. The literature on intergenerational poverty persistence recognises the role of parental conditions such as economic assets, educational human capital, and occupational choices. This paper highlights the importance of maternal nutrition as another potential channel for intergenerational persistence. The two key results of the paper stand out. *First*, women's decision-making power (a measure of empowerment) is an important correlate of nutritional deprivations among currently married women, even after controlling for factors such as household asset- poverty, women's education and work status, and partner's characteristics. *Second*, while women's decision-making power do not have direct influence on child nutrition, its effect on the latter percolate through the mother-child nutritional link. These results seem to have larger impact cutting across asset quintiles. The role of women's decision-making power along with other women-empowering measures needs to be viewed as an integral component of anti-poverty measures.

Keywords: Chronic Poverty, Women's Empowerment, Maternal Nutrition, Child Nutrition, Women's Agency
JEL Classification: O15

I. INTRODUCTION

In *The Subjection of Women*, written in 1869, John Stuart Mill outlines what can be viewed as a manifesto espousing women's *equality in decision-making* in the home and the society at large. Mill argues that the social and legal conditions

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which inhibit the liberty of women serve as one of the "chief hindrances to human improvement," thus having wider implications for development. Such views spread wide across the continents, as has been reflected in the writings of Begum Rokeya, the Muslim Feminist and educator in Bengal during the first decade of the twentieth century. In *The Decline of Women*, written in 1904, Rokeya's argument is that giving education to women and treating them more equally will not just be good for maternal and child health outcomes, but also for the society at large. However, the barriers to women's greater decision-making role are still formidable. As argued in the present paper, uneven spread of women's decision-making role—which we take as a proxy for "women's empowerment"—has resulted in very different maternal and child health outcomes in different groups of households and, arguably, in different geographic parts of Bangladesh.

In an earlier attempt, we tried to show the relevance of women's decision-making role based on DHS 2000 (Begum and Sen 2009). The present paper provides further and, arguably, more robust evidence on three aspects. *First*, it uses more reliable "objective" asset-poverty based on DHS 2004 data compared to "subjective poverty" based on DHS 2000 data to isolate the wealth effects from the empowerment effects.[1] *Second*, it offers a more "objective" construction of the women's empowerment indicator by using Principal Component Analysis (PCA) for constructing the composite score on women's decision-making power as against simple addition of scores across different decision-making roles of women. The PCA results are also compared with other methods for constructing the composite score. *Third*, the estimation method represents an improved modeling strategy over the previous one, as it adds partner's characteristics (such as spouse's education along with woman's education), and a few more demographic (female-headedness) and economic (a better classification of

[1] Begum and Sen (2009) used "subjective poverty" data such as self-assessment about the capacity to meet food consumption needs according to four categories—whether the household is in deficit for food throughout the year, or it is only in deficit during "some months of the year", as opposed to being "breakeven" and having "food surplus." Clearly, such subjective characterisation runs the risk of being "noisy" in the precise ranking of *deficitness* in comparison to asset-score based ranking of households on which one arguably have more verifiable information. Asset-poverty has the other advantages over subjective poverty indicator as being better proxy for economic wealth of a household (see, Carter and Barrett 2006). Also, the subjective poverty ranking is a discrete ranking while household wealth index is a continuous variable and hence sensitive to even slight variation in wealth status within and across poor/ non-poor groups.

sanitation access) variables as "controls" along with the consideration of clustered standard error for obtaining robust estimates in DHS clustered setting (the latter was not considered previously).

1.1 Poverty across Generations: Four Transmission Channels

Based on the review of the literature on chronic poverty transmitted across generations, we can identify three main channels of pass-through and chronicity.[2] At the heart of these channels lies the concept of an "asset threshold" that is arguably required to escape chronic poverty. Thus, having a below critical minimum level of physical and financial assets can keep a poor household in chronic poverty for generations. This may be termed as the *economic asset channel*. Another pathway to intergenerational chronic poverty works through education-occupation-productivity linkages. Current schooling choice and performance shapes the future choice of occupation. Not having adequate educational human capital predetermines engagement in activities that are marked by low productivity and hence lower earning probability. This may be termed as the *educational human capital channel.* Another transmission mechanism underscores the more foundational role of nutritional intake for a range of faculties such as cognitive growth of children affecting schooling performance, vulnerability to sickness and susceptibility to health shocks, and inability to display the full potentials with respect to the work efforts. All these adversely affect productivity of the adult work force and negatively influencing labour earnings. This may be termed as the *nutrition-productivity channel*. All these channels imply an intervention strategy that aims to close the asset gap of the poor households from the threshold line—an insight that lay at the core of the "big push" theory.

Assets are important because their inadequate presence can constrain access to other market and non-market opportunities. Thus, access to collateralizable assets such as land is often considered "binding" in the backdrop of credit market imperfections. Lack of credit access, in turn, can constrain the investment choice of the chronically poor deemed critical for escape from poverty (Bardhan 1996, Deininger *et al.* 2008). Assets can be leveraged to mitigate debilitating influences of risks and shocks that often condition further descent into poverty (Morduch 1994, Jalan and Ravallion 1999, Krishna 2010). Panel studies have highlighted the role of *initial asset conditions* in socially reproducing chronic poverty

[2] The discussion on the channels of intergenerational poverty transmission draws, in part, on Begum and Sen (2009).

(Baulch and Hoddinott 2000, Hossain *et al.* 2002, May and Carter 2001, Sen 2003, Osmani and Sen 2011, Osmani 2012). While intergenerational persistence in land and other physical assets is widely reported (Asadullah 2006), the claim of existence of asset poverty trap through the use of survey data, however, produced contrary claims (Quisumbing and Baulch 2009, Carter and Barrett 2006). The nutrition-productivity channel has been emphasized in a number of studies (Dasgupta 1993, Ray 1999).

The present paper marshals further arguments and evidence to underscore the silent mediation of the *fourth channel pertaining to women's empowerment* (Sen 1999, Begum and Sen 2009, Dreze and Sen 2013, Sen 2014, Eswaran 2014). The latter is proxied by women's decision-making status within a household both with respect to areas concerning women's own wellbeing and areas concerning wellbeing of the household as a whole. It is shown that women's empowerment has non-trivial positive effects on *women's health* even in asset-poor households. Female agency can enhance nutritional status of mothers in resource poor setting and can overturn the vicious cycle of maternal malnourishment leading to child malnourishment, and via the latter, persistence of chronic poverty across generations. The "opposite evidence" on the side of the non-poor households that lack promotion of female agency is also considered here. The results suggest that, predictably, female-conservative households are not only marked by a higher maternal under-nutrition but also higher child under-nutrition, having adverse long-term implications for household income growth.

1.2 Women's Empowerment-Health Nexus as Pathway to Escaping Chronic Poverty

The relevance of women's empowerment-health nexus for escaping poverty, as outlined above, can be further elucidated by combining predictions of health literature that developed in three main directions. The well-known study by Glewwe and King (2001), based on the longitudinal data on mothers and children in Philippines, analysed the causal links between mother's antenatal care and future schooling performance of children. The "fetal connections" that mediate nexus between women's health and child nutrition (and health) was examined by a seminal paper by Osmani and Sen (2003) based on cross-country data. The effects of mother's under-nutrition were visible among children even up to the adolescent years, indicating long persistence of a bad equilibrium. Based on the Indian district-level data, Murthi *et al.* (1995) focused on another approach that showed the relevance of female agency for her own wellbeing as well as wellbeing of the female child in the household. The female disadvantage in

reproductive health and child mortality was found to be higher in households with "conservative outlook and norm" in the sense of being biased against women's empowerment.

The paper assembles the above propositions connecting female agency-child wellbeing to consider the long-term dynamic possibility of escape out of chronic poverty. Higher female agency at a lower level of income creates the possibility whereby poor but internally empowered household can be "strategic" in working through a difficult context of climb from poverty through what looks like "a two-period overlapping intergenerational model" (Galor and Zeira 19993). In the first period, they allocate less on consumption and more on strategic investment, thus embracing a scenario that is welfare-reducing in the short-term but welfare-enhancing in the long-run. Not all poor households can embrace such a strategy, however. The paper argues that households which place greater value on women's agency are likely to adopt such long-term welfare enhancing investment strategy. The latter includes giving more priority to the human development of children while maintaining a better "intra-household social capital" (meaning more family cohesion, mutual respect and greater consideration of women's voice in household decisions).[3]

To test the above we take recourse to Bangladesh Demographic and Health Survey 2004 (BDHS) round data with intermittent reference to the past results for DHS 2000 to check the consistency of the main conclusions. The advantage of using DHS data is well known. The latter contains data on the nutritional status of the surviving children and their corresponding mother in addition to the background parental personal and household markers, thus enabling to control the household's asset-poverty status. Recent investigations show that the household asset-poverty index or household wealth index that is generated through the Principal Component Analysis—provided it is calculated on the basis of a comprehensive list of household assets – is a good proxy of a household's permanent income or poverty ranking.[4] It is, arguably, much more reliable indicator than the "subjective poverty" indicator available in DHS 2000 and used earlier in the literature, including by the authors.

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[3]It may be noted that we use the terms female "agency", women's "empowerment", female "voice", and female "autonomy" interchangeably throughout the paper glossing over the subtle conceptual differences among these categories in terms of pathways and outcomes (on these differences, see Azim and Sultan 2010). How women's agency is to be suitably defined is an important operational issue though (to be elaborated upon later in the empirical part of the paper).

[4] On this, see Carter and Barrett (2006); Filmer and Pritchett (2001).

A further consideration relates to the wealth score itself. Each household is categorised in one of five quintiles based on the wealth score. We did not attempt to construct our own wealth score but relied on the wealth score generated by Marco International that was included in the DHS data set. In the case of mother, the analysis has been done based on the currently married women aged 15-49. The analysis of the child wellbeing or their nutritional status and its interface with mother's characteristics and nutritional status has been carried out using the pair information for "all the children under the age of five" and their "currently married" mother, as was the case in previous studies.

1.3 Structure of the Paper

The remaining sections of the paper are structured as follows. Section II, which presents the main descriptive results, discusses four empirical links, sequentially. First, we establish the general links between asset-poverty and maternal as well as child malnutrition. Second, we show the presence of bio-medical links between maternal nutrition and child nutrition irrespective asset-poverty status. Third, we introduce the female agency dimension into the analysis, by displaying the connection between female agency and maternal nutrition. Lastly, we examine the connection between female agency and child nutrition.[5] Analysis of the bivariate links between women's agency and maternal/ child nutritional status is carried out by considering the household wealth effects into account.

Section III brings a range of factors that may shape maternal and child nutrition within a "multivariate framework" but with emphasis on the effects of women's decision-making role as an independent causative factor. The theory guiding the choice of factors is premised on the insights of female empowerment, chronic poverty and maternal and child under-nutrition literature cited earlier. Section IV summarises the results and considers their implications for social policy.

II. HOUSEHOLD WEALTH, FEMALE AGENCY, MATERNAL AND CHILD NUTRITION: TRACING THE HIDDEN LINKS

Choice of indicators of household wealth, female agency, maternal and child nutrition, as presented in the paper, is guided by the availability of data. The DHS allows us to estimate body mass index (BMI) as the key summary indicator

[5]It may be emphasised that the term "domestic decision-making autonomy" captures only a part of the female agency/ empowerment and can only be seen as a proxy measure for the statistical purpose of our analysis.

of maternal nutritional status.[6] The estimates of both average attainment for the group (i.e. mean BMI) and the proportionate shortfall (proportion of mothers below 18.5 BMI for the weight indicator) are presented. For the indicator capturing a severe degree of maternal malnutrition, we consider the cut-off point of 16.0. For the child nutritional status, we use three standard child anthropometric measures: proportion of children stunted (less than bio-medically recommended height compared to age), wasted (less than bio-medically recommended weight compared to height), and underweight (less than bio-medically recommended weight compared to age). The measure of stunting reflects the long-term deprivation in nutrition, the measure of wasting indicates deprivation in the short-term, while that for underweight is a mix of both. For each of these categories, we have given separate consideration to the *degree of severity* by constructing estimates for severe child malnutrition. As mentioned earlier, we construct a household wealth index by using a Principal Component Analysis (PCA) to serve as the statistical proxy for household poverty.

2.1 Household Wealth, Maternal and Child Nutrition: In Search of Deviants

Reducing household poverty is often considered as the best way to reduce nutritional deprivations. Connections between poverty and nutrition are undeniable. A large body of regional and global evidence supports this story (Wagstaff 2000, Gawatkin *et al.* 2000, WHO 2001, FAO 2015). The evidence collected from the successive DHS rounds on Bangladesh also upholds it.

Thus, the survey data shows that both maternal and child malnutrition vary significantly with household asset-poverty status (Table I). The proportion of malnourished mothers varies from 16 per cent for the richest asset class to 45 per cent for the poorest asset category.[7] Following the above trail, the weight of underweight children varies from 30 per cent for the richest to 60 per cent for the poorest asset category. It is remarkable that there is still a considerable presence of maternal and child nutrition in the richest wealth quintile. This implies that wealth alone cannot eradicate under-nutrition. Factors other than income/wealth have to be considered. Similar results are reported by Begum and Sen (2009) based on DHS 2000 data but using subjective poverty category (see, Annex Table 1).

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[6]BMI, the body mass index, is defined as weight in kilogram divided by the square of height in meters (kg/m2). For BMI, a cut-off point of 18.5 is recommended for defining thinness or malnutrition.

[7]We often use the terms "asset category," "wealth category" and "asset–poverty category" interchangeably in this paper.

TABLE I
MATERNAL AND CHILD NUTRITIONAL STATUS BY ASSET QUINTILES--DHS 2004

Wealth Quintiles	Per cent mothers malnourished as per BMI			Per cent children malnourished (<2SD)		
	Average BMI	Below 18.5	Below 16	Under-weight	Wasted	Stunted
Poorest	19.14	44.7	7.2	59.8 (19.0)	16.1 (1.5)	54.8 (25.6)
Poorer	19.44	38.8	6.1	54.0 (15.1)	13.7 (1.7)	47.1 (19.0)
Middle	19.86	34.0	4.4	45.2 (12.5)	13.9 (1.5)	42.9 (15.7)
Richer	20.59	29.1	4.2	43.6 (10.3)	11.0 (1.2)	40.0 (12.9)
Richest	22.41	16.1	2.1	30.1 (5.8)	9.6 (0.7)	24.9 (6.0)
All	20.31	32.4	4.8	47.8 (13.1)	13.1 (1.3)	43.3 (16.7)

Note: Figures in parentheses represent per cent children severely malnourished (<3SD).

It is in this context we proceed to examine the varying role of women's empowerment as a key factor influencing maternal nutritional outcomes, and through that channel, the child nutritional outcomes. To that end, we first examine whether there is a link between maternal and child nutritional outcomes in the first place. We could have skipped this part, admittedly. After all, from the general biomedical literature, we know that there is indeed causal link between the two sets of nutritional outcomes. However, in an empirical setting of DHS, we wanted to confirm the presence of such link, yet again, before turning to the main analytical argument of female agency-child nutrition-household poverty escape possibility. Once this is established in the case of DHS data, we can proceed to examine the effects of varying female agency on nutritional outcomes, affecting future productivity of child and, consequently, future poverty.

2.2 Biomedical Causality between Maternal Nutrition and Child Nutrition

There is clear evidence from the DHS 2004 data that the mother's nutritional status is directly correlated with the nutritional status of the children (Table II). Malnourished mothers are very likely to produce malnourished children. This is a biomedical relationship irrespective of socioeconomic status (see Annex 2 and Annex 3 for similar results based on DHS 2000). As a result, the mother-child nutritional link stands out even when one controls for the variation in household wealth (Table III).

TABLE II

PREVALENCE OF MODERATE AND SEVERE CHILD UNDER-NUTRITION BY MOTHER'S NUTRITIONAL STATUS – DHS 2004

Mother's nutritional status (BMI)	Per cent children malnourished (<2SD)		
	Underweight (W/A)	Wasted (W/H)	Stunted (H/A)
< 16	71.5	25.6	57.1
16 - 16.99	61.3	21.3	50.1
17 – 18.49	56.1	15.7	49.7
18.50+	41.2	10.1	38.8
	Per cent children malnourished (<3SD)		
< 16	27.4	4.9	24.7
16 - 16.99	19.5	2.1	21.2
17 – 18.49	16.9	1.5	20.3
18.50+	9.8	0.9	14.1

TABLE III

PREVALENCE OF CHILD UNDER-NUTRITION (<2SD) BY MATERNAL NUTRITIONAL AND BY ASSET QUINTILES– DHS 2004

Wealth Quintiles	Mother's BMI			
	< 16	16 – 16.99	17 – 18.49	18.50+
	Per cent children stunted (H/A)			
Poorest	62.0	57.7	56.4	52.2
Poorer	61.4	53.6	51.8	42.7
Middle	54.1	48.9	46.3	39.7
Richer	48.6	42.3	49.0	36.5
Richest	39.1	27.9	29.9	23.6
	Per cent children wasted (W/H)			
Poorest	31.0	20.1	19.3	11.3
Poorer	27.1	24.5	14.5	10.3
Middle	27.0	28.3	15.8	10.6
Richer	8.6	16.7	13.2	9.8
Richest	21.7	11.6	12.0	8.9
	Per cent children underweight (W/A)			
Poorest	70.3	69.9	62.6	54.7
Poorer	76.1	69.4	60.6	46.3
Middle	73.0	60.9	49.5	40.1
Richer	71.4	42.3	56.8	37.7
Richest	60.9	41.9	35.9	27.6

In the case of the poorest asset class, the proportion of underweight children for *severely malnourished* mothers (i.e. those with BMI less than 16) is 70 per cent, while the matched figure for the well-nourished mothers (those with BMI more than 18.5) is 55 per cent. Similarly, in the case of middle asset group (middle 20 per cent), the matched figure for the severely malnourished mothers is 73 per cent as opposed to 40 per cent for the well-nourished mothers and in the richest class these figures are respectively 61 and 28 per cent. The sharp contrast in the child nutritional status between the two polar groups of severely malnourished and the well-nourished mothers largely holds true for all three child anthropometric measures and all five wealth categories.

The upshot of the above is to stress that mother's health can make difference to child's health irrespective of wealth/poverty status of a household. This is not a new finding: it is a well known clinically established causality. But, the fact that such bio-medical link often gets ignored has important socio-economic consequences for long-term growth and overcoming chronic poverty. Since such link is common across wealth quintiles, it is logical to explore what other (non-wealth) factors may, in turn, be crucial to the health status of the mothers. It is in this context "women's agency" becomes an important area of investigation.

2.3 Female Agency and Maternal Nutrition: Causal Links?

First we start from one important caveat. Although here we attempt to relate individual woman's "agency" to maternal nutritional outcomes, it is fair to acknowledge what we are broadly concerned about is individual woman's nutritional status in general i.e. *irrespective of her motherhood status*. This is because deprivation of woman in the South Asian context starts from the early childhood and continues through the various phases of her life cycle. Improving maternal nutritional status thus requires focus on the *pre-pregnancy* phase. A striking demographic fact indicated by both DHS 2000 and 2004 data is that about 70-80 per cent women are married in Bangladesh before the legally entitled age of 18. There is thus a direct connection between adolescent health and maternal health. But, this has implication for the discussion on "women's agency" as well. Thus, when we talk about women's agency this is a relevant concern not just for adult women who are mothers, but applies equally to adolescent girls who are "future mothers." In fact, about 60 per cent of the currently married women gave birth to their first child before the age group of 18 as per DHS 2004. In short, women's agency discussion cannot be delinked from the wider issue of agency of adolescent girls. Unfortunately, in constructing statistical index of women's agency, we are bound by what we have in the DHS

data i.e. indicators of female autonomy related to her *domestic decision-making* role.

Women's agency has been put forward as an important factor influencing women's own wellbeing such as fertility status as well as child wellbeing such as child mortality (Murthi *et al.* 1995, Sen 1999, Dreze and Sen 2013). Often less emphasised in the literature is the fact that maternal nutrition also varies by a considerable degree with the level of women's agency, the latter captured by proxy indicators. The term "proxy indicators" is important to take note of, however. "Agency" is a measure of the ability to take control over own lives and the ability to make own choices; such measure is not easy to capture directly from the conventional survey instruments.[8]

However, women's agency can be indirectly captured in several ways. In contrast to Begum and Sen (2009), we only consider women's role in the "domestic decision-making" as the proximate measure of women's agency in this exercise. While we include women's education (level of formal schooling) and their exposure to media (TV) as "control" variables, we do not consider them as proxies for women's agency for they are developmentally important in their own rights as educational human capital and access to information, respectively. In empirical exercise for other countries, "women's present work status" (whether works for cash) is also taken as a proxy for women's agency. However, in the Bangladesh context, we found that labour force participation for female workers is mainly poverty-driven. The rural labour force participation rate for female workers is higher for the poorer households, irrespective of whether poverty is defined by land, income, or self-categorisation (Rahman and Hossain 1995, BIDS 2001, Mahmud 2003, Begum 1994, Labour Force Survey 2000). This is also true of DHS data used in the present exercise.[9] Lack of data providing further disaggregation of the work status of women workers by nature of employment arrangement is also an additional consideration for not counting the "work status" as a measure of women's agency. Kabeer (2002), for instance, found that the modern (formal) employment arrangement is more agency-

[8]It may be re-emphasized, however, that the terms female "autonomy" and women's "agency" have been used interchangeably in the present paper. Admittedly, there are fine gradations and differences between the two, especially when one considers their statistical representations. However, we are limited by the DHS data setting here.

[9]Again, this is to be seen only as an empirical statement specific to Bangladesh. For instance, in India the female labour force participation rate is found to be agency-enhancing and cited as an important factor for reducing female disadvantages in mortality and malnutrition (Murthi *et al.* 1995).

enhancing than the traditional (informal) jobs.[10] Given the pre-dominant picture of poverty-driven participation in the labour market and lack of data on employment arrangement, we dropped the present work status of women as being unsuitable for capturing the agency effect. The other possible indicator of women's agency such as individual ownership of land or non-land productive assets by women—as argued by Aggarwal (1994)—could not be used in this exercise due to lack of data.

In this paper, we approached the indicator of "women's decision-making role" in the household context (assessing "freedom to choose") as a distinct measure of female autonomy. We consider five types of "domestic decision-making role" to measure female autonomy. These are: (1) own health care, (2) child's health care, (3) large household purchases, (4) household purchases of daily needs, and (5) visits to relatives and friends (assessing freedom of physical mobility). In DHS there is an additional item relating to decision-making role regarding what food should be cooked every day. However, in the cultural context of Bangladesh women are often entrusted with the responsibility of cooking in any case, so we decided to avoid this item.

In order to assess women's overall decision-making role from the view-point of empowerment, we deployed three approaches. The first one is the Principal Component Analysis (PCA) approach. Here the responses of the women for all five decision-making roles mentioned above have been assigned numerical values as originally given in DHS[11]: decision by woman alone=5, decision by woman jointly with her husband=4, decision by woman jointly with persons other than husband=3, decision taken by husband alone=2, decision taken by person other than husband alone=1. The spread of the numerical scale can be illustrated by considering the decision-making process on mother's own health care. Thus, for the "final say" on own health care decision, only 22 per cent of the mothers can decide alone, another 22 per cent of the mothers have to depend on the joint decision with husband, in 5 per cent of cases "joint decision" is taken in consultation with someone other than her husband. By contrast, in 44 per cent

[10]Using qualitative case studies, Kabeer (2002) compares the women workers of ready-made garment industry employed under factory conditions in Dhaka with the home-based garment workers working under sub-contracting arrangements in London and found that the former are enjoying greater freedom and agency.

[11]The only intervention we made is to *reverse* the original DHS ordering before conducting PCA so that (for example) "decision by woman alone" gets a score of 5 instead of 1; similarly, "decision by person other than husband alone" gets a score of 1 instead of 5.

of cases it is the husband who takes the decision, while in another 8 per cent of cases the decision entirely rests with someone else. Combining the last two categories one can compute that in 52 per cent of cases mothers do not have any final say on matters related even to their own health. We consider the mix of decision-making across all five decision-making roles and then conduct PCA on all the five decision-making roles to construct a composite score (based on the weights provided by the First Component of PCA). In this variant we use the full information of the sample on women's decision-making role and hence this is also our preferred variant.

In the second approach, which is a variation of the first approach, we follow the PCA approach, but with slightly changed procedure for assigning values involving a fewer categories: decision by woman alone=2, decision by woman jointly with their husbands or with someone else in the family=1, decision taken by husband alone or someone else in the family=0. We then conduct PCA on all the five decision-making roles and construct a composite score based on the weights provided by the First Component of PCA. In this variant, evidently, we did not use the full information of the sample on women's decision-making role as we had to collapse a few categories.

In the third approach, we exactly follow the non-PCA approach – essentially Borda count – used in Begum and Sen (2009) whereby values are assigned as follows: decision by woman alone=2, decision by woman jointly with their husbands or with someone else in the family=1, decision taken by husband alone or someone else in the family=0. Scores on all decision-making categories are then added together to get a single score for a woman, which ranges between 0 and 10 representing the level of their overall decision-making role. Women with no decision-making role at all scored 0, while those with full decision-making power scored 10. Women with different decision-making scores were then divided into four groups: one with no decision–making role at all viz., who scored 0 (accounting for 23 per cent of respondents); second one comprised of women with low decision-making role viz., who scored a value between 1-5 (37 per cent of respondents); third one represents those with medium decision-making role scoring a value between 6-9 (32 per cent of respondents); and the fourth group consists of those scoring a value of 10 (8 per cent of respondents). We later estimate the determinants of maternal and child nutrition with all four variants of constructing female agency mentioned above to check for the robustness of the results (see, Section III of the paper).

Several features are noteworthy. First, the results confirm the role of woman's education and exposure to media as having favourable influences on

maternal nutrition. The proportion of malnourished mothers is 38 per cent for the uneducated mothers and the corresponding figure is 15 per cent for the highly educated ones (Table IV). These figures in the case of women with "some exposure to media" and "no exposure to media" are respectively 27 and 39 per cent. Consistent with our prediction, descriptive results also show that female autonomy in domestic decision-making has favourable effects on maternal nutrition. The proportion of malnourished mothers is 39 per cent for those with no decision-making role as opposed to 29 per cent for their counterparts with medium and higher decision-making role. The effect is equally important for the severely malnourished mothers (Table IV).

TABLE IV

MOTHER'S NUTRITIONAL STATUS BY FEMALE EDUCATION, MEDIA EXPOSURE AND FEMALE AUTONOMY– DHS 2004

(per cent figure)

Empowerment Characteristics	Mother's BMI		
	Average BMI score	< 18.5	< 16
Mother's Education			
No education	19.66	38.3	6.3
Primary	20.14	32.8	4.6
Secondary	21.03	26.0	3.0
Higher	22.62	14.8	1.6
Decision- making Role (score)			
Nil (0)	19.70	38.6	6.3
Low (1-5)	20.29	32.1	4.4
Medium and high (6+)	20.76	28.6	4.2
Exposure to Media			
Some Exposure	20.94	26.7	3.3
No exposure	19.53	39.3	6.6

The above results are based on aggregate decision-making score considered over several dimensions of decision-making. It is, therefore, of interest to examine the dimensions individually. Table V presents disaggregated results with respect to maternal nutrition. Two key aspects are noteworthy. *First*, remarkably enough, for all aspects of decision-making the favourable effect on maternal nutrition status tends to be higher when woman has complete control over decision as opposed to when decisions are taken by her spouse alone. Thus, the proportion of well-nourished mothers is 70 per cent in case of control over decision about her own health care needs compared to 65 per cent when her

spouse takes that decision. The matched difference for other key decision-making roles, such as exercising choice and control over child health, asset purchase, buying daily necessities and freedom to visit friends and relatives, is of similar magnitude justifying their inclusion as empirical proxy indicators of women's empowerment.

Second, even when the decisions are jointly taken by both partners the favourable effects on maternal nutrition are noticeable. Indeed, according to DHS 2004, such effect is almost equal to that noted when she herself decides the matter. This was not the case in DHS 2000 where joint decision has much more muted effects (see, Annex Table 5).

TABLE V

DISTRIBUTION OF MOTHERS BY DECISION-MAKING ROLE AND BMI GROUPS– DHS 2004

Mother's decision-making role	Mother's BMI		
	< 16	16 – 18.49	18.50+
	Women's own health		
Women alone	5.1	24.9	70.0
Husband alone	5.3	29.3	65.4
Jointly by women and husband/others	3.8	26.4	69.7
	Health care of the children		
Women alone	4.9	25.0	70.1
Husband alone	5.6	31.5	62.9
Jointly by women and husband/others	4.2	26.2	69.6
	Large household purchase		
Women alone	4.7	24.5	70.8
Husband alone	6.0	31.3	62.7
Jointly by women and husband/others	4.1	25.8	70.2
	Purchase of daily needs		
Women alone	4.0	23.1	72.9
Husband alone	5.8	31.5	62.7
Jointly by women and husband/others	4.3	26.4	69.3
	Visit to family/friends/relatives		
Women alone	4.9	25.2	69.9
Husband alone	5.6	30.6	63.9
Jointly by women and husband/others	4.2	26.0	69.8

Since women's empowerment may be positively influenced by household resource position, it is important to isolate the specific influence of women's agency on health and nutrition outcomes of the mothers as distinct from the income/wealth effects (which in the present exercise is proxied by the household wealth status). Table VI tests the proposition that within the same household wealth group mother's nutritional status varies positively with female empowerment. Even for the poorest category greater decision-making role for women leads to their better nutritional status. For example, if we focus solely on the bottom 20 per cent in the asset ladder (equivalent to the poorest group), then the prevalence of moderate malnutrition among mothers would be 49 per cent for the group with the lowest female autonomy as against 43 per cent for the group with the highest female autonomy. Similarly, if we concentrate on the next 20 per cent in the asset ladder (equivalent to the moderate poor group), then the matched figures would be 44 per cent and 37 per cent respectively.

TABLE VI

PERCENTAGE OF MOTHERS 'MALNOURISHED' AND 'SEVERELY MALNOURISHED' BY FEMALE AUTONOMY SCORES ACROSS WEALTH CATEGORIES – DHS 2004

	Wealth Quintiles				
	Poorest	Poorer	Middle	Richer	Richest
	Per cent of women malnourished (<18.5)				
Decision-making Role (score)					
Nil (0)	49.2 (9.2)	43.6 (7.6)	36.9 (5.2)	37.8 (5.6)	20.0 (2.8)
Low (1-5)	43.3 (5.3)	37.1 (6.0)	32.6 (3.6)	28.7 (4.6)	17.3 (2.4)
Medium and high (6+)	42.7 (7.8)	37.3 (5.2)	33.3 (4.5)	23.8 (3.0)	13.7 (1.7)

Note: Figures in parentheses represent per cent severely malnourished (BMI < 16**).**

The emerging message indicates the presence of clear positive links between female autonomy and maternal nutritional outcomes. Thus, *mother's malnutrition and severe malnutrition in terms of BMI decline noticeably with the improvement in mother's domestic decision-making role for all wealth categories*. However, the matched effect is larger for the richer groups, suggesting that autonomy has greater liberating effects in the presence of wealth. One implication of this finding is that an "inclusive growth" strategy needs to combine both wealth accumulation and expansion of female autonomy.[12]

[12] The term "inclusive growth" has been subjected to varying interpretations, which has been summarised elsewhere in the Bangladesh context (see, Sen 2014).

2.4 Persistent Link between Women's Agency and Child Nutrition

Greater woman's agency matters not only for her own wellbeing, but also for the wellbeing of her children. The nutritional status of the children gets substantially better with the increase in education of the mother, her exposure to media suggesting broader knowledge base and her domestic decision-making role signifying her ability to influence many critical factors of child wellbeing. All three anthropometric measures confirm this (Table VII). Several results are noteworthy.

First, prevalence of child malnutrition can differ considerably with the extent of women's agency. Even for severely malnourished mothers, such differences are quite prominent. Thus, proportion of children underweight is 56 per cent for illiterate women, 50 per cent for primary educated and 41 per cent for those having secondary education. Similarly, the proportion of underweight children is assessed at 49 per cent for households where mothers do not enjoy decision-making autonomy compared to 46 per cent observed for households where mothers have medium-to-high autonomy and control over household decisions. These differences are persistently pronounced for all three child anthropometric measures and for both the categories of child malnutrition. However, note that the bivariate results seem to show that the female agency effects are comparatively muted in the case of child nutrition compared to maternal nutrition.

TABLE VII

PROPORTION OF CHILDREN MALNOURISHED AND SEVERELY MALNOURISHED BY WOMEN'S EDUCATION, MEDIA EXPOSURE, AND AGENCY STATUS – DHS 2004

Women's Agency Characteristics	Underweight	Wasted	Stunted
	Per cent children malnourished (< 2SD)		
Mother's Education			
No education	55.7 (17.6)	14.1 (1.4)	50.9 (22.7)
Primary	49.3 (13.4)	13.6 (1.3)	45.9 (17.8)
Secondary	40.5 (8.6)	12.1 (1.6)	34.9 (10.0)
Higher	19.7 (2.0)	8.4 (0.3)	15.4 (1.3)
Domestic Decision-making Role			
Nil (0)	47.8 (13.5)	14.5 (1.6)	43.7 (17.5)
Low (1-5)	49.2 (13.8)	12.9 (1.1)	44.6 (16.7)
Medium and high (6+)	46.4 (12.1)	12.4 (1.4)	41.5 (16.1)
Exposure to Media			
Some exposure	42.1 (10.5)	12.2 (1.2)	37.5 (12.6)
No exposure	54.3 (16.0)	14.2 (1.5)	49.7 (21.4)

Note: Figures in parentheses represent per cent children severely malnourished (3SD).

III. CORRELATES OF MATERNAL AND CHILD MALNUTRITION: RESULTS OF THE MULTIVARIATE ANALYSIS

In bivariate considerations, it is difficult to isolate the individual (statistical) significance of household wealth and female agency on maternal and child nutrition, both having implications for intergenerationally transmitted chronic poverty. This is because there is likely to be confounding influence of household wealth status as well as various individual characteristics of the mother and the child. In order to address this problem we now extend the analysis to a multivariate framework. Since maternal nutritional status is seen here as a causal determinant of child nutritional status, we first focus on the determinants of maternal malnutrition itself (Table VIII). As a second step, we cross-check its central importance in explaining the child nutrition (Table IX). Keeping in view of the main hypothesis of the paper, here our interest is to see whether women's agency is an important factor in shaping women's own and her children's wellbeing as measured by their nutritional status.

3.1 Female Empowerment as a Correlate of Maternal Nutrition

As observed earlier, the distribution of malnourished mothers is not restricted to the poor households only. This brings to the question: what other factors—in addition to wealth/poverty—determine mother's nutritional status in Bangladesh? In particular, we are interested to examine whether the importance of female agency/empowerment stands out as a correlate of maternal nutrition even when other possible candidates are controlled for.

To seek an answer to this a multivariate analysis has been carried out using mother's nutritional status, as measured by body mass index (BMI), as the dependent variable. As possible factors of influence, we consider the target indicator of main interest i.e. a composite indicator of woman's agency (along the line discussed earlier in Section 2.3) in conjunction with a range of variables considered for their relevance either as "control" or as important additional pathways for nutritional improvements from the existing nutrition literature. The regression is carried out for all women who are currently married (n=10,417) with and without under-five children at present.

We explicitly consider other pathways for nutritional improvements such as the wealth/poverty channel (wealth quintiles), behavioural health channel (access to sanitary latrine), information and awareness channel (exposure to media such as TV), human capital channel (mother's own education), and reproductive health channel (number of children ever born to the mother). *These pathways,*

considered together and along with the factor of "female agency" (however measured), cover the main ingredients or building blocks for the analysis of maternal nutrition and provide the theoretical justification for inclusion/exclusion of particular variables in actual empirical work.

As additional controls, we consider partner characteristics such as educational and occupational backgrounds of husband/partner, which may have confounding influence in judging the pure effects of female agency. Standard demographical variables such as religion, age of the mother and sex of the household head are included. The last but not the least we also include the geographic fixed effects with separate dummy variables for rural and urban regions of the six administrative divisions of Bangladesh that constitute the sample frame of DHS.

We select OLS as the preferred model and present the results of the weighted OLS regression to reflect the sample weights originally used by DHS. The regression model has been estimated with STATA. The results are presented in Table VIII. Several results are noteworthy.

First, the results of the multivariate regression exercise confirm the importance of woman's agency (however defined) as a correlate of maternal nutrition. The regression coefficients of the composite score of female agency—derived through PCA—are positively correlated with mother's BMI and statistically highly significant. The matched coefficient of the female agency through Borda count (as done previously in Begum and Sen 2009 based on DHS 2000 data) is also highly significant for DHS 2004 data. While other pathways matter, there is clear gain in promoting woman's autonomy and empowerment—voice, status, and agency—to exert favourable influence on maternal nutrition.

Second, other woman related variables are also statistically important for improving maternal nutrition. This relates to woman's exposure to media, woman's education, and woman's reproductive burden.

Third, woman's earner status turns out, however, to be negatively correlated with BMI. This confirms our earlier prediction that woman's work status *per se* cannot be held as an indicator of female agency in Bangladesh. It is still mainly the poor and undernourished women who display higher work force participation rate than the non-poor (middle class) women. Thus, the share of working mothers is 30 per cent in the poorest wealth quintile, 27 per cent in the poorer quintile, 22 per cent for the middle wealth quintile, down further to only 18 per cent for the richer and 17 per cent for the richest wealth quintile according to the DHS 2004 data.

Fourth, the household wealth status, of course, matters for mother's BMI, but it seems to matter mostly for the non-poor, as the matched regression coefficients are statistically significant only for the middle wealth quintiles and above.

Fifth, partner's characteristics also matter. Here the "threshold effects" seem important for maternal nutrition: husband's education below secondary level does not directly contribute to woman's nutrition. The effect is stronger at the higher education level. Similarly, husbands/partners with "modern sector" occupations such as salaried jobs and business have additional positive influence on maternal nutrition compared to other occupation types. Note that the positive influence of modern occupation is found important even after controlling for the wealth effects.

TABLE VIII

WOMEN'S AGENCY AS CORRELATE OF MATERNAL NUTRITION IN BANGLADESH

Independent variables of the OLS Regression	Dependent Variable (Model 1)	Dependent Variable (Model 2)	Dependent Variable (Model 3)
	Maternal Nutrition (BMI)	Maternal Nutrition (BMI)	Maternal Nutrition (BMI)
Constant	17.226***	17.298***	16.794***
Region			
Rajshahi rural (RC)	-	-	-
Barisal urban	.348	.242	.283
Barisal rural	-.461**	-.485***	-.477***
Chittagong urban	.397	.351	.363
Chittagong rural	-.026	-.052	-.039
Dhaka urban	.436*	.376	.394
Dhaka rural	-.116	-.177	-.155
Khulna urban	.461*	.417	.437
Khulna rural	-.199	-.273*	-.256
Sylhet urban	-.048	-.053	-.059
Sylhet rural	-.806***	-.829***	-.818***
Rajshahi urban	-.261	-.345*	-.344*
Mother's Education			
No education (RC)	-	-	-
Primary	.201**	.209**	.208**
Secondary	.469***	.422***	.425***
Higher	.227	.311	.321
Exposure to Media (TV)			
No exposure (RC)	-	-	-
Some exposure	.432***	.452***	.455***

(Contd. Table VIII)

Independent variables of the OLS Regression	Dependent Variable (Model 1)	Dependent Variable (Model 2)	Dependent Variable (Model 3)
	Maternal Nutrition (BMI)	Maternal Nutrition (BMI)	Maternal Nutrition (BMI)
Work Status			
Not-working (RC)	-	-	-
Currently working	-.293***	-.303***	-.295***
Mother's Decision-making Role: PCA Score	.159***	.145***	-
Mother's Decision-making Role: Borda Score			
Nil (0) (RC)	-	-	-
Low (1-5)	-	-	.418***
Low (6-9)	-	-	.623***
High (10)	-	-	.502***
Wealth Quintile Status			
Poorest (RC)	-	-	-
Poorer	.099	.082	.090
Middle	.291**	.265*	.270*
Richer	.621***	.633***	.644***
Richest	1.60***	1.57***	1.58***
Sex of the Household Head			
Male (RC)	-	-	-
Female	-.458***	-.424***	-.267*
Sanitation			
Open space (RC)	-	-	-
Sanitary toilet	.426***	.349***	.352***
Other toilet	.046	0.081	0.76
Husband's/Partner's Education			
No Formal Education (RC)	-	-	-
Incomplete primary	.029	.039	.029
Complete primary	.079	.120	.117
Incomplete secondary	.131	.186	.179
Complete secondary	.513**	.560***	.537**
Higher	1.01***	1.012***	.996***

(Contd. Table VIII)

Independent variables of the OLS Regression	Dependent Variable (Model 1)	Dependent Variable (Model 2)	Dependent Variable (Model 3)
	Maternal Nutrition (BMI)	Maternal Nutrition (BMI)	Maternal Nutrition (BMI)
Husband's/ Partner's Occupation			
Cultivator (RC)	-	-	-
Agricultural labour	.403**	.369**	.374**
Non-agricultural labour	.196*	.133	.156
Salaried worker	.798***	.735***	.745***
Business	.408***	.379***	.390***
Others	1.01***	.224	.258
Religion			
Islam	.263*	.272*	.288**
Other religions (RC)	-	-	-
Current Age of the Mother	.065***	.065***	.067***
Children Ever Born to the Mother	-.145***	-.151***	-.150***
R^2	.136	.136	.136
Number of cases	9,549	10,284	10,284

Note: RC-reference category for the group; *** Significant at < .01 level, ** Significant at < .05 level, * Significant at < .10 level. The results are based on regressions done in STATA; the statistical significance of the regression coefficients is based on clustered standard errors. Model-1: OLS regression with woman's agency score defined in the space of domestic decision-making on the 5-point scale as available in DHS (giving higher numerical value to female autonomy, see text for discussion) and where the composite score has been derived through PCA; Model-2: It is a variation of model-1 with the difference that we assigned values such as 2 for woman's own decision-making, 1 for joint decision-making and 0 for decision-making exclusively by others; Model-3: All other variables remain the same except the aggregate score on the female agency variable now is not based on PCA and defined through Borda count on all five dimensions of decision-making. The aggregate score then classified into three agency categories—low, medium and high (with zero score as reference).

3.2 Correlates of Child Nutrition: Role of Maternal Nutrition and Mother's Agency

For the child-level regression exploring correlates of child nutrition, the stunting measure is considered and z-score for "height for age" of children under five is used as the dependent variable. We also crosscheck the results with the underweight measure, using z-score for "weight for age" of children under five as the dependent variable. We consider similar model that has been adopted for exploring the correlates of maternal nutrition with a few obvious exceptions such as sex and age of the child. Our hypothesis is that given the strong biomedical link between maternal and child nutrition, mother's BMI will dominate over

other effects. Women's empowerment, *per se*, may not have any direct bearing on child nutrition as the "agency effect" percolates mainly through influencing mother's BMI. We use all three ways of defining female agency in the space of domestic decision-making role in the child nutrition regression as well. However, the results are similar across the female agency variables and hence in the tabular results we only report the findings of the PCA on domestic decision-making role (i.e. on the original 5-point scale provided by DHS and discussed in Section 2.3). The tabular results only report the main findings and hence we do not include the regression coefficients of additional controls (Table IX).

Both stunting and underweight regressions show similar results. Three results are noteworthy. First, mother's nutritional status – as measured by the body mass index (BMI) – is an important and statistically highly significant variable that stands out among others even in the multivariate exercise that controls for household wealth, mother's human capital, father's education and occupation along with other factors of possible confounding influence. This is an expression of underlying clinical regularity that connects maternal and child nutritional outcomes. This indicates that neglecting maternal nutritional concern can act as a key barrier to improving child nutrition and—through that channel—influence future escape chances from chronic poverty.

Second, mother's agency does not have any direct effect on child nutritional status. The agency effect percolates through the channel of mother's own wellbeing (maternal nutrition in this case) and through that pathway can indirectly influence child nutrition.

Third, mother's education (especially secondary and higher education) is an important correlate of child nutrition, even after controlling for household wealth and agency effects. Mother's education possibly matters for child wellbeing through the channel of better knowledge about improved maternal and child-care practices.[13]

[13]The key point is that it is not so much the access to formal educational attainment per se (as is implied by the conventional definition of human capital) that can make the crucial difference to child wellbeing status. Knowledge about improved health care practices can be imparted even to mothers with otherwise moderate or little education by encouraging behavioural change and communication. The implicit argument is that imparting such knowledge to mothers can strengthen their agency even without the accumulation of (formal) human capital.

TABLE IX

MATERNAL NUTRITION AS CORRELATE OF CHILD NUTRITION IN BANGLADESH

Independent variables of the OLS Regression	Dependent Variable (Model 1)	Dependent Variable (Model-2)
	Z-Score for Height – for-Age	Z-Score for Weight-for-Age
Mother's Nutrition (BMI)	.030***	.050***
Mother's Education		
No education (RC)	-	-
Primary	-.055	-.004
Secondary	.089**	.062
Higher	.548***	.310***
Mother's Decision-making Role: PCA Score	.006	.004
Wealth Quintile Status		
Poorest (RC)	-	-
Poorer	.052	.014
Middle	.078*	.087*
Richer	.094**	.076
Richest	.317***	.197**
Sex of the Child		
Male (RC)	-	-
Female	-.026	-.035
R^2	..077	.077
Number of cases	5747	5747

Note: RC-reference category for the group; *** Significant at < .01 level, ** Significant at < .05 level, * Significant at < .10 level. The identical model (as in Table VIII) for maternal regression has been used here with some obvious exceptions such as sex of the child and inclusion of BMI (a target variable of interest). Thus, the model controls for partner characteristics (husband's education and occupation), exposure to media, access to sanitation, age of mother, working status of mother, religion, sex of household head, and number of children ever born. The model also controls for the geographic fixed effects with separate dummy variables for rural and urban regions of the six administrative divisions of Bangladesh that constitute the sample frame of DHS.

The results are based on regressions done in STATA; the statistical significance of the regression coefficients is based on clustered standard errors. For female agency variable, we used the agency score defined in the space of domestic decision-making on the 5-point scale as available in DHS (giving higher numerical value to female autonomy, see text for discussion) and where the composite score has been derived through PCA.

IV. MAIN CONCLUSIONS

In this paper we revisit the issue of maternal nutrition as the key pathway for influencing child nutrition, which in turn have known effects on child schooling performance, future occupational choice and escape chances from chronic and intergenerational poverty. While recognizing the causal role of maternal nutrition we tried to explore the less-emphasized role of women's agency/empowerment channel as a candidate of independent influence on maternal nutrition—and through that channel—on child nutrition. Here our key challenges have been two-fold.

First, we needed to construct a conceptually defensible and empirically testable indicator of "female agency"—which is often ignored in the conventional survey data – within the bounds of the DHS data for Bangladesh. We constructed a proxy indicator of female agency by looking at the degree of autonomy enjoyed by Bangladeshi women in the space of domestic decision-making. We considered five types of "domestic decision-making role" to measure female autonomy with regards to "final say" over decisions such as own health care, child's health care, large household purchases, small household purchases, and visits to relatives and friends (assessing freedom of physical mobility). We then constructed a composite index of female autonomy by conducting Principal Component Analysis (PCA) across all five decision-making roles.

Second, we needed to assess the separate influence of the female agency indicators statistically distinguishable from the other pathways for improving maternal and child nutrition. Specifically, we tried to control for the confounding influence of other pathways for nutritional improvements such as the wealth/ poverty channel (wealth quintiles), behavioral health channel (access to sanitary latrine), information and awareness channel (exposure to media such as TV), human capital channel (mother's own education), and reproductive health channel (number of children ever born to the mother). We also controlled for spouse's characteristics as female autonomy – defined in the space of domestic decision-making—could be influenced by her life-partner's educational and occupational choices.

In respect of both construction of composite index on female autonomy and in more conscious allowance to control for other pathways that matter for maternal and child nutrition our analytical approach is, arguably, more comprehensive than our previous attempt in Begum and Sen (2009). Besides, this time we also used a more recent data set of DHS 2004 in addition to DHS 2000.

Our results further reinforce the conclusions derived in Begum and Sen (2009). We highlight three main conclusions.

The first main conclusion relates to the importance of the channel of maternal nutrition and the role that female agency can play in improving it. Our results confirm the findings of the literature that malnourished mothers give birth to babies that are born underweight and thin. In this way, under-nutrition is handed down from one generation to another as a terrifying inheritance. These children do not experience much catch-up growth in subsequent years, remain vulnerable to diseases, enter school late, do not learn well and are less productive as adults (Gillespie and Haddad 2003). All of these contribute to the perpetuation of chronic poverty in the successive generations. In the context of chronic poverty, mother's health and wellbeing thus assume special importance and can prove well an intervention point for poverty alleviation.

Past studies have found out that woman related variables are statistically important for improving maternal wellbeing and child wellbeing (see, Murthi *et al.* 1995, World Bank 2005). Our results also support this finding. Woman's exposure to media, woman's education, and woman's reproductive burden—all three indicators are found to be important for improving maternal nutrition. What is additional here is that we find agency can make considerable difference to how wellbeing is shaped within intra-household and extra-household contexts. While other pathways matter, the composite indicator of female autonomy stands out as being statistically highly significant as correlate of maternal nutrition. There is clear gain in promoting woman's autonomy and empowerment – voice, status, and agency—to exert favourable influence on maternal wellbeing and through that channel on child wellbeing. It may be noted that woman's earner status turned out, however, to be negatively correlated with BMI. This is a context-specific result: in Bangladesh, it is still mainly the poor and undernourished women who experience higher work force participation rate than the non-poor (middle class) women.

A related point is whether partner's characteristics also matter. Here the "threshold effects" seem important for maternal nutrition: husband's education below secondary level does not directly contribute to woman's nutrition. The effect is stronger at the higher education level. Similarly, husbands/ partners with "modern sector" occupations such as salaried jobs and business have additional positive influence on maternal nutrition compared to other occupation types. The positive influence of modern occupation is found important even after controlling for the wealth effects.

The results suggest that the overall effect of women's agency on child nutrition (indeed child wellbeing at large) can percolate through both direct and indirect channels. The *indirect* effect of agency works through its influence on maternal nutrition. However, some aspects of female agency such as the level of maternal education seem to have *direct* impact as well. The effect of women's education is statistically important only for secondary education and beyond, suggesting the presence of "threshold effects."

The second main conclusion relates to the need for blending anti-poverty policy with female agency strengthening policy. Our findings suggest that both wealth and agency matter for addressing maternal/child nutrition and for attacking, through that route, chronic poverty. However, what is striking is that while the household wealth status matters for both mother's BMI and child nutrition, it seems to matter mostly for the non-poor. The matched regression coefficients are statistically significant only for the middle wealth quintiles and above in case of both maternal and child nutrition (see, Tables VIII and IX). Strengthening women's agency need not be seen as an alternative to anti-poverty policies. Any interventions combining income-poverty reducing policies and women's empowerment enhancing policies designed to make a difference to maternal and child health outcomes would be a welcome policy stance.

The third main conclusion relates to the need for addressing the "nutritional outliers" in both wealth quintiles and geography. Our findings suggest that considerable segment of non-poor households are characterised by high maternal and child under-nutrition. While further work needs to be done to understand the deviant behaviour, the persistence of a culture of patriarchy goes a long-way to explain the overall low women's empowerment and high malnutrition in the case of these deviant non-poor households (or in the case of certain poverty-wise advanced but health-wise backward regions of the country such as rural Sylhet). As mentioned in the paper, about 70-80 per cent of the currently married women got married before the legally entitled age of 18, and 60 per cent of them had given birth to their first child before they turned 18. The issue of high maternal malnutrition is, therefore, likely to be linked with early marriage. It may be also linked to dowry practices as later aged marriages are associated with higher dowry rates (Ambrus *et al.* 2010). Appropriate institutional interventions designed to bring about favourable attitudinal changes (ranging from conscious encouragement of women's autonomy to fighting social taboos and restrictive customs) are needed to address these social/regional pockets of high maternal and child malnutrition and to reduce the incidence of chronic poverty.

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ANNEX TABLE 1

MOTHER'S AND CHILD'S NUTRITIONAL STATUS BY HOUSEHOLD POVERTY LEVEL- 2000

	Per cent mothers malnourished as per BMI score			Per cent children malnourished (<2SD)		
Consumption Poverty level	Average BMI Score	below 18.5 (%)	below 16 (%)	Underweight (%)	Wasted (%)	Stunted (%)
Extreme poor	18.7	52.9	9.1	59.2 (19.9)	12.8 (1.5)	54.8 (26.4)
Moderate poor	19.1	45.9	5.9	49.8 (14.4)	10.6 (1)	46.7 (19.4)
Middle non-poor	20.0	35.3	4.5	40.9 (9.1)	10 (0.9)	39.5 (13.6)
Top non-poor	21.0	27.6	2.4	34.8 (5.8)	7.8 (1)	28.9 (10.2)

Note: Figures in parentheses represent per cent children severely malnourished (<3SD).

ANNEX TABLE 2

NUTRITIONAL STATUS OF THE CHILDREN BY MOTHER'S NUTRITIONAL STATUS - 2000

Mother's Nutritional Status (BMI)	Per cent children malnourished (<2SD)		
	Underweight (W/A)	Wasted (W/H)	Stunted (H/A)
< 16	66.7	22.8	53.7
16- 16.99	61.6	13.7	53.9
17-18.49	55.4	12.1	47.8
18.50+	38.6	7.9	39.2
	Per cent children severely malnourished (<3SD)		
< 16	27.9	2.7	24.8
16- 16.99	19.7	1.9	23.8
17-18.49	15.9	1.4	20.7
18.50+	8.6	0.6	14.7

ANNEX TABLE 3

PER CENT CHILDREN MALNOURISHED (<2SD) BY MATERNAL NUTRITION AND HOUSEHOLD POVERTY STATUS: DHS 2000

Consumption Poverty Level	Mother's BMI			
	< 16	16-16.99	17-18.49	18.50+
		Per cent stunted		
Extreme poor	63.4	54.0	55.3	53.1
Moderate poor	57.4	53.5	49.9	42.1
Middle non-poor	41.7	55.4	42.7	35.9
Top non-poor	26.7	50.0	35.3	25.3
		Per cent wasted		
Extreme poor	24.4	11.9	13.6	10.3
Moderate poor	22.4	12.8	10.7	8.7
Middle non-poor	23.6	16.9	12.8	7.0
Top non-poor	13.3	13.9	13.4	5.5
		Per cent underweight		
Extreme poor	75.6	64.3	61.4	53.3
Moderate poor	70.4	59.7	56.2	41.7
Middle non-poor	55.6	62.2	53.0	32.6
Top non-poor	40.0	63.9	45.4	29.1

ANNEX TABLE 4

MOTHER'S NUTRITIONAL STATUS BY EMPOWERMENT CHARACTERISTICS-DHS 2000

	Mother's BMI		
	Average BMI Score	< 18.5 (%)	< 16 (%)
Women's Education			
No education	18.8	49.2	7.6
Primary	19.1	44.5	4.9
Secondary	20.5	30.8	3.6
Higher	22.8	8.8	1.8
Decision-making Role			
Nil **(0)**	19.0	48.4	6.8
low (1-5)	19.5	41.3	5.4
Medium (6-9)	20.2	32.2	5.3
High (10)	20.2	41.4	3.6
Exposure to Media			
Some exposure	20.1	34.7	4.4
No exposure	18.7	50.4	7.2

Note: Figures in columns 2 and 3 represent percentages of mothers within each dimension of women's agency.

ANNEX TABLE 5

DISTRIBUTION OF MOTHERS BY DECISION-MAKING ROLE AND BMI WITH REFERENCE TO PARTICULAR DOMESTIC DECISION-MAKING ROLE- DHS 2000

Women's decision-making role	Mothers BMI		
	< 16	16- 18.49	18.50+
	Women's own health care		
Women alone	5.4	31.6	63.0
Husband alone	6.5	37.1	56.4
Jointly by women and husband/others	4.8	36.3	58.8
	Health care of the children		
Women alone	4.7	31.1	64.2
Husband alone	7.0	38.6	54.4
Jointly by women and husband/others	5.0	35.6	59.4
	Large household purchase		
Women alone	4.7	29.4	61.5
Husband alone	6.5	39.6	53.9
Jointly by women and husband/others	5.3	33.9	60.8
	Purchase for daily needs		
Women alone	4.6	31.3	64.0
Husband alone	6.5	38.9	54.6
Jointly by women and husband/others	5.4	35.4	59.2
	Visit to family/friends/relatives		
Women alone	5.3	31.6	63.0
Husband alone	7.1	39.9	53.0
Jointly by women and husband/others	4.8	34.1	61.1

Note: Figures represent percentages of row total.

ANNEX TABLE 6

CHILD MALNUTRITION BY WOMEN'S AGENCY AND OTHER CHARACTERISTICS- DHS 2000

	Per cent children		
	Underweight (weight for age)	Wasted (weight for height)	Stunted (height for age)
	Per cent children malnourished (<-2SD)		
Mother's Education			
No education	55.4 (17.7)	12.2 (1.4)	52.6 (23.9)
Primary	49 (12.5)	10.2 (1.1)	46.1 (18.3)
Secondary	34.1 (5.4)	8.1 (0.4)	30 (8.1)
Higher	16.9 (2.7)	6.7 (0.8)	12.9 (2.0)
Domestic decision-making role			
Nil	49.2 (14.4)	10.9 (1.3)	45.9 (21)
Low	47.5 (12.8)	10.3 (1)	44.3 (17.2)
Medium	42.4 (11.0)	10.9 (1.3)	39.4 (16.7)
High	42 (8.9)	8.9 (0.6)	41.4 (11.8)
Exposure to media			
Some exposure	40.6 (9.6)	9.3 (1)	36.9 (13.8)
No exposure	54.7 (16.6)	11.8 (1.2)	52.3 (22.6)

Note: Figures in parentheses relate to the percentage of severely malnourished children (with < 3SD).