A Multifaceted and Multi-dimensional Approach to Women's Empowerment and its Links to the Nutritional Status and Immunization of Children in India

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Deconstructing the traditional proxies of women's empowerment

> The objective is to promote gender equality in all spheres of life, including family and community life, and to encourage and enable men to take responsibility for their sexual and reproductive behavior and their social and family roles (Paragraph 4.25, ICPD, Cairo, 1994)
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> To promote equality of opportunity for family members, especially the rights of women and children in the family (Paragraph 5.2c, ICPD, Cairo, 1994)
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> Equal rights, opportunities, and access to resources, equal sharing of responsibilities for the family by men and women, and a harmonious partnership between them are critical for their well-being and that of their families as well as to the consolidation of democracy (Paragraph 15, Beijing Declaration, 1995)

In developing countries, infants and children face an elevated risk of illness and death due to malnutrition and incomplete immunization, with severe implications for their growth potential and the risk of morbidity and mortality in later years (Kishor, 1993).[1] Because the care of infants remains an almost exclusive domain of women in most societies, it is argued that improving women's status should improve the overall health and survival of their infants, thus influencing the timing and shape of demographic processes (Caldwell and Caldwell, 1993; Hobcraft, 1996).[2] Consequently, the Program of Action of the ICPD (1994) and subsequent population policies of various governments have incorporated the concept of women's empowerment and the language of gender equity by re-focusing on the effect of commonly measured indicators, such as education, labor force participation, delayed age of marriage, etc. on child health and survival (Mason, 1987, has a list of other commonly used indicators).[3]

[1] Poor nutritional status of women has been associated with a higher age at menarche and a lower age of secondary sterility. Additionally, despite extensive immunization programs, at least two million children die from vaccine-preventable diseases every year, including more than a million from measles, 430,000 from neonatal tetanus, and close to 400,000 from whooping cough (WHO, 1998).

[2] Women's empowerment allows them to control their reproductive lives, improve maternal and child health, and reduce fertility and child mortality, thereby resulting in a gradual slowing of population growth (Riley, 1987).

[3] The easy availability of data through the World Fertility Survey and Demographic and Health Surveys has further facilitated the extensive use of these proxies rather than of more direct measures (Lloyd, 1991).

While ideally education should raise a woman's skills and self-confidence, increase her exposure to information, and allow her to interact effectively with and feel control over modern institutions (Cleland, 1990), it may not always do so in a strongly gender inequitable society such as India (Das Gupta, 1987; Hobcraft, 1996; Jeejhebhoy, 2000). On a similar note, can we assume that women's employment invariably translates into their financial independence (DeRose, 2002)? Consequently, emerging deliberations on the subject of women's empowerment are critical of these routinely measured proxies, especially since they do not capture its increasingly evident, increasingly multifaceted dimensions (Kishor, 2000). According to these critics, an important aspect of empowerment is whether women are *truly* in control of their own lives—demonstrated through the extent to which they have an equal voice in matters affecting themselves and their families, control over material and other resources, access to knowledge and information, the authority to make independent decisions, freedom from constraints on physical mobility and physical violence, and the ability to forge equitable power relationships within families (Jejeebhoy, 2000: p. 204). Unfortunately, these alternative dimensions of women's empowerment have seldom been measured in empirical analyses.

Replicating Sunita Kishor's seminal work on women's empowerment and child health in Egypt to the Indian context, I argue that women's empowerment needs to be conceptualized as an ongoing process with three fundamental components: the environment or *setting* of women's lives, women's access to potential *sources* of empowerment, and the product or *evidence* of empowerment (Kishor, 2000: p. 149). Focusing on women's empowerment in terms of the sources alone, i.e. education and labor force participation, neglects the fact that women's access to empowering *circumstances* may itself be vital in a milieu where women's empowerment is far from complete. Without *direct* measures of empowerment, the efficacy of routinely used

indicators is debatable, and the *actual* relationship between women's empowerment and children's health remains unanswered and unclear. Thus, at the heart of this paper is the question: what are some alternative dimensions of women's empowerment measures and how are they linked to child health and survival?

This paper attempts to build on, and contribute to, extant literature on women's empowerment and child health by first developing several direct indicators of empowerment, and then using them to examine how mother's empowerment in India relates to child nutrition and immunization in the first three years of the child's life. The analysis uses the rich and detailed information contained in the women's status module, collected as a part of the 1998/99 India Demographic and Health Survey (NFHS-2), a nationally representative sample of ever-married women age 15-49. The paper commences with a literature review encapsulating the conceptualization, definition, and measurement of women's empowerment, which is then followed by details of the multivariate logistic analysis of the effect of women's empowerment on two indicators of infant health and survival: stunting and immunization. Stunting is the height for age index, measured among children age 0 – 35 months, while infant immunization measures the probability that a woman's last child born 12 to 23 months prior to the survey is completely inoculated against six fatal, but preventable diseases. Examining the linkages of women's empowerment with more than one indicator of child health allows us to examine *how* different facets of women's empowerment affect different aspects of child health and survival. What emerges from the analysis is that while, to some extent, women's health-seeking behavior such as children's immunization is a function of the evidence and setting of empowerment, health outcomes such as stunting are affected by the sources of empowerment (as well as household socioeconomic status). The paper concludes with relevant policy recommendations.

Setting the Indian context

India gained its independence in 1947, and with that inherited a highly segregated society with an inequitable pattern of land ownership and a weak industrial base. In order to accelerate the process of making India internationally competitive and be a part of the global economy, the government adopted substantial structural reforms in 1991. Critics of these reforms argue that cutbacks in government spending on social developmental goals such as improvements in health, education, and nutrition, decreases in real wages and employment, and increases in prices of basic necessities have resulted in widespread poverty, with negative ramifications on health, particularly among women and their children (Kabeer, 1994). Such circumstances in a country that is significantly more rural (75%) than urban, with agriculture contributing nearly one-fourth of the GDP and providing a livelihood to about two-thirds of all workers, is grave.

According to the latest Human Development Report (UNFPA, 2000), India ranks 121 among all countries in terms of GDP per capita, and somewhat lower (128) on the human development index. Economic improvement has been relatively slow with the percentage of population living below the poverty line declining from 55% in 1973-74 to only 36% in 1998-99 in 25 years (Central Statistics Organization, 1999). The literacy rate increased from 18% in 1951 to 52% in 1991, although the literacy rate for adults in India (62%) is much lower than the rate in China (83%) or the Philippines (95%). These indicators of the performance of social sectors in India underscore the need for giving high priority to key sectors like education, health, and poverty eradication, areas that are also crucial for accelerating the demographic transition.

Typically patriarchal and patrilocal, India continues to be a nation of fairly rigid gender norms with great complementarity between male and female roles (Dube, 1988). However, clear regional differences in women's situation exist, with women from the South of India possessing

relatively more autonomy and decision-making power than women in the rest of India (Dyson and Moore, 1986). Although India has witnessed the following improvements in its demographic situation, the situation for women has not improved proportionately:

- A reduction of the CBR from 40.8 births per 1000 population in 1951 to 26.4 in 1998.
- A halving of the IMR from 146/1000 live births in 1951 to 72/1000 live births in 1998.
- A reduction of the CDR from 25 deaths per 1000 population in 1951 to 9 per 1000 in 1998.
- The quadrupling of the couple protection rate from 10% in 1971 to 44% in 1999.
- The addition of 25 years to life expectancy from 37 years to 62 years.
- A reduction in the total fertility rate from 6.0 in 1951 to 3.3 in 1997.

However, the sex ratio of the Indian population remains unfavorable to females since the beginning of the 20th century and has declined in every decade except 1971-81: 930, 934, and 927 females per thousand males in 1971, 1981, and 1991, respectively. The maternal mortality rate (estimated at 400 maternal deaths per 1000 live births in 1997) is several times higher than the MMR of 115 in China or 30 in Sri Lanka.

With a population of a little more than a billion people, low economic growth, relatively low levels of urbanization (20% in 1971, 23% in 1981, and 26% in 1991), slowly expanding educational opportunities, and high but falling rates of infant mortality, India provides an ideal setting for a study of women's empowerment and infant health and survival. The number of potential restrictions on women's autonomy in such a traditional environment, in addition to the simultaneous existence of modernizing influences associated with economic development (such as mass media exposure and the spread of education) allows for the conceptualization of a large number of indicators of women's empowerment. In addition, given the emphasis on traditional gender roles, it becomes even more important to determine whether, and to what extent, the level of empowerment of the mother affects infant survival and health (Kishor, 2000).

Women's empowerment, child stunting, and immunization: a brief review

The most widely used indicator of empowerment in developing countries are the level of education and labor force participation, but like most other routinely-used indicators, they are only partially associated with empowerment (Presser, 1997). For example, Caldwell argues that "a large number of studies have shown, almost as convincingly as anything can in the social sciences, that a mother's education has an independent, strong, and positive impact on the survival of her children" such as higher levels of immunization, less stunting, and a greater knowledge of ORS (1994). Several researchers have also attempted to disentangle the possible links and pathways between child health and maternal education, by highlighting issues such as an increase in direct child-health knowledge and in ability to access such information, increased autonomy or agency which enables the mother to make her own decisions and to negotiate access with medical personnel; and potential health benefits from delayed and lower fertility among educated women enabling greater investment the child (Caldwell and Caldwell, 1993).

Nonetheless, a few scholars such as Hobcraft (1996) are uncomfortable about concluding from the above-mentioned correlation that a strong causal relationship exists between maternal education and child health. For example, research by Das Gupta (1987) demonstrates that in fact, education can make mothers more effective in discriminating against daughters in societies with there is only partial empowerment of women in a strongly gender inequitable culture.[4] Finally, by using fixed effects models, Desai and Alva (1998) argue that maternal education may be a proxy for the socioeconomic status of the household as well as for characteristics of the community of residence. According to them, it is important to recognize that educated mothers, who come from households with high socioeconomic status, also tend to live in more

[4] Das Gupta's results from the Punjab show generally poorer survival chances for second or subsequent daughters; her results also suggest that the relative effect of discrimination is even greater when the mother is educated.

economically developed areas with good school and medical facilities. Consequently, the observed correlation between maternal education and various markers for child health may be spurious (Desai and Alva, 1998: 71; Palloni, 1981). In short, the evidence concerning the effect of education, one of the strongest proxies for empowerment, on child health is mixed, making us wonder: what *is* the precise nature of the relationship between women's empowerment and the above-mentioned traditional proxies? Is it just enough to focus on the *sources* of empowerment (such as education and employment), rather than examining the process, the setting, or direct evidence of empowerment? In this postmodern age, isn't it time that we broadened our lenses to include alternative dimensions of women's empowerment?

A basic question at this stage is, how do scholars define women's *empowerment* and how can we operationalize the concept in a manner that permits empirical evaluation of its influence on child nutrition and immunization? Women's empowerment, a cornerstone of the ICPD-POA, refers to the means and ability of women to choose and control outcomes, implying a shift towards a greater individual agency (Kishor, 2000). Srilatha Bathliwala presents a somewhat fuller working definition of the term:

> The most conspicuous feature of term *empowerment* is that it contains the word of *power*, which, to side-step the philosophical debate, may be defined as control over *material assets*, *intellectual resources*, and *ideology*. The material assets over which control can be exercised may be physical, human, or financial, such as land, water, forests, people's bodies and labor, money, and access to money. Intellectual resources include knowledge, information, and ideas. Control over ideology signifies the ability to generate, propagate, sustain, and institutionalize specific sets of beliefs, values, attitudes, and behavior—virtually determining how people perceive and function within given socio-economic and political environments. (Bathliwala in Sen, Germain, and Chen, 1994; my italics)

Since empowerment emerges as a dynamic concept, encompassing both individual and collective group processes and the results of those processes, its operationalization is not just a question of *defining* suitable indicators but also of clarifying *what* it is that those indicators need to measure

(Jejeebhoy, 2000). And most importantly, the measurement of women's empowerment needs to take on the current reality of their lives into consideration, their control over "material assets, intellectual resources, and ideology" (Kishor, 2000; Bathliwala, 1994).

Since women's empowerment is still in its nascent stages, scholars such as Jejeebhoy (2000), Presser (1997), and Kishor (2000) argue that it is imperative to design and operationalize indicators that are wide-ranging enough to capture the various nuances and dimensions, the processes **and** the end-results, of empowerment. In other words, especially for women residing in traditional societies such as India, the focus should be on the building blocks, the process, of empowerment, rather than just the end result of empowerment. Thus, while the process of empowerment needs to document the existence, or lack thereof, of an appropriate setting for empowerment and of women's access to different sources of empowerment, indicators of women's empowerment as end-result need to directly measure women's control over their lives and environment (Kishor, 2000; Basu, 1997). In this paper, I have created, according to the framework suggested by Kishor (2000), several variables measuring women's empowerment. Table 1 lists variables according to whether they are indicators of *evidence* of empowerment, or of *sources* of empowerment, or of an appropriate *setting* for empowerment. The signs in parentheses give the hypothesized direction of the relationship of each variable with women's increased control over their lives.

INSERT TABLE 1 HERE

Indicators of evidence of empowerment

Indicators that attempt to *directly* measure empowerment (or the exertion of control) must necessarily provide *evidence* of empowerment through acts such as women's power over various

tangible and intangible aspects of their lives including marriage and finances as well as the ability to move outside the confines of their home. Women's justification of wife beating is an evidence of their disempowerment since it highlights their acceptance of patriarchal ideology. All indicators listed in column 1 of Table 1 fall into the category of evidence. Specifically, the variables "financial security" and the "permission to visit market/relatives" demonstrate women's current bargaining power and autonomy within the household. Attitudes that justify the subordination of women to men, measured by the "index of acceptance of wife beating," are inversely related to women's empowerment and have negative consequences for child health.

Indicators of sources of empowerment

Indicators listed in column 2 of Table 1 are conceptualized as potential *sources* of empowerment because they provide the knowledge and advantage in the access to and control over resources. As discussed earlier, these indicators cannot be considered as evidence of empowerment because there is no assurance that women will exercise, or will be in a position to exercise, these tools to gain control over their lives. Specifically, "education" and "exposure to mass media" (through regular access to newspapers, television, and radio messages) can empower women by imparting them with the information and the agency to function and negotiate effectively in an increasingly modernizing world. Similarly, the variable, "worked in the past 12 months," may help provide women with alternate sources of social identity, financial independence, and exposure to and integration into power structures independent of kin networks (Dixon-Mueller, 1993). Even though women's education and their exposure to media tend to be highly correlated, I have included both indicators in this analysis because extensive government focus on media as a public health intervention, has been particularly effective in impoverished

areas. Finally, the variable "worked in the past 12 months" is problematic because it does not capture women's empowerment through past employment/earnings.

Indicators of setting of empowerment

Indicators of the *setting* for women's empowerment, summarized in column 3 of Table 1 refer to the *circumstances* of the respondent's current or past life such as a woman's marriage, quality of relationship with her spouse, or the type of family structure. Specifically, traditional family power structures, operationalized through "co-residence with mother-in-law" are likely to affect a woman's ability to access resources directly and to exercise autonomy and decision-making control within and outside the household (Dyson and Moore, 1983). "Spousal communication" attempts to measure a woman's level of comfort with her husband, and it is hypothesized that marriages in which the husbands communicate with their wives tend to be more egalitarian and afford women greater opportunities to exercise control or at least share control, especially in patriarchal settings. The confidence acquired through this process has a direct effect on women's health-seeking behavior.

In conclusion, the process of empowerment has only just commenced, and to define it as a process so complete so that women can be classified as either empowered or not empowered fails to capture the actual reality. If women's empowerment was conceptualized strictly in terms of the control they exercise over their lives, then the gains that they are making in the process of empowerment would be ignored. The reality is that women are at varying stages along the process of becoming empowered and many still have a long road to travel (Sen, 2000).

Alternative dimensions of Women's empowerment and child health: Some Hypotheses

At the most basic level, women's empowerment is hypothesized as positively influencing the overall health and survival of their children since it puts them in a position to make and implement their own informed decisions, besides giving them access to as well as control over necessary resources. My hypotheses are as follows:

- A mother's empowerment should decrease the probability of stunting, or chronic malnutrition, in her last living child because an empowered mother is likely to have the necessary negotiating power within the family, access and control over resources, and the capability to interact effectively with modern institutions to protect the interests of her infants (Cleland, 1990; Hobcraft, 1996).
- A mother's empowerment should increase the probability that her last living child born 12-23 months ago is fully immunized because an empowered mother is likely to possess the commitment, comprehension, and capability to follow up after the first set of immunizations to ensure that all eight of the recommended immunizations are completed by the right age (Bicego and Boerma, et al, 1990).

The definition of empowerment in this analysis includes not only measures of women's *sources* of empowerment such as education, but also indicators that measure *settings* and direct *evidence* of ways in which women can gain control of their lives.

Data and Methodology

This analysis is based on cross-sectional data from India's 1998/99 National Family Health Survey-2 (NFHS-2) collected by the Indian Institute of Population Studies in collaboration with Macro International, MD. The NFHS-2 is nationally representative and samples ever-married women aged 15-49 years using a stratified, multistage area probability sample of household clusters; the 1998/99 dataset interviewed 90,303 women residing in 91,196 households. In addition, the survey also collected extensive information on 32,393 children born in the three years preceding the survey; one health investigator on each survey team carefully

measured the height and weight of eligible women and children.[5] Specific household- as well as village-level information was also collected. Overall, the dataset represents 99% of India's population residing in 26 states.

The NFHS-2 is particularly useful because, in addition to extensive anthropometric records on the dependent variables, child stunting and infant immunization, the women's status module (which was introduced for the first time in India) provides a wealth of information on the main explanatory variables, women's empowerment. Questions pertaining to the respondent's as well as spouse's age and past/current labor force participation, intra-household relationships, education, respondents' attitudes towards domestic violence, freedom of movement, etc were asked of all women. Additionally, the individual and child sub-datasets contain detailed information on reproduction, maternal and child health, birth history, household possessions, and other relevant demographic variables, several of which are used as controls in this study.

INSERT TABLE 2 HERE

Although the sample size of the NFHS-2 was originally 90,303 women, the first dependent variable, *child stunting* (or height-for-age index, which measures linear growth retardation among children *between 0-35 months*), reduced the overall sample size to 13,230 women with an eligible living child between 0-35 months. The second dependent variable, *infant immunization*, which focused on a woman's last living child *between 12-23 months*, further dropped the sample size to 8,815 women with eligible children between 12-23 months.

[5] Interviewers measured the height of children under two years of age with the child lying down on an adjustable measuring board, and the height of children age two years or older with the child standing up. The training of interviewers on height and weight measurement followed United Nations (1986) guidelines and height was measured to the nearest 0.1 centimeters.

The reason for restricting samples by age (in months) is because stunting, a sign of chronic malnutrition, is most evident during the early years of existence when the need for nutrition is also the greatest. Regarding immunization, guidelines require that children received eight vaccinations all in the *first year of life*, suggesting that the issues of concern in the study of infant immunizations are more than just that a child should be immunized; completeness and *timeliness* of immunizations are also critical (Mosley and Chen, 1991; Bicego and Boerma, 1990).

The two dependent variables in this study are coded as follows:

- **STUNTED**: Whether a woman's living child born 0 to 35 months ago suffers from chronic malnutrition or stunting. A child is considered stunted if his or her height-for-age is more than two standard deviations *below* the median value of an international reference population. The international reference population used is that defined by the National Centre for Health Statistics (NCHS) and accepted by WHO.[6] This variable has 2 values: "0" if the child is *not stunted* and is above -2 standard deviations of the reference median and "1" if the child *is stunted* and is 2 SD below the reference point.
- **IMMUNIZED**: Whether a woman's last living child born 12 to 23 months ago has received all of the following eight immunizations; 3 DPT, 3 Polio, 1 measles, and 1 BCG. This variable has two values: "0" if the child did not receive all 8 immunizations and "1" if the child received *all* eight.

Cases with missing values for the dependent variables were dropped and only one child per woman and per household was used for the analysis.

Eight explanatory variables that measure the sources, setting, and evidence of women's empowerment, are created. Table 2 encapsulates details regarding the specific question asked in the NFHS-2, the coding and recoding (if any), and the direction of the hypotheses. Missing values were imputed through series means imputation.

In order to determine how mother's empowerment is associated with STUNTED and IMMUNIZED, these binary dependent variables are regressed on the eight indicators identified above as representing eight different dimensions of women's empowerment using the technique

[6] There have been discussion about whether the NCHS reference population is an appropriate reference population for India, and presently there is no choice but to use an international reference standard.

of multivariate logistic regression. In addition, eleven control variables that, quite independently of women's empowerment, are known to affect child nutrition and immunization are used in the analysis. While most variables are mainly categorical, 4 are continuous in nature. The control variables are (1) *regional*: geographic region (South, North, Central, East, West) and area of residence (urban, rural), (2) *social background*: religion (Hindu, Muslim, Others) and caste/tribe (SC, ST, other), (3) *socioeconomic*: index of consumption possessions (ranging from 0-8) and index of basic facilities (0-3), and (4) *bio-demographic*: child's age (a continuous measure in months), sex of child (male, female), birth order of child (one, two or three, four or higher), mother's age at childbirth (a continuous measure in years), and previous birth interval (first birth/more than 24 months and less than 24 months). Two variables, mother received folic acid tablets during pregnancy (yes, no) and mother received two or more tetanus injections during pregnancy (yes, no) are also included in the STUNTED models.

The hypotheses that women's empowerment decreases the probability of stunting among children and increases the probability of complete *and* timely immunizations of infants are tested using three different models in each case. Model 1 estimates the effect of the eight measures of empowerment on the two dependent variables: STUNTED and IMMUNIZED. In Model 2, controls are introduced for region, area of residence, social background (religion and caste/tribe), and the bio-demographic variables. Model 3 comprises of all the variables including the socio-economic variables. The rationale for differentiating between Models 2 and 3 is to evaluate the extent to which household socioeconomic status explains the effect, if any, of the empowerment variables (Desai and Alva, 1998). Results for the descriptive statistics are encapsulated in Tables 3, 4, and 5, while results for the logistic regression of the dependent variable STUNTED are

presented in Table 6 and those for IMMUNIZED are encapsulated in Table 7. Finally, all models were separately run for STUNTED and IMMUNIZED.

Does women's empowerment affect child health?: Analyses and discussions

Univariate analyses

Univariate statistics for all variables included in the models are presented in Tables 3. Because most variables are categorical, the mean value of a variable consists of the set of percentages of children falling in each category of that variable. Means and standard deviations are included for continuous variables.

INSERT TABLE 3 HERE

The sample size for STUNTED is 13,230 women with eligible children between age 0 and 35 months, and 8,815 women with eligible children between 12 to 23 months for IMMUNIZED. The relatively grave situation surrounding child health and survival is revealed in the fact that about one-third of all children are stunted, while a little less than half (42.8%) are completely immunized. This is despite the fact that infant immunization represents one of the most powerful public health interventions initiated by the government of India to improve child survival. Girls comprise approximately 46.5% and boys forming 53.59% of the sample, thus indirectly highlighting the skewed sex ratio in India.

Approximately two-thirds of the population reside in rural areas and are thus, assumed to be at higher risk of negative outcomes in child health due to inadequate facilities and uneven socioeconomic development. Hindus represent a majority (75%), with Muslims comprising 13%

of the sample and the rest (12%) categorized as other religions. Although individuals from scheduled caste and tribe comprise roughly one-third of the Indian population, they have been over-sampled in the NFHS-2 (45% to 50%). Overall, the sample is relatively disadvantaged in terms of their own socioeconomic status (household possessions index) and access to good health facilities (flush and toilet), as evident through the skewed distribution.

While the average age of the child is 16 months with a standard deviation of 9.783 months for the STUNTED sample, for the IMMUNIZED sample, the mean is 17 months with a standard deviation of 3.3 months. Mother's age, for both dependent variables, is centers around 24 years with a standard deviation of 5 years. In almost 85% of the cases, the child under consideration was either the first child or was born after a 24-month birth interval; in 15% children, the birth interval was less than 24 months, thus exposing them to a higher likelihood of stunting. Most children (75%) were of the first, second, or third birth order. As far as STUNTED is concerned, a majority of mothers (approximately 85%) exhibited health-seeking behavior by consuming iron/folic acid tablets and taking tetanus injections during pregnancy.

Multivariate Analyses

In a logistic regression, the coefficient β_i for the *i*th variable gives the log of the odds ratio of the event of interest occurring. For ease of interpretation, the values given in Tables 5 and 6 are the values of $e^{\beta i}$ which is interpreted as the change in the odds of the event occurring for a unit change in the value of the *i*th explanatory variable. The overall fit of the full models for STUNTED and IMMUNIZED are satisfactory in that besides the model fit improving from Model 1 to Model 3, the model chi-squares are also very significant for all models.

INSERT TABLES 5 AND 6 HERE

As expected, children with better-educated mothers tend to be better nourished and fully immunized. More specifically, in the full model, the odds of stunting in a child are reduced by almost 50%, and the odds of complete immunization increase by almost the same percent, for mothers who have completed their matriculation, compared to mothers with no education. Results are consistent for both outcome variables and remain robust despite the introduction of the socioeconomic variables. The relatively stronger results for immunization are not surprising since a mother's "preventative" actions or health-seeking behavior, i.e. knowing which shots are necessary, the act of taking her child for immunization shots, and even maintaining an immunization card, could be ascribed to education. Additionally, the positive correlation between maternal education and both aspects of child health could reflect an educated woman's non-fatalistic attitude, knowledge, and perceptions of *what* is required to protect her child's health, *when* it is required, and why, especially in a traditional Indian environment.

However, a comparison across the three models for both outcome variables also reveals that the effect of education is *weakest* when variables measuring household socioeconomic status (assets and facilities) are introduced, thus highlighting the importance of household resources, *besides* maternal education, in determining child health. Interestingly, the reduction in effect is highest for mothers with higher education, compared to mothers with primary education. Thus, one could argue that children residing in wealthier families (with high food security, hygiene, etc), and by extension, more affluent areas (with better availability of healthcare systems and greater publicity regarding immunizations/camps), *would be* better nourished or immunized *in spite* of their mother's education. In fact, children whose mothers possess lower levels of

education are the ones benefiting the most, on a relative scale, from their mother's education. This raises some questions regarding the assumed causality between maternal education and child health (already highlighted by Desai and Alva, 1998) as well as education as an *evidence*, rather than a *source*, of empowerment for women. Thus, while women's education does have large direct effects on child health and survival, some indirect effects through some of the other predictor variables diminishes the overall effect, albeit slightly.

Financial autonomy, or "control over material assets" according to Bathliwala (1994), has varying effects on both child health outcomes. Women who are "allowed" to keep money aside for their own (future) use, which is a possible reflection of their autonomy and relatively higher bargaining power within the household, have better-nourished offspring, a result that remains robust with the addition of socioeconomic and other controls (Jejeebhoy, 2000). This could be partially ascribed to the fact that women, rather than men, tend to spend a higher share of their earnings/savings on child welfare (such as health, education, etc). However, while women possessing higher degree of financial autonomy have higher odds of completely immunizing their children than mothers with no financial autonomy in Model 1, the empowerment effect gets washed away when controls are introduced into the equation. Thus, child immunization appears more likely to be subject to household (and maybe, neighborhood) circumstances such as poverty and the presence of immunization camps and facilities in the area, rather than a mother's own material resources. This result seems consistent with those observed for women's education.

Other empowerment indicators that appear to positively affect child nutrition and immunization include women's access to the mass media (weekly exposure to newspapers, television, and radio) and the freedom to leave the confines of their home to visit the market or friends/relatives without asking for permission from the in-laws. However, a large part of the

effect of exposure, or the ability to access "intellectual resources" (Bathliwala, 1994), in the case of child stunting, is explained away by socioeconomic controls, so that in the full model, this particular indicator is no longer significant. This, again, testifies to the importance of household socioeconomic status on child nutrition, rather than the independent effect of women's empowerment. On the other hand, even with all controls, woman's exposure to mass media has a positive effect on child immunization. In India, the use of mass media to disseminate information pertaining to immunization/camps is a widely used government strategy, and these observations attest to the efficacy of their efforts. Although the positive association of the dependent variable with household wealth can explain slight decrease in odds over models, the important point to note, nonetheless, is that women from all socioeconomic backgrounds are *responding* to these public health interventions and taking the *initiative* of getting their children immunized.[7] Finally, the effect of women's freedom of movement on child nutrition as well as infant immunization, which can be construed as her ability to manipulate and feel unencumbered by intrahousehold dynamics as well as the outside world, remains robust despite controls.

Women's short-term labor force participation during the 12 months prior to the survey has no significant effect on child immunization. Surprisingly, sustained maternal employment has a negative effect on child nutrition, which, being contrary to prior research, needs to be investigated more thoroughly. However, this effect loses significance when household socioeconomic status is controlled indicating that *maybe* it is the type of employment, the remuneration, or other related issues that makes a difference to child health. Finally, all of the remaining empowerment measures do not have a significant impact on child stunting irrespective of whether controls are included or excluded from the models.

[7] However, it must be borne in mind that exposure to mass media and education tend to be highly correlated.

Given the centrality of marriage in India, the importance of the circumstances of a woman's marriage and household structure (spousal relationship, acceptance of wife-beating, and presence of a mother-in-law) are critical dimension of her ability to enhance the survival of her child (Kishor, 2000). Specifically, the ability to communicate with one's husband (proxied by the freedom and willingness to discuss a sensitive issue such as contraception and reproductive health, especially in India) as well as possessing an "ideology" (Bathliwala's third spoke in the wheel of empowerment) that does not support *or* justify wife-beating augments the odds of a child being immunized. Thus, modernized and gender-egalitarian attitudes create an atmosphere that is conducive for women to act for their children's benefit. On the other hand, a woman who co-resides with her mother-in-law is less likely to get her child completely immunized in a timely manner, suggesting that family structure and inequitable distribution of intrahousehold power mediate between a woman's characteristics and the survival of her child (Kishor, 2000: 147). If we extend the definition of "traditional family structures" to encompass spousal interaction and patriarchal attitudes of wife beating, the important point that emerges is the importance of empowering household environments, not just women.

Overall, control variables had the predicted effect on child nutritional status and infant immunization in India. Significant regional differences exist with almost all regions, especially the Northern and Central states, reporting lower child health and immunization outcomes, than the South. Controlling for the other predictor variables does not make much difference in these geographic differentials, indicating that geographic region exerts a substantial independent effect on the prevalence of stunting. While a part of the effect might have to do with variations in the availability and quality of health services, which are, for the most part, offered through state-level departments of health and family welfare, kinship structures and gender ideology may also

play an important role in explaining geographic differentials (Das Gupta, 1987). While the North/Central and South of India are typically patriarchal and patrilocal, female powerlessness is much more acute in the North/Central, as exhibited by limited inheritance rights, limited support for women from their natal family after marriage, female exogamy, and limited opportunities for control over economic resources (Dube, 1988).

Regarding area of residence, although the prevalence of stunting and incomplete/no immunization is considerably lower in urban areas than in rural areas, the relationship reverses (in the case of stunting) and disappears (for both) when socioeconomic controls are introduced into the model, suggesting that the effects of urban/rural residence are mostly indirect. While belonging to a Muslim household has no effect on child stunting, it does lessen the odds of complete immunization, simply because Muslims tend to reside in disadvantaged areas with poorer healthcare systems. Children belonging to other religions have a considerably higher probability of better nourishment as well as immunizations, compared to Hindus. Children belonging to scheduled castes or scheduled tribes have a significantly higher prevalence of stunting and incomplete immunization than do other children, as a result of their relatively low socioeconomic status. And, as expected, children living in households with a relatively high standard of living (as measured through the possession index) have positive outcomes on both variables. However, while presence of general household hygiene, proxied through availability of piped water and flush toilet facilities, decreases the probability of stunting, it has no effect on immunization, indicating that child health is more likely to be subject on household circumstances, while immunization is more affected by mother's personal empowerment.

The prevalence of stunting is the same for boys and girls, a finding that is somewhat surprising in the face of much evidence regarding widespread discrimination against girls in

India (United Nations, 1998). This issue warrants further investigation, although one could speculate that girls who are alive (and in the population) are "selected" into survival and hence, tend not to be stunted because they are "wanted" by the parents and household. On the other hand, boys are more likely to be immunized than girls, thus pointing to gender differentials that are not captured by stunting. Older children, children of higher birth order (four and above), those born after birth intervals of less than 24 months, and those born to younger mothers tend to have insufficient nutritional and immunization status, thus reflecting improved expertise in childcare as well as increased autonomy in the household as mothers get older.[8] Children of mothers who received iron and folic acid tablets when they were pregnant have a lower prevalence of stunting, although controlling for socioeconomic variables eliminates this effect. The impact of receiving two or more tetanus injections during pregnancy remains statistically non-significant, with or without controls.[9]

Conclusions and policy implications

This research, in contrast to previous research, shifts the emphasis from individual characteristics alone to the characteristics of women's familial environments and the accumulation of experiences of women over their life course. The multivariate analyses of child nutrition and immunization highlight the importance of women's empowerment as an important explanatory factor net of all regional, bio-demographic, social background, socioeconomic influences. Most *importantly*, the results highlight the need to conceptualize empowerment as multi-dimensional and not restrict its measurement to traditional *evidence* or proxy variables

[8] In separate analyses, a somewhat more detailed breakdown by age shows that stunting is considerably less common in the first six months of life, when most babies are fully breastfed, than at older ages.
[9] This finding is not consistent with earlier evidence from the NFHS that a mother having two or more tetanus injections during pregnancy is a good proxy for that mother's health-seeking behavior (Luther 1998).

(Jejeebhoy, 2000; Kishor, 2000). With the exception of three variables, the dimensions most important for ensuring child nutrition are *not the same ones* important for ensuring the completeness and timeliness of infant immunizations. In fact, what emerges from the analysis is that health outcomes such as stunting are affected by the *sources* of empowerment (such as education and employment) as well as household socioeconomic status and familial environment which increases the child's access to better resources. On the other hand, women's health-seeking behavior such as infant immunization is more a function of the *evidence* and *setting* of empowerment—"actions" that require individual agency, women's exposure to non-traditional ideas and behavior, and power to interact with the modern world. This finding needs to be especially emphasized because it suggests that women's empowerment is related to different aspects of child health and survival in different ways, thus highlighting the importance of empowering women along several different dimensions if children are to benefit across the whole spectrum of their health and survival needs (Hobcraft, 1996).

Ensuring the well being of children, the next generation of citizens, is of critical concern for both parents and states (Hobcraft, 1996). Consequently, besides a re-conceptualization and re-operationalization of women's empowerment, there is a need to collect relevant and timely data and also to design indicators sensitively. More comprehensive, direct, and context-specific strategies that enhance women's empowerment by moving beyond education, employment, or delayed marriage must also be sought. However, this insistence on a shift beyond traditional proxies does not imply their dismissal; instead, education and employment are viewed as sources of empowerment, implying that as compared to a woman who is not educated/not employed, women who are educated/employed have more sources on which they can draw on to become empowered. To continue, some alternate approaches of effective empowerment include raising

women's gender consciousness, enabling women to mobilize community resources and public services, improving their access to information, skills, services, and technologies, providing support for the challenge of traditional norms that underlie gender inequity, providing for the acquisition of usable vocational and life skills, increasing women's political participation, protecting women from violence, and enhancing women's real access to and control over economic resources (Kishor, 2000). Relevant policies must also encourage participation in decision-making and create a group identity that becomes a source of power—a group identity separate from that of the family because for many women the family is often the social institution that enforces strict adherence to existing gender norms (Bathliwala, 1994). Thus, the emphasis should be on the ongoing process of empowerment rather than on the end product.

Since partial empowerment in a gender-inequitable society can have negative consequences for women and the girl-child, contextual issues need to be addressed when making policy changes as well as operationalizing the variables for measurement across various cultures (Das Gupta, 1987). For example, the fact that traditional family structure such as co-residence with a mother-in-law can have negative effects on child immunization underscores the importance of empowering households and household environments, rather than just women themselves. Consequently, broader social and contextual changes that reduce gender subordination and the imbalance in power between women and men are necessary to improve child health and survival, since this arena or inquiry has exposed the damaging consequences of women's powerlessness in and on society. Only then can women be agents of their own, as well as their children's, health-seeking negotiations.

Table 1 Main explanatory variables for women's empowered used in the study

Indicators that give *evidence* of empowerment	**Indicators that are more likely to be *sources* of empowerment**	**Indicators that are a *setting* for empowerment**
Financial Autonomy/Security (+)	Education (+)	Lives with mother-in-law (-)
Permission to visit market or friends/relatives (+)	Exposure to mass media (+)	Spousal communication (+)
Acceptance of wife beating (-)	Worked in the last 12 months (+)	

Table 2 Description of covariates used in the study.

Explanatory variables

Indicators that give evidence of empowerment

Financial Autonomy/Security:

- "Are you allowed to have some money set aside that you can use as you wish?"
- Dummy variable with "1" = Yes and "0" = No.
- *Hypothesis:* Women who are allowed to set aside money for themselves will have better nourished and fully immunized children.

Permission needed to visit market/relatives:

- "Do you need permission to (1) go to the market, and (2) visit relatives or friends?"
- 2 dummy variables with "1" = Yes and "0" = No, which were then added up to create an index ranging from 0-2. Women with 0 required no permission while those with 2 had no individual agency regarding movement.
- *Hypothesis:* Women who need permission to move outside the physical confines of their house are more likely to have malnourished and insufficiently immunized children.

Acceptance of wife beating:

- "Sometimes a wife can do things that bother her husband. Please tell me if you think that a husband is justified in beating his wife in each of the following situations: (1) if he suspects her of being unfaithful, (2) if her natal family does not give enough dowry, (3) if she shows disrespect for in-laws, (4) if she goes out without telling him, (5) if she neglects the house or children, and (6) if she doesn't cook properly."
- 6 dummy variables with "1" = Justified, and "0" = Not justified, which were then combined through factor analysis to create an index ranging from 0 to 6. Women with 0 showed intolerance for wife-beating while those with 6 justified wife-beating completely
- *Hypothesis:* Women who tolerate and justify wife-beating more likely to have malnourished and insufficiently immunized children than those who do not tolerate it.

Indicators that are more likely to be sources of empowerment

Education:

- 4 main categories: No education, Primary Education, Secondary Education, and Matriculation and above.
- Categorical variable that was dichotomized in order to enter into the regression equation.
- *Hypothesis:* Better-educated mothers will have better nourished and fully immunized children than mothers of lower educational levels.

Exposure to the mass media:

- "Do you usually (1) read a newspaper or magazine, (2) listen to the radio, and (3) watch television at least once a week?"
- 3 dummy variables with "1" = Yes and "0" = No, which were then added together to generate a new variable with values ranging from 0-3. Women with 0 had no media exposure while those with 3 had complete access to mass media.
- *Hypothesis:* Women who have greater access to the mass media are more likely to have better nourished and fully immunized children than those women who don't have access to it.

Worked in the last 12 months:

- "How many months have you worked in the past 12 months?"
- Dummy variable with "1" = Yes, worked all 12 months and "0" = No work.
- *Hypothesis:* Women who worked in the past 12 months prior to the survey are more likely to have better nourished and fully immunized children than those women who have not worked.

Indicators that are a setting for empowerment

Lives with mother-in-law:

- "Does your mother-in-law live with you?"
- Dummy variable with "1" = Yes and "0" = No.
- *Hypothesis:* Women who co-reside with their mothers-in-law are more likely to have malnourished and insufficiently immunized children than those who don't.

Spousal communication:

- "Have you discussed family planning with your husband?"
- Dummy variable with "1" = Yes and "0" = No
- *Hypothesis:* Women who have the freedom to discuss family planning options with their husbands, which is a proxy for spousal communication, are more likely to have better nourished and fully immunized children than those women who cannot.

Control variables

Geographical/residential

Region:

- Region of the country: North, South, East, West, and Central
- Dummy coded with South as the reference category ("1").
- *Hypothesis:* Children residing in the South are more likely to be well nourished and completely immunized than children from any other region.

Area of residence:

- Urban and rural
- Dummy coded with Urban as reference category ("1").
- *Hypothesis:* Children residing in rural areas are more likely to be malnourished and insufficiently immunized than children residing in urban areas.

Social Background

Caste/tribe:

- Three categories: scheduled caste, scheduled tribe, and non-scheduled caste/tribe
- Dummy coded with non-scheduled caste/tribe as the reference category ("1").
- *Hypothesis:* Children belonging to scheduled caste/tribes are more likely to be malnourished and insufficiently immunized than children belonging to scheduled caste/tribes.

Religion:

- Three categories: Hindu, Muslim, and other
- Dummy coded with Hindu as the reference category ("1").
- *Hypothesis:* Children belonging to Muslim or other religious groups are more likely to be malnourished and insufficiently immunized than Hindu children.

Socioeconomic status

Possessions index:

- Index of eight important household possessions such as fan, bicycle, radio, etc
- The individual variables were first dummy coded and then added up together. A value of "0" implied no possessions and low socioeconomic status while a value of "8" implied a high socioeconomic status.

Facilities index:

- Index of two important facilities: presence of flush toilet and presence of piped water.
- Similar methodology as "possessions index."
- *Hypothesis:* Children belonging to households with high socioeconomic status ate more likely to be better nourished/completely immunized than children from low socioeconomic backgrounds.

Bio-demographic variables

Age of the child:

- Continuous variable in months
- Restricted to ages 0-35 months for STUNTED and 12-23 months for IMMUNIZED
- *Hypothesis:* Older children are more likely to be malnourished and insufficiently immunized than younger children.

Sex of the child:

- Two categories: male and female
- Dummy coded with female as the reference category ("1").
- *Hypothesis:* Boys are more likely to be well nourished and completely immunized than girls.

Age of the mother:

- Continuous variable in years
- *Hypothesis:* Older mothers are more likely to have well nourished and completely immunized children than younger mothers.

Birth order of the child:

- Three categories: first birth, second or third, fourth and above
- Dummy coded with first birth as the reference category ("1").
- *Hypothesis:* Children of higher birth order are more likely to be malnourished and insufficiently immunized than children of a lower birth order.

Previous birth interval:

- Two categories: first birth or more than 24 months, less than 24 months
- Dummy coded with first birth or more than 24 months as the reference category ("1").
- *Hypothesis:* Children born after shorter birth intervals (less than 24 months) are more likely to be malnourished and insufficiently immunized than those with longer birth intervals.

Antenatal care:

- Two variables: received folic acid and tetanus injections
- *Hypothesis:* Mothers who did not receive any antenatal care are more likely to have stunted children then those who did receive antenatal care.

Source: National Family Health Survey, 1998/99

Table 3: Univariate Statistics (Percent/Means) for variables in the logistic regressions of STUNTING AND IMMUNIZE: India, 1998/99

VARIABLES	STUNTED	IMMUNIZED
	Total Sample (N = 13,230 women with eligible children)	Total Sample (N = 8,815 women with eligible children)
Dependent variables		
STUNTING: Whether a woman's last child currently between the ages of 0–35 month is stunted or not.		
Child Stunted (1)	36.46%	
Child not Stunted (0)	63.54%	
IMMUNIZE: Whether a woman's last child currently between the ages of 12 to 23 months has received 3 DPT, 3 Polio, 1 BCG, and 1 Measles immunization.		
Received all immunizations (1)		42.8%
Did not receive all (0)		57.2%
Independent variables		
Region:		
South (Ref category)	20.85%	15.29%
North	25.42%	23.65%
East	25.93%	31.92%
West	15.43%	10.54%
Central	12.37%	18.59%
Area of residence:		
Urban (Ref category)	34.99%	26.75%
Rural	65.01%	73.25%
Social Background:		
Non sch. caste/tribe (Ref category)	43.52%	38.32%
Scheduled Caste	45.73%	47.25%
Scheduled Tribe	10.75%	14.43%
Religion:		
Hindus (Ref category)	75.01%	74.40%
Muslims	13.02%	11.23%
Others	11.97%	11.36%
Socioeconomic controls:		
Toilet and water-facilities index		
Min: 0	Mean: 0.536	Mean: 0.395
Max: 2	Std: 0.750	Std: 0.680

VARIABLES	STUNTED	IMMUNIZED
Household possession index		
Min: 0	Mean: 2.649	Mean: 2.161
Max: 8	Std: 1.838	Std: 1.799
Bio-demographic control variables:		
Age of the child (in months)	Mean: 16.093 Std: 9.783	Mean: 17.043 Std: 3.332
Sex of the child		
Female (Ref category)	46.41%	47.45%
Male	53.59%	52.55%
Mother's age at birth of child (in years)	Mean: 23.926 Std: 4.894	Mean: 24.132 Std: 5.378
Birth order of child		
First (Ref category)	32.79%	28.95%
Second or third	48.07%	44.25%
Fourth and above	19.14%	26.80%
Previous birth interval		
First birth/24+ months (Ref category)	84.85%	84.65%
Less than 24 months	15.15%	15.35%
Antenatal care		
Consumed folic acid tablets	84.61%	---
Received tetanus injections	89.34%	---

Source: National Family Health Survey, 1998/99

Table 4: Descriptive Statistics for variables distributed within the independent variables

VARIABLES	NOT STUNTED (0)	STUNTED (1)
	Total Sample (N = 13,230 women with eligible children)	
Independent variables		
Women's empowerment indicators:		
1. Educational Attainment		
No education (Ref category)	51.08%	48.92%
Primary	60.67%	39.31%
Secondary	70.27%	29.73%
Matriculation and above	80.68%	19.32%
2. Financial autonomy/security		
Allowed to keep money aside	67.31%	32.69%
Not allowed to keep money aside	42.32%	57.68%
3. Exposure to mass media	--	--
4. Recent employment (12 months)		
Employed	56.78%	43.22%
Not employed	43.22%	56.78%
5. Presence of mother-in-law	63.48%	36.52%
6. Spousal communication	65.47%	34.53%
7. Acceptance of wife beating	--	--
8. Permission needed to visit market/relatives	--	--
Independent variables		
Region:		
South (Ref category)	69.36%	30.64%
North	60.10%	39.90%
East	64.40%	35.60%
West	68.12%	31.88%
Central	53.27%	46.73%
Area of residence:		
Urban (Ref category)	70.14%	29.86%
Rural	59.98%	40.02%
Social Background:		
Non sch. caste/tribe (Ref category)	67.84%	32.16%
Scheduled Caste	60.00%	40,00%
Scheduled Tribe	61.18%	38.82%
Religion:		
Hindus (Ref category)	62.29%	37.71%
Muslims	63.26%	36.74%
Others	71.64%	28.36%
Socioeconomic controls:		
Toilet and water-facilities index	--	--
Household possession index	--	--

VARIABLES	NOT STUNTED	STUNTED
Bio-demographic control variables:		
Age of the child (in months)	--	--
Sex of the child		
Female (Ref category)	63.16%	36.84%
Male	63.87%	36.13%
Mother's age at birth of child (in years)	--	--
Birth order of child		
First (Ref category)	68.37%	31.63%
Second or third	64.21%	**35.79%**
Fourth and above	53.55%	46.45%
Previous birth interval		
First birth/24+ months (Ref category)	64.67%	35.33%
Less than 24 months	57.21%	42.79%
Antenatal care		
Consumed folic acid tablets	64.54%	35.46%
Received tetanus injections	63.76%	36.34%

Source: National Family Health Survey, 1998/99

Table 5: Descriptive Statistics for variables for IMMUNIZED distributed within the independent variables used: India, 1998/99

VARIABLES	NOT IMMUNIZED (0)	IMMUNIZED (1)
	Total Sample (N = 8,815 women with eligible children)	
Independent variables		
Women's empowerment indicators:		
1. Educational Attainment		
No education (Ref category)	73.83%	27.17%
Primary	53.03%	46.97%
Secondary	40.97%	59.03%
Matriculation and above	27.37%	72.63%
2. Financial autonomy/security		
Allowed to keep money aside	50.53%	49.47%
Not allowed to keep money aside	45.76%	54.24%
3. Exposure to mass media	--	--
4. Recent employment (12 months)		
Employed	63.16%	36.84%
Not employed	62.87%	37.13
5. Presence of mother-in-law	71.28%	28.72%
6. Spousal communication	49.08%	50.92%
7. Acceptance of wife beating	--	--
8. Permission needed to visit the market/relatives	--	--
Independent variables		
Region:		
South (Ref category)	31.01%	68.99%
North	52.09%	47.91%
East	69.58%	30.42%
West	34.23%	65.77%
Central	77.00%	23.00%
Area of residence:		
Urban (Ref category)	41.14%	58.86%
Rural	63.06%	36.94%
Social Background:		
Non sch. caste/tribe (Ref category)	50.59%	49.41%
Scheduled Caste	57.67%	42,33%
Scheduled Tribe	71.19%	26.81%
Religion:		
Hindus (Ref category)	56.69%	43.31%
Muslims	64.99%	35.01%
Others	50.57%	49.25%
Socioeconomic controls:		
Toilet and water-facilities index	--	--
Household possession index	--	--

VARIABLES	NOT IMMUNIZED (0)	IMMUNIZED (1)
Bio-demographic control variables:		
Age of the child (in months)	--	--
Sex of the child		
Female (Ref category)	58.52%	41.48%
Male	56.00%	44.00%
Mother's age at birth of child (in years)	--	--
Birth order of child		
First (Ref category)	46.79%	53.21%
Second or third	54.27%	45.73%
Fourth and above	73.29%	26.71%
Previous birth interval		
First birth/24+ months (Ref category)	56.90%	43.10%
Less than 24 months	58.83%	41.17%
Antenatal care		
Consumed folic acid tablets	---	---
Received tetanus injections	---	---

Source: National Family Health Survey, 1998/99

Table 5. Logistic regressions of a woman's last living child currently between the age of 0 and 35 months being stunted: India, 1998/99

VARIABLES	Exp (β)		
	Model 1	**Model 2**	**Model 3**
Women's empowerment indicators:			
1. Educational Attainment			
No education (Ref category)	1.000	1.000	1.000
Primary	0.760***	0.760***	0.777***
Secondary	0.571***	0.603***	0.658***
Matriculation and above	0.366***	0.415***	0.527***
2. Allowed to keep money aside	0.862**	0.831***	0.843***
3. Exposure to mass media	0.863***	0.888***	0.960
4. Recent employment (12 months)	1.223***	1.092*	1.067
5. Presence of mother-in-law	0.952	0.963	0.993
6. Spousal communication	1.018	1.059	1.061
7. Acceptance of wife-beating	0.991	1.002	0.994
8. Permission needed to visit the market/relatives	1.097***	1.049*	1.051
Region:			
South (Ref category)		1.000	1.000
North		1.569***	1.819***
East		1.171*	1.161*
West		1.178*	1.260**
Central		1.672***	1.786***
Area of residence:			
Urban (Ref category)		1.000	1.000
Rural		1.122*	0.943
Social Background:			
Non sch. caste/tribe (Ref category)		1.000	1.000
Scheduled Caste		1.252***	1.223***
Scheduled Tribe		1.253**	1.188*
Religion:			
Hindus (Ref category)		1.000	1.000
Muslims		0.996	1.011
Others		0.728***	0.739***
Socioeconomic controls:			
Toilet and water-facilities index			0.805***
Household possession index			0.902***
Bio-demographic control variables:			
Age of the child		1.067***	1.069***

Table 5 (continued)

VARIABLES	Exp (β)		
	Model 1	**Model 2**	**Model 3**
Sex of the child			
Female (Ref category)		1.000	1.000
Male		0.949	0.953
Mother's age at birth of child		0.967***	0.971***
Birth order of child			
First (Ref category)		1.000	1.000
Second or third		1.072	1.064
Fourth and above		1.408***	1.368***
Previous birth interval			
First birth/24+ months (Ref category)		1.000	1.000
Less than 24 months		1.223***	1.232***
Antenatal care			
Consumed folic acid tablets		0.899*	0.925
Received tetanus injections		0.987	1.007
-2 Log Likelihood	8296.413	7666.870	7613.809
Model Chi-Square	765.82	2024.90	2131.02

* significant at p < 0.05
** significant at p < .01
*** significant at p < .001
Source: National Family Health Survey, 1998/99
Note: Constant is included in all the models

Table 6. Logistic regressions of a woman's last child currently between 12 and 23 months having had all of eight recommended immunizations: India, 1998/99

VARIABLES	Exp (β)		
	Model 1	**Model 2**	**Model 3**
Women's empowerment indicators:			
1. Educational Attainment			
No education (Ref category)	1.000	1.000	1.000
Primary	1.827***	1.750***	1.699***
Secondary	2.201***	1.808***	1.687***
Matriculation and above	2.800***	1.929***	1.599***
2. Allowed to keep money aside	1.189***	1.098	1.085
3. Exposure to mass media	1.437***	1.264***	1.165***
4. Recent employment (12 months)	0.992	0.905	0.925
5. Presence of mother-in-law	0.606**	0.626*	0.596**
6. Spousal communication	1.251***	1.331***	1.318***
7. Acceptance of wife-beating	0.960***	0.968*	0.973*
8. Permission needed to visit the market/relatives	0.763***	0.866***	0.861***
Region:			
South (Ref category)		1.000	1.000
North		0.448***	0.409***
East		0.253***	0.259***
West		0.858	0.836
Central		0.199***	0.194***
Area of residence:			
Urban (Ref category)		1.000	1.000
Rural		0.859*	0.966
Social Background:			
Non sch. Caste/tribe (Ref category)		1.000	1.000
Scheduled Caste		0.958	0.978
Scheduled Tribe		0.529***	0.557***
Religion:			
Hindus (Ref category)		1.000	1.000
Muslims		0.695***	0.698***
Others		1.478***	1.476***
Socioeconomic controls:			
Toilet and water-facilities index			1.075
Household possession index			1.124***
Bio-demographic control variables:			
Age of the child		1.051***	1.051***

Table 6 (continued)

VARIABLES	Exp (β)		
	Model 1	**Model 2**	**Model 3**
Sex of the child			
Female (Ref category)		1.000	1.000
Male		1.103*	1.106*
Mother's age at birth of child		1.026***	1.025***
Birth order of child			
First (Ref category)		1.000	1.000
Second or third		0.746***	0.751***
Fourth and above		0.474***	0.484***
Previous birth interval			
First birth/24+ months (Ref category)		1.000	1.000
Less than 24 months		1.022	1.011
Antenatal care			
Consumed folic acid tablets		---	--
Received tetanus injections		---	--
-2 Log Likelihood	5335.403	4919.528	4898.705
Model Chi-Square	1366.06	2197.81	2239.45

* significant at $p < 0.05$
** significant at $p < .01$
*** significant at $p < .001$
Source: National Family Health Survey, 1998/99
Note: Constant is included in all the model

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