

ABSTRACT

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Abstract: Social capital has increasingly been recognized as an important determinant of health in developed countries with advanced infrastructure, educated populations, and accessible and quality health and educational services. Hence, it may be a particularly advantageous resource in developing countries where human and economic capitals are found wanting. This dissertation addresses the paucity of developing country research on this issue by examining the relationship between social capital and children's nutritional outcomes in India.

The literature on social capital identifies three key distinctions: between bridging and bonding social capital; between positive and negative effects of social capital; and the different roles of household and community based social capital that are critical for understanding how social capital operates. Using the India Human Development Survey 2005-2006, I operationalize these different forms of social capital and test how they impact child nutrition. I find that household-based bridging social capital has a positive association with child nutrition whereas bonding social capital has the opposite impact. Household-based connections with social capital are of greater importance than community (village)-based social capital. Contextual social capital primarily operates as a proxy for local development.

Next, I find that bridging social capital improves child nutrition by improving

access to modern health care, such as antenatal care, improving uptake of government nutrition supplementation programs, and health knowledge. On the other hand, religious or caste-based social capital reinforces traditional fertility ideals and discourages the use of contraception thereby adversely affecting the health of children. Lastly, I ask if the impact of social capital on child nutrition varies by the level of regional development. I find that social capital acts in the expected ways in developed regions, which have stronger public amenities and higher literacy rates. However, in more deprived areas, bonding social capital has unexpected positive consequences on child nutrition because of how social capital interacts with community resources.

SOCIAL CAPITAL AND CHILDHOOD MALNUTRITION IN INDIA

By

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DEDICATION

This dissertation is dedicated to my parents,

My mother, Sujata, for grounding me,
My father, Pankaj, for giving me wings,

And my spiritual guru,
Late shri. Parthasarathi Rajagpalachari for being my eternal guide.

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CHAPTER I: INTRODUCTION

Considerable evidence has documented the positive relationship between social capital and health (see e.g., Kawachi, Kennedy, Lochner, & Prothrow-Stith, 1997; Kawachi, Kennedy, & Glass, 1999; Lomas, 1998). This evidence pertains not just to physical health outcomes such as mortality and chronic health conditions (Kim, Subramanian, & Kawachi, 2008), but also mental health outcomes such as depression and children's behavior problems (Almedom & Glandon, 2008). Additionally, the evidence is also strong for a range of health related behaviors such as alcohol abuse and sexual behavior (Lindström, 2008). However, most of this research has focused on developed countries where infrastructure is highly developed, the population relatively well educated, and health and educational services accessible and reliable. This dissertation addresses the paucity of developing country research on this issue by examining the relationship between social capital and children's nutritional outcomes in India.

Three distinctions have emerged in social capital literature that are essential for developing country research: between bridging and bonding social capital; between positive and negative effects of social capital; and the different roles of household and community based social capital. In this dissertation, I further the discourse on social capital by extending this research to developing countries and operationalizing different forms of capital to the Indian context.

The role of household-level factors on child health has been a much-researched topic in demographic and public health literature, but there exists limited research that evaluates the role of neighborhood factors on child health in developing countries. I evaluate the impact of social capital on childhood malnutrition in India at both the

contextual and household level. The focus is on structural social capital, wherein social capital is viewed as resources residing in societal structures, networks and associations.

Contextual social capital can have an impact that is significantly different from household based social capital. At the individual-level, social capital can be seen as a private good - providing personal social networks for social support, social influence, new knowledge, and increased access to scarce resources. At the community level, social capital can function as a public good – community cohesion and information flow accrue to all members of the community even if they do not have high levels of personal social capital themselves. Putnam refers to this public good aspect of social capital a “rainmaker” effect to describe how resources produced through social capital diffuse to all people living in regions with high levels of social capital (Putnam, Pharr, & Dalton, 2000). I use organizational and voluntary associations as an indicator of social capital. At the contextual level, the measure is defined as the number of organizations in the village, and at the household level, it is defined as the number of memberships within a household in these organizations. One of the contributions of this project is to explore the differential impact of social capital at the two levels, the household and the village. Additionally, I ask if the impact of family based social capital pertains only to those villages with associational organizations or does the impact pervade households, irrespective of whether the organization functions in the village?

Secondly, Putnam (2000) proposed two distinct forms of social capital, bonding social capital and bridging social capital. Another objective is to operationalize these two forms of capital to the Indian context and examine how these are related to nutritional outcomes of children. Bridging social capital, measured as associations with

development-based organizations, is found to have a negative association with malnutrition. Bonding social capital, measured in here as association with religious or caste-based groups is hypothesized to have a positive association with malnutrition.

I find that bridging and bonding social capital have opposite relationships with nutritional outcomes of children as hypothesized. Bridging social capital is found to be negatively associated with undernutrition whereas bonding social capital is found to have a positive association. The impact of contextual social capital gets entirely explained by local development. This is plausible as voluntary organizations and civic societies are more likely to form in areas where a certain degree of co-operation occurs. This co-operation may lead to better governance resulting in more educated and developed societies (Putnam, Leonardi, & Nanetti, 1993). However, Portes (1998) argues that this result could be capturing unmeasured heterogeneity in villages, such as local development, which might impact social capital as well as underweight among children. Hence, the presence of social capital could be capturing the overall development effect. Additionally, I find that family's social capital is equally effective in villages with and without development organizations. That is, belonging to a development organization helps, whether that organization is located in the village or not.

Another goal of the dissertation is to examine the specific mechanisms through which social capital, at both the household and village levels, impacts nutritional status of children. Surprisingly, even though there exists a strong theoretical discussion of the different pathways through which social capital might operate, there is very little evidence of the same. This paucity is partly due to lack of data that provide detailed measures of the pathways through which it operates. I use a survey rich in measures of social capital

and the pathways through which social capital might impact child health. Health knowledge, female empowerment, greater use of health services, adoption of healthy behaviors and lower fertility are hypothesized to be the pathways through which household social capital impacts child malnutrition. At the village level, social capital had been hypothesized to impact the functioning of health services and the national child nutritional program. However, given the lack of significance of contextual social capital in the presence of controls for local development, I drop this line of inquiry in subsequent analysis.

I find that bridging social capital improves child nutrition by improving health knowledge, access to modern health care, such as postnatal care, as well as increased provision or uptake of government nutrition supplementation program. On the other hand, ties with religious or caste-based groups reinforce traditional fertility ideals and discourage the use of contraception thereby adversely affecting the health of children.

The influence of social capital is theorized to be dependent on the normative and economic context. Some argue that if social capital is a form of capital, which can substitute or complement other forms of capital, it may be a particularly advantageous resource within a developing country where human and economic capitals are often found wanting (Kunitz, 2004; Woolcock, 1998). In the context of resource-deprived regions, where access to health services is limited, people are less educated, and infrastructure weak; social capital may make a significant difference to child health. On the other hand, social capital may fail to show a significant impact in communities with meager resources; the provision of information and contacts may prove to be inadequate

if basic systems are not in place. It is also possible that different kinds of social capital are of varying importance in the less developed and more developed regions.

In the last set of analyses, I evaluate if the impact of social capital on childhood malnutrition varies by the level of development in the region. Before discussing whether the impact of social capital varies by the level of development, it is important to discuss how social capital is distributed across the two regions. More educated and developed regions in India are richer in both types of social capital, bridging and bonding. Less developed regions are less likely to have access to bridging social capital but have comparable stock of bonding social capital.

My results demonstrate that the impact of social capital indeed varies by the level of development in the community. In the more developed region of India, social capital works in the hypothesized manner. Presence of religious and caste-based organizations in a village indicates the presence of traditional networks and perhaps being more backward *vis-à-vis* others in the region. Bonding social capital at the village level is found to be negatively associated with nutritional status of children. Household connections with developmentally oriented organizations are beneficial for children.

In the less developed region, social capital works in non-intuitive ways. Bonding social capital at the village level has a positive impact on child nutrition, similar to that of bridging social capital in the more developed region. For this region, which is also highly traditional, the religious and caste-based organizations are not harmful. In fact being embedded in such networks, probably leads to greater cohesion and trust within communities, which is reflected in this positive outcome. This cohesion and trust can operate in different ways to prevent underweight among children – providing financial

assistance to overcome a nutritional crisis, improving local infrastructure and collective efficacy in the community. At the same time, bridging social capital does not prevent children from being undernourished at the village or household level. If a community has no or little access to safe water, transportation, and health services, then bridging organizations are able to do little by themselves to impact nutritional outcomes of children in a village. It is also likely that bridging organizations are too few to make a substantial impact on population health.

This dissertation uses a rich dataset, India Human Development Survey (IHDS) 2005-2006, which is a nationally representative survey and provides detailed individual and contextual data relevant to children's health. Even though this survey is ten years old it is unique as no other data can provide this information on social capital and child health for India. This nationally representative data is astonishingly rich as it provides measures of social capital at both the household and the village level, bridging and bonding social capital, mechanisms through which capital might operate and a rich set of village and household level controls. Such an analysis would offer insight into how social organizations can work to impact population health in India. It also provides multiple measures of children's health and nutritional status. This analysis uses child underweight as the dependent variable and utilizes hierarchical linear modeling, which produces unbiased estimates of community and individual effects simultaneously.

Child Undernutrition in India and the Importance of Social Capital

Indian children are amongst the most undernourished in the world. According to the national Demographic and Health Survey (IHDS), 48% of Indian children have low

height-for-age, another 43% have low *weight-for-age* and 20% have low *weight-for-height* (IIPS & Macro International, 2007). India is responsible for one-third of the global burden of underweight children under age five and has the highest population of children who are wasted. According to recent estimates, malnutrition has been the underlying cause of 2.6 million child deaths worldwide each year, which translates into more than one in three of all child deaths (Save the Children, 2012). It also contributes to 35% of the disease burden in children less than 5 years of age (Black et al., 2008). Stunting, severe wasting, and intrauterine growth restriction constitute the largest percentage of any risk factor of global deaths and disability-adjusted life-years (DALYs) in children less than 5 years old (Black et al., 2008).

Malnutrition leads to cumulative disadvantage over the life course, as early experiences of undernutrition among children has a continuing impact. Pregnancy and infancy are the most significant periods for brain development, and good nutrition is needed at this stage to lay the foundation for the child's future cognitive, motor and social skills, school success and productivity. Poor fetal growth or stunting in the first 2 years of life leads to irreversible damage, including shorter adult height, lower attained schooling, reduced adult income, and for women, decreased offspring birth weight (Victora et al., 2008).

The causes of malnutrition are diverse and entail household characteristics, such as low household income and poor maternal education, biological characteristics such as mother's deprived nutritional status as well as lack of adequate nutrition, cultural factors such as norms regarding feeding practices, lack of women empowerment, and environmental factors, such as lack of availability and accessibility of health services,

substandard quality of drinking water and sanitation. Communicable diseases such as diarrhea and acute respiratory infections (ARI) also cause malnutrition and undernutrition is also the underlying reason for increased susceptibility to infectious diseases and death (Pelletier, Frongillo, & Habicht, 1993). This relationship results in a vicious cycle of sickness and malnutrition (Rodríguez, Cervantes, & Ortiz, 2011).

Social capital can impact several determinants of malnutrition. Social capital is positively correlated with educational attainment (Coleman, 1988, 1990), status attainment and improved economic outcomes¹ (Lin, 1999), which in turn would be associated with better child health. Social capital may enable greater diffusion of health knowledge regarding nutrition, diseases and hygiene. It may also lead to greater empowerment of women leading to a change in health behavior such as visiting the health center or negotiating for resources for a girl child. The importance of environmental factors, such as water and sanitation, electricity, and public transportation and health services on child health is well established (Sastry, 1996; Van de Powel, O'donnell, & Van Doorslaer, 2009; Spears, 2013). It is also plausible that social capital works through improved infrastructure due to increased cohesion and accountability derived through local organizations and leads to improved health. Hence, it is critical to study how social capital impacts child nutrition in India.

Research on social capital also helps extend neighborhood effects research on health. Morenoff (2003) emphasizes how the purview of neighborhood effects research is limited to socioeconomic determinants of health outcomes, without adequately considering more proximate mechanisms that may offer insights into *how* neighborhood

¹ although establishing causality for this relationship is especially difficult (Mouw 2006).

environments are associated with health (Carpiano, 2006). Social capital, in its different forms, might influence proximate determinants of health and throw more light on the linkages between neighborhood resources and health.

Lastly, but very importantly, voluntary and associational sector in India has been on the rise and there is little systematic study of how (and if) these organizations impact outcomes at the population level. These organizations are diverse in their scope and address a range of issues such as micro-credit, agriculture and trade practices, but they can nonetheless be instrumental in generating social capital that can directly and indirectly impact health. Some organizations can be established with the explicit purpose to ameliorate health conditions but their number is quite limited in this data². Hence this analysis is unlikely to be capturing programmatic benefits derived from health organizations alone but can nonetheless demonstrate the incidental advantages or disadvantages of such organizations.

² Only 1.4% of the organizations are non-governmental organization in the sample. Although, IHDS does not provide specifics on what these organizations do, it is unlikely that all of these work on addressing child health or child nutrition in particular. These organizations work on a range of issues like education, women empowerment, employment training, disability support, housing, conservation of natural resources and addiction among many others. Since the number of organizations working on child health or child nutrition is likely to be infinitesimal, this analysis is unlikely to be capturing programmatic benefits.

CHAPTER II: THEORETICAL FRAMEWORK OF SOCIAL CAPITAL

Social capital broadly refers to the idea that social structures, particularly social networks, are a potential resource that can be used to benefit individuals and communities. Pierre Bourdieu and James Coleman have been seen as founding fathers of social capital research (Häuberer, 2011). Bourdieu (1986) defined social capital as “the aggregate of the actual or potential resources linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition—or in other words, to membership in a group—which provides each of its members with the backing of the collectively-owned capital (Bourdieu 1986, p. 248-249).” These networks provide resources that can be drawn upon by individual group members for pursuing individual aims. Bourdieu’s conceptualization of social capital is more individualistic as the gains derived from social networks are seen as serving private ends. His work was rooted in stratification focusing on the fungibility of different forms of capital into economic capital. In his definition, social networks and the resources within social networks are identified as being the core elements of social capital (Portes, 1998; Carpiano, 2006).

According to Coleman, “Social capital is defined by its function. It is not a single entity, but a variety of different entities having two characteristics in common: They all consist of some aspect of social structure, and they facilitate certain actions of individuals who are within the structure” (Coleman 1990, p. 302). His definition highlights the productive function of social capital, which facilitates the actions of individuals to achieve a certain end. Coleman distinguishes social capital from other forms of capital as

“social capital inheres in the structure of relations between persons and among persons” (Coleman 1990, p. 302).

Coleman discusses several kinds of social capital advantages such as mutual relations (trust), information potential, enforcement of norms and appropriable organizations, all of which has pioneered future work on social capital although some can be seen as mechanisms through which social capital operates such as sharing of information. Mutual relations refer to the importance of trust within social structure that leads to the easier functioning of obligations and expectations. Social structure also provides a place for the establishment of social norms that can generate positive externalities for the entire structure. Social relationships contain information potential or the capability to provide its members with information helpful in the utility maximization process. The information can be gathered easily because of greater trust (mutual relations). Lastly, he discusses the role of appropriable social organizations that are organizations established to achieve certain goals but that can also be useful in obtaining other aims. They can also be established with the explicit purpose of generating social capital such as voluntary organizations for public good. All these features emphasize the utility of social capital for societies – “Social capital is for none of the embedded actors a private good; it has the character of a public good” (Coleman 1995, p. 409 as cited by Häuberer, 2011).

Putnam (1995) built on Coleman’s work, defining social capital as “the features of social organizations, such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit” (Putnam 1995, p. 67). This definition of social capital is the most widely cited in health research, but it has also faced a fair share

of criticism (e.g. Portes, 1998). Social capital is viewed as a collective characteristic of a community that benefits the community as a whole. Communities with greater generalized trust, civic engagement, trust and norms of reciprocity are more likely to experience positive economic, political, and social outcomes (Putnam et al., 1993).

A major factor behind economic and governmental effectiveness according to Putnam is civic participation, which is measured through voting behavior, newspaper readership, and participation in sports clubs and voluntary cultural associations. However, underlying civic participation is generalized trust, which is central to the development of reciprocity and voluntary associations. According to Putnam et al. (1993), trust is the lubricant of civic life (Putnam 1993:13). The higher the level of mutual trust in a community, the higher the probability of cooperation will be. Norms of reciprocity refer to the act of helping others in return for help, or a more generalized norm where transaction is not necessarily carried out for personal benefits for self. Generalized reciprocity means that people will help each other without expecting an immediate service in return. Hence, norms of reciprocity and functioning voluntary associations also strengthen and produce trust. Coleman (1988) has also emphasized the mutually/self-reinforcing property of social capital.

Robert Putnam has tried to measure social capital by counting voluntary groups in civil society, using various censuses and surveys to track size of memberships in sports clubs, bowling leagues, literary societies, political clubs, and the like across different geographical regions. Fukuyama (2001) states that it is not just important to assess the density of voluntary organizations as a measure of social capital, but also their size.

However, it is harder to gain information on the size of these organizations and we do not have such data for India.

The focus of this dissertation is on structural social capital as a form of capital wherein groups of people work together to achieve collective goals that could not be accomplished by individuals alone (Macinko & Starfield, 2001). Both Coleman and Putnam have discussed the centrality of social capital emanating from voluntary or associational organizations. These organizations can facilitate co-operation and coordination for mutual benefit irrespective of its specific end. The greater the number of organizations, the greater the degree of social capital inherent in that community. Since involvement in associations is a central construct of social capital, I use organizational memberships as a source of social capital. However, even though my conceptualization of social capital draws heavily on Putnam, I am also strongly influenced by Lin (1999) and Bourdieu (1986) in my formulation of the mechanisms through which social capital works to impact child health.

Bourdieu (1986) discusses how social capital can be exchanged for economic and human capital. This exchange can be beneficial for children's health by substituting for other resources not available to the family. Bourdieu also quantifies social capital by the size of network connections that the individual can effectively mobilize (Carpiano, 2006). Hence, the density of social connections as well as the potential to make available resources previously unavailable to the family makes his conceptualization useful for this study.

Lin (1999) directs our attention to the resources embedded in social networks as forming social capital. These social resources are not possessed goods of the individual

but are resources that are accessible through one's direct and indirect ties. Operationally, it can be measured as the sum of resources available to individuals or as value or quality of resources accessed and used (Lin, 2005). Lin also highlights the importance of *diversity of resources embedded in one's networks*. Lin makes an important distinction between social networks and social capital – social networks are the basis for social capital. Although, Lin's approach has focused on the analysis of social networks and not on voluntary organizations, he nonetheless makes an important contribution by focusing on instrumental utility of accessed and mobilized resources embedded in social networks. This conceptualization places the significance of social resources in the broader theoretical discussion of social capital and sharpens the definition and operationalization of social capital as a research concept (Lin, 1999). To conceptualize social capital in this manner helps to focus on tangible resources that social capital offers, and not just norms and trust, which could be both -- an antecedent and a consequence of social capital.

This next section primarily reviews the key distinctions made in social capital literature that are relevant for understanding my conceptualization of the term. This dissertation makes three distinctions: between contextual and individual social capital, between bridging and bonding social capital and between the positive and negative effects of social capital. I also review the other key distinctions made in the literature but not in as much detail i.e. the distinction made between cognitive and structural social capital as well as between linking and bridging social capital as they are peripheral to this dissertation.

Social Capital: A Personal Resource or a Collective One?

In recent years, there have been debates on whether social capital is a collective attribute of communities or possession of households that access social capital through social connections (Kawachi, Kim, Coutts, & Subramanian, 2004). When viewed as a collective resource, social capital becomes the basis for a macro-level study, such as that of civil society and political development (Putnam, 2000). Theoretically, Putnam (1993, 2000) and Coleman (1990) define social capital as an aggregate concept, a characteristic of communities rather than individuals that facilitates action that is beneficial to entire communities. These definitions propose an investigation of the contextual impact of social capital at the community level.

Low levels of social capital and trust impact government performance adversely and hence affect all citizens negatively, irrespective of their personal reserve of social capital (Putnam 1993, 2000). Resources produced through social capital diffuse not only to those who possess social capital but also to people living in regions with a high level of social capital (Putnam, Pharr, & Dalton, 2000). Generalized trust, norms and mutual relations and information exchange have positive externalities for the entire community and not just those members that possess social capital (Coleman, 1990). Putnam (2000, p. 20) explains the utility of community levels of social capital - "a well-connected individual in a poorly connected society is not as productive as a well-connected individual in a well-connected society."

This has often been referred to as the communitarian perspective or the 'social cohesion' school of social capital (Moore, Shiell, Hawe, & Haines, 2005; Kawachi, Subramanian, & Kim, 2008). However, the quantum of benefits derived by members of a

community may still vary depending on the level of their participation in these organizations or their proximity to the participating members.

At the individual-level, social capital is seen as a private good, an individual resource whereby individuals benefit directly from their own social affiliations and network strategies (Burt, 1992; Lin, 1999). In this school of thought, social capital is viewed as a property of individuals who use it “to command scarce resources” rather than as a structural property of communities (Portes, 1998). In contrast to measures of social cohesion, which rely upon survey items inquiring about perceptions of trust and reciprocity or measures of community involvement, the network approach to social capital typically employs network analysis. Even though the data used in this dissertation does not lend itself to network analysis, we can hypothesize and test if our measure of social capital enables access to particular resources (see chapter VI).

Bridging, Bonding, and Linking Social Capital

This dissertation makes a distinction between two types of social capital, namely development and religious or caste based social capital, on the basis of resources they offer to people and communities. These are visualized as forms of bridging and bonding social capital respectively.

Bonding social capital refers to trusting and co-operative relations between members of a network who have similar social identities (Putnam, 2000; Szreter, & Woolcock, 2004). It is a form of localized social capital that accumulates in the course of social interactions of families, churches, and social groups, those with similar social identities. These networks communicate and enforce norms of behavior among group

members, and can also provide information and resources. However, it tends to be inward looking thereby reinforcing exclusive identities and homogeneous groupings (Putnam 2000).

Bonding social capital is helpful in providing solidarity and support to group members, but it can also come at a price. This price can be exacted in obligations that may undermine individual autonomy. Dense networks within communities can lead to demands for conformity that may limit individual expression and autonomy (Boissevain, 1974). In two studies in the U.S, bonding social capital has been found to be associated with higher level of mental stress (Mitchell & LaGory, 2002; Caughy, O'Campo, & Muntaner, 2003). A study in Australia also finds a negative relationship between bonding social capital and physical and mental health (Ziersch & Baum, 2004). In these studies, the negative impact of bonding social capital is worse for those in deprived communities. Neighborhood deprivation was defined in a variety of ways and included measures of neighborhood poverty rate (Mitchell & LaGory, 2002; Caughy, O'Campo, & Muntaner, 2003), unemployment rate, vacant housing rate, and proportion of households with children in single headed households (Caughy, O'Campo, & Muntaner, 2003) as well as racial segregation (Mitchell & LaGory, 2002). Hence, it is likely that bonding social capital is especially harmful in developing countries – imposing greedily on well-off members and not providing useful information for upward mobility.

Association with religious or caste organizations may operate as bonding social capital in India. Religion and caste continue to have a stronghold on beliefs and practices of Indians and organizations linked with them may reinforce conservative ideas about medicine and orthodox norms discouraging mothers to adopt modern health practices

(Vikram, Vanneman & Desai, 2012; Story, 2014). It is also well established that strong ties with families, ethnic groups and traditionally oriented groups is associated with higher fertility and lower use of contraceptive services in developing countries (Caldwell & Caldwell, 1987; Paek, Lee, Salmon, & Witte, 2008; Vikram, 2012), which impacts health of mothers and children.

On the other hand, bonding social capital may provide a cohesive force that is able to organize communities into action for public good. There is evidence to show that bonding social capital in Indonesia, with respect to kinship and religion, primarily benefits the community as whole by organizing collective action in associations (Grootaert, 2001). Similarly, Kähkönen (1999) also reports that homogeneity of kinship, caste and ethnic background aids collective action for water supply. Stack (1974) finds that among disadvantaged communities, bonding social capital represents an important survival mechanism for residents. Story (2014) finds that bonding social capital, defined as ties with religious and caste-based groups, is positively associated with professional care during childbirth in India. This suggests that even though traditional attitudes and norms regarding modern health care practices hold sway for members of homogenous religious and caste based groups in India, support is provided to the family in time of a medical need such as delivery. It is possible that in deprived regions of India social capital provides valuable resources that buffers families from nutritional crises leading to lower underweight prevalence among children.

The second form of social capital is called bridging capital, it refers to connections between heterogeneous individuals or groups who are 'more or less equal in terms of their status and power'. This concept is based on the work of Granovetter (1973)

and others who show that so-called weak ties (relationships with individuals outside of one's immediate or localized network) are important for the acquisition of new information and opportunities. He suggested that weak ties generate cohesive power, increase diversity, and promote diffusion of information regarding employment opportunities, therefore presenting an individual with an important resource for possible mobility. Strong ties, on the other hand, only duplicate the information and connections you already have. Interacting with homogenous caste or religious groups tends to convey redundant information, as their "sociological niche" is not very different. Putnam suggests that bridging social capital is the key to mobilizing community resources, acquiring wider variety of resources and sharing diverse information. It may even serve to increase social cohesion at the societal level (Granovetter, 1973; Varshney, 2002).

As discussed earlier, involvement in associations and participatory behavior in a community is a form of social capital (Coleman, 1990; Putnam, 2000; Macinko & Starfield, 2001). Since such involvement often utilizes connections between heterogeneous individuals or groups and sharing of information and resources, it can be viewed as a form of bridging social capital. Grootaert (2001) shows that the heterogeneous composition of membership in voluntary associations strengthens the association between social capital and household income. Heterogeneous memberships, diversified with respect to education, economic status, and occupation, bestow larger benefits on their members than less diversified ones. He argues that diversification promotes fruitful exchanges of knowledge and information.

More recently, another form of social capital called linking social capital has been gaining currency. According to Szreter and Woolcock (2004) linking social capital can be

defined as trusting relations among people interacting across explicit, formal, or institutionalized power structures. Coleman (1988, 1990) has argued that social capital can include “vertical” associations as well, characterized by hierarchical relationships and unequal power distribution among members.

Like bridging social capital, linking social capital emerges from heterogeneous social networks but vertical relationships as opposed to the more horizontal ones in bridging social capital. Linking social capital links the community with formal institutions beyond the community. The operationalization of this type of social capital is the least developed in literature but could be represented by the presence of community-based organizations and networks and relationships between individuals and members of health and educational institutions. Development organizations, such as non-governmental organizations, cooperatives, saving groups, and self-help groups, can be valuable forms of bridging social capital but can also provide vertical linkages. (For instance, cooperatives and saving groups can connect financial institutions like banks with village residents). This dissertation focuses on voluntary organizations because these organizations can provide both bridging as well as linking ties.

Structural and Cognitive Social Capital

Social capital has also been divided into a behavioral component referring to what people do, for instance, how they participate in groups and a cognitive component pertaining to what people think, for instance, whether they trust other people. These are referred to as structural and cognitive social capital respectively (Bain & Hicks, 1998). Structural social capital can refer to linkages among people who are similar to each other,

such as between people of the same ethnicity, as well as people belonging to more heterogeneous groups, such as in credit unions.

It is extremely important to pay attention to the different components of social capital as they can operate in very different, even opposing ways. When different components are combined in a single measure then it is difficult to assess the true impact of social capital as well as the specific factors influencing outcomes of interest.

Positive and Negative Ramifications of Social capital

There is a lot of evidence that eulogizes the positive effects of social capital. Its primary proponent, Putnam sees social capital as the “bonds of community that in myriad ways enrich our lives” (Putnam, 2001, p. xv). According to Putnam (1993, 2000) societies with high levels of interpersonal trust, prosocial norms, and interpersonal networks that emphasize reciprocity and civic participation are more likely to experience positive economic, political, and social development than those lacking these characteristics. Such connections among people have been associated with community development (for instance, Saegert, Thompson, & Warren, 2001), with better population health (for instance, Kawachi, Kennedy, Lochner et al. 1997; Kawachi, Kennedy, & Glass, 1999; Veenstra, 2000), youth and child development (Sampson, Raudenbush, & Earls, 1997; Drukker, Kaplan, Feron, & Van Os, 2003) and health behaviors among others (Story, 2014). The next section discusses the different mechanisms through which social capital operates to impact health outcomes positively.

However, Portes (1998) has warned against adopting an uncritical view of the consequences associated with social capital. He identifies four negative consequences of

social capital: exclusion of outsiders, excess claims on group members, restrictions on individual freedoms, and downward leveling norms. The process of building social capital through participation in groups by its very nature is exclusionary - if groups are formed on the basis of shared identities then it necessarily excludes those with different norms and identities. Businesses in New York, construction to diamond trade, have benefitted from the bounded solidarity and trust found in the ethnic group that control these businesses. However, economic advancement of certain groups comes at the cost of exclusion of out-of-group members (Portes, 1998). Social capital can also work at excluding people that do not fit in such as the minority or the most disadvantaged (Dominguez & Watkins, 2003).

In Bourdieu's work, social capital emerges from, and is structured by, other forms of capital, particularly economic capital (Bourdieu, 1986). Social capital can be used to reinforce the prestige and power of affluent social groups, which in turn can serve to segregate groups from each other, and reinforce relative positions within social hierarchies (Bourdieu, 1979). Hence, social capital can act as a tool to further privilege certain classes.

Secondly, strong ties with group members might impose excessive demands to provide support to others. Bonding social capital, especially in deprived communities, has been shown be associated with greater mental and physical distress (Mitchell & LaGory, 2002; Ziersch & Baum, 2004; Caughy, O'Campo, & Muntaner, 2003). Stronger bonding ties may involve higher expectations to assist others in need, and hence higher levels of financial and mental strain. In the same studies however, bridging ties i.e. being

connected with individuals with social ties outside of one's immediate social milieu was associated with better health.

Thirdly, even though social capital can increase cohesion, it can enforce traditional norms that impede the adoption of modern behaviors or autonomy. Social capital can be developed in ways that restrict freedoms. In India, caste and religious groups can enforce majoritarian rules of conduct that can go against more progressive modes of thought and action. For instance, caste *panchayats*³ and Hindu groups, such as *Rashtriya Swayamsevak Sangh* (RSS), have been antagonistic to the cause of inter-caste and inter-religious marriages and have increasingly penalized the dissenters in their communities (Kaur, 2010; Dhar, 2013). There can be significant pressures in a community to adhere to socially accepted norms despite desiring otherwise (Caldwell & Caldwell, 1987; Paek, Lee, Salmon et al., 2008).

Lastly, gangs and mafia families can also produce social integration and access to resources but association with them can thwart upward social mobility as well as exert significant pressure to conform to group norms (Portes & Landolt, 1996).

The Linkages between Social Capital and Health

The evidence on the positive association between social capital and physical and self-rated health has been overwhelming (Subramanian, Kim, & Kawachi, 2002; Kawachi, Kennedy, & Glass, 1999; Lomas, 1998). However, there is little research that provides evidence on the specific mechanisms through which social capital impacts health outcomes. Several plausible pathways are discussed in the literature by which social capital is hypothesized to influence individual health.

³ Described in greater detail in Chapter 4.

These include health promotion through rapid diffusion of health information, increased likelihood that healthy norms or behaviors are adopted, social control over deviant health-related behavior (collective efficacy), increased access to local services and amenities, and psychosocial processes such as affective support, self-esteem and mutual respect (Kawachi, Kennedy & Wilkinson, 1999; Sheffler & Brown, 2008).

Kawachi (1999) argues that mechanisms linking social capital with health may vary at the level of aggregation at which social capital is conceptualized and measured. He theorizes that social capital at the neighborhood level operates via processes of informal social control, maintenance of healthy norms, and the provision of various forms of social support. According to Putnam, Leonardi & Nanetti (1993), social capital impacts government functioning, which in turn, can lead to better functioning health systems and local institutions. They show that low stocks of social capital, defined as civic engagement, predicted poorer government performance. Hence, social capital can have a positive effect on community health.

The role of voluntary organizations in generating social capital at the neighborhood level is well established (Putnam, 2001). Neighborhood organizations enable formal, collectively organized, activity of the residents' for addressing neighborhood issues (Putnam, 2001; Saegert, Winkel, & Swartz, 2002). According to Carpiano (2006), community participation can be hypothesized to be essential for health in several ways. First, these organizations can work towards improving the quality of life in the community, whether bringing resources into the community via bridging ties or via improving cohesion through bonding ties

(Saegert, Winkel, & Swartz, 2002). Second, membership in such groups provides social support that individuals can draw upon to cope with daily problems. Dominguez and Watkins (2003) find that social service organizations in neighborhoods can serve to bolster women's social support networks as they provide relationships that are less stressful and burdensome in terms of reciprocity. These networks also serve as social mobility bridges providing access to quality resources connecting low-income mothers with different strategies and tools to cope with problems. A high degree of community participation may also help foster a psychological sense of community as well as a sense of community empowerment from which all residents can benefit. It can facilitate community self-help, allowing communities to bond together to solve collective problems (Kawachi, 2004).

Sampson and colleagues (1997) have discussed the importance of collective efficacy, which refers to the global willingness of residents to intervene on behalf of the common good. According to the theory of collective efficacy, the willingness of local residents to intervene depends on the presence of mutual trust and solidarity among neighbors. Active neighborhood organizations can help develop solidarity and trust that is instrumental in the formation of collective efficacy. According to Grootaert (1997), local associations impact economic outcomes using three mechanisms: the sharing of information among association members, coordination of activities and reduction of opportunistic behavior, and the facilitation of collective decision-making. Voluntary organizations can operate through similar routes to influence health outcomes within a community.

Conclusion

Social capital theory and literature has been criticized for its lack of conceptual clarity. The term social capital has hence been criticized as being vague and indiscriminate (Woolcock, 1998; Portes, 1998; Macinko & Starfield, 2001) because, as shown above, it has been used to refer to a vast array of different social characteristics like interpersonal trust, civic participation, social cohesion, and collective efficacy (Macinko & Starfield, 2001). The variability of its definition and use has been criticized because the concept seems to have lost heuristic value and can mean so many things (Macinko & Starfield, 2001; Fine, 1999; Portes, 1998; Woolcock, 1998).

Since there exists a lack of consistency regarding the definition of social capital, there exists a lack of clarity on how the concept(s) are measured. For instance, a variety of constructs and labels are used to refer to neighborhood social capital such as social support, social resources, social cohesion, informal social control among others. Associated with the measures of neighborhood are issues of aggregation (these are discussed in greater detail in chapter 4). For others, social capital appears to be a repackaging of what health promoters and community organizers have been doing for a long time (Labonte, 1999).

The work on social capital has also been criticized as it largely ignores other structural inequalities embedded in social structures. A single-minded focus on social capital can obscure the other kinds of inequalities that disadvantage subordinate groups. Muntaner, Lynch, and Smith (2001) have argued that the use of social capital in public health research obscures the structural inequalities of class, race, and gender as those are

the main social factors that impact health. Similarly, Muntaner and Lynch (2002) have criticized Putnam's bowling alone as it appears oblivious to the economic and political inequalities between the haves and the have nots while studying the lack of trust and civic engagement.

Additionally, often the studies of social capital do not acknowledge the endogeneity present in their results (Portes, 1998). It is often the case that areas that are more civic, developed and better governed – are also more likely to have social capital and are also more likely to enjoy positive outcomes such as economic development, health and lower crime. Social capital might be capturing a different construct such as better governance, which is then associated with better population health.

Most of these are valid criticisms of social capital literature and in my dissertation I try to address some of these conceptual inadequacies prevalent in current body of work. Firstly, I focus on a well-established indicator of social capital i.e. voluntary associations, household connections with associations as well as their presence in the neighborhood, as providing social capital. The benefits emanating from these organizations are viewed as the consequence of social capital. These organizations provide a basis of interaction, provide bonding and bridging ties, enable neighborhood residents to organize themselves for collective action and are able to facilitate solidarity and norms of reciprocity. Secondly, the social capital measures used have been established as reliable and valid indicators of social capital in previous work such as in the Young Lives Study (Harpham, de Silva, Jones & Garlick, 2006).

I have also tried to address the role of structural inequalities in child health (chapter VII). A comprehensive study of social capital should assess its relationship with

the outcome of interest in conjunction with the broader structural forces that might influence the presence and development of social capital, the outcome as well as the relationship between the two.

In this review, I have presented the key distinctions in social capital literature that are relevant to my dissertation. In the following chapter, I present the conceptual framework and the research design, which utilizes these distinctions.

CHAPTER III: CONCEPTUAL FRAMEWORKS AND RESEARCH QUESTIONS

Conceptual Map for Chapter V and its description

The first objective of the dissertation is to examine whether social capital, and its different forms, is associated with child undernutrition in India. It further explores if two kinds of social capital, namely development (bridging) associations and religious or caste based (bonding) associations are differentially related to nutritional outcomes of children. The conceptual map (*Figure 3.1*) shows that development social capital is expected to be positively associated with reduced underweight and religious or caste based social capital is expected to have a negative association. The broken line indicates the negative relationship between religious or caste based social capital and nutrition and the solid line is indicative of the positive relationship between bridging social capital and nutrition.

As described in the preceding chapter, social organizations can be seen as resources for the entire community, whose benefits can be shared by all residents and not just by participating members (Coleman, 1990; Putnam, 2000; Kawachi & Berkman, 2000). Thus, social capital is hypothesized to be independently associated with undernutrition at *both* the village and household levels. Hence, the impact of village based social capital is assessed at both these levels. The grey ovals indicate development and religious or caste based social capital at the village level. These are connected to social capital at the household level as well as the outcome. The map represents a multilevel framework with social capital operating at both levels –village and household and each having an independent impact on child nutrition.

Research Questions: Types of social capital

The first question pertains to how the two kinds of social capital, namely development associations and religious or caste-based associations, are differentially related to nutritional outcomes of children. Association with development social capital is hypothesized to have a negative association with child underweight after controlling for relevant covariates. Religious or caste based social capital is hypothesized to have a positive association with the dependent variable.

The second objective pertains to testing whether social capital has an impact at the household level, or the village level, or both. Social capital can have an impact at the community level, over and above that of household social capital and household and community socio-economic status. It is also possible that the impact of social capital pertains only to the households' connected to these organizations and hence does not have a significant association at the community level once household social capital is held under control.

The research design entails examining whether each type of social capital is associated with child health outcomes at each level. Village-level social capital predictors are expected to be independently associated with child malnutrition, net of community socioeconomic status. Household social capital is expected to be associated with malnutrition, net of village levels of social capital and household and community level controls.

Thirdly, this analysis would test who benefits more from village-level social capital. Does village-level social capital largely benefit those households participating in these civic organizations more, or do the benefits reach all those who reside in areas with

these organizations equally? The test here would calculate an interaction between the presence of social capital at the village level and the presence of social capital at the household level.

Conceptual Map for Chapter VI and its description

This first conceptual (*Figure 3.1*) showed the linkage between social capital and child nutritional status and distinguishes between two types of social capital and how they might operate at two levels. The second conceptual map (*Figure 3.2*) highlights the different mechanisms through which social capital impacts nutrition among children in India. Development social capital can positively impact the nutritional status of children in distinct ways – it can increase knowledge regarding health and nutrition such as the importance of colostrum feed, nutritional intake during pregnancy and treatment of diarrhea. It may also lead to greater empowerment of women through direct or indirect participation in savings and self-help groups, where they may attain greater economic independence.

Greater knowledge and empowerment of women may impact the more proximal determinants of child nutrition. These proximate determinants of child nutrition include practice of healthy behaviors, such as, hand washing and exclusive breastfeeding, greater health seeking behavior during and after pregnancy, and reduced fertility and practice of spacing. Adoption of sanitary practices, such as hand washing, may make a significant impact on the spread of infections and fecal contamination and reduce contagion, which in turn is associated with nutrient loss and malnutrition among children. The practice of such behaviors could be a result of increased information and support gained through

participation in development organizations.

Additionally, more knowledge and empowerment of women can lead to greater use of health services during pregnancy leading to pre- and post- natal care, such as iron-folic acid consumption, leading to better nutritional status of children. Lastly, reduced fertility and increased spacing can lead to better health outcomes of children. Repeated and frequent child bearing with short intervals is associated with poorer birth outcomes. Increased knowledge, exposure to modern ideas and empowerment through exposure to development organizations and their participants may lead to reduced fertility.

On the other hand, religious or caste-based associations are hypothesized to reinforce Indian patriarchal norms restricting maternal autonomy. They may also inhibit the spread of useful information regarding nutrition, health and hygiene by promoting unhelpful religious beliefs regarding childcare and feeding practices of children and pregnant women. Therefore, a household's association with traditional social capital may be regressive, leading to lower knowledge regarding health, hygiene and high fertility and reduced use of modern health care services.

Development social capital may not only benefit the households directly linked to the development organizations. The presences of these organizations may function to increase the collective efficacy of the whole community. It can also act as an overseer for governmental welfare programs or may approach government offices to demand more services, rectify existing ones or organize residents of a community to take action for these programs. Therefore, the impact of structured social capital may also be indirect, leading to better provision of governmental services to the entire community, regardless of the particular ties of each individual household.

In the conceptual map, development social capital is conceptualized as benefitting the village infrastructure, such as, improved medical facilities, and a more effective government nutrition supplementation program called the integrated child development scheme (ICDS). This improved infrastructure may influence the extent to which all residents of a community are able to use and benefit from these services. For instance, the provision and quality of health services in a region can determine the extent to which residents use the service. Thus, social capital may have positive externalities for the entire community.

Research Questions: Mechanisms of Social Capital Benefits.

In this chapter, a number of mechanisms are tested through which social capital can impact childhood nutrition. I hypothesize that being connected to development organizations leads to greater acquisition of health knowledge among mothers, and that more health knowledge is associated with better nutritional outcomes for children independently of social capital. Secondly, household social capital is hypothesized to be associated with mothers' greater decision-making autonomy, freer mobility, and less extensive veiling (purdah or pallu); these, in turn, will be associated with favorable child health outcomes. Thirdly, social capital is expected to be associated with the practice of better health behaviors, such as water treatment and hand-washing, which should have a positive impact on the nutritional status of the child. Fourthly, household social capital may lead to greater use of health services such as prenatal and postnatal care, which is expected to be associated with better nutritional outcomes for children. Lastly, social capital is hypothesized to reduce fertility, so that greater spacing between births may be

associated with favorable anthropometric outcomes. At the contextual level, development social capital is hypothesized to impact village infrastructure, which is associated with reduced underweight among children.

Conceptual Map for Chapter VII and its description

The influence of social capital may depend on the larger normative and economic context. In resource-deprived regions, where access to health services is limited, people are less educated, and infrastructure is weak, social capital may make a significantly greater difference to child health. Similarly, social capital may have a more limited impact in villages that are developed, with high stock of education, infrastructure, and health amenities, so that the resources provided by social capital may be redundant. In these developed villages, social capital may not prove to be particularly helpful, as those communities may not need the resources provided by social organizations because these health resources are so readily available that everybody has easy access to them.

On the other hand, social capital may fail to show a significant impact in communities with meager resources; the provision of information and contacts may prove to be inadequate if basic systems are not in place. With adequate infrastructure in place, social capital can be effective in making demand side adjustments.

Hence, social capital can be hypothesized to either complement development or act as its substitute. The conceptual map shows that social capital can either operate as a complement or a substitute to social capital. In the conceptual map (*Figure 3.3*), the arrow from social capital to child undernutrition is intersected with an arrow from village development; this indicates that village development can moderate the relationship

between social capital and child health at the village and the household level.

Research questions: Interactions with other forms of capital.

Does the impact of community social capital vary by the level of development in a village? Does the impact of household based social capital vary by the level of development in a village? Development of the region may influence whether social capital exerts a significant influence on childhood nutrition. The research design entails examining whether development moderates the relationship between bridging and bonding social capital and child underweight at the village and the household level.

Dissertation Conceptual Map

This map (*Figure 3.3*) pulls together the conceptual framework for the entire dissertation. It integrates the key elements of the three maps described above. It shows the linkage between social capital and child nutritional status and distinguishes between two types of social capital and how they might operate at two levels. It shows that development social capital and religious or caste based social capital have a different relationship with undernutrition. The map also depicts social capital to operate at the contextual (village) level as well as the household level. Contextual social capital is hypothesized to be directly associated with nutritional outcomes.

This map also highlights the different mechanisms through which social capital impacts nutrition among children in India. Development social capital can positively impact nutritional status of children in distinct ways – by increasing health knowledge, empowerment of the mother, practice of healthy behaviors, health service utilization and

reduced fertility. Religious or caste based social capital is hypothesized to have a negative association with these mechanisms as such associations may strengthen patriarchal norms and restrict maternal autonomy, reinforce traditional ideas about health and medicine, and discourage the use of modern health facilities. A broken line indicates this negative relationship.

In the conceptual map, development social capital is conceptualized as benefitting the village infrastructure, such as, water, medical infrastructure, and integrated child development scheme. Social capital may provide this advantage to all the residents of the community and not just its participating members.

The conceptual map also shows three sets of controls – village, household and child characteristics. The village level controls include the local development index and percent of women literate in the village. The second set of controls includes the socioeconomic status of the household, parental education and employment among others. The last set of controls includes child characteristics such as her age and sex.

The full conceptual map also shows that regional development moderates the relationship between contextual social capital at the village level and undernutrition. This is represented through an arrow that intersects the line connecting village social capital with childhood malnutrition. Similarly, the map also shows that household based social capital effect is moderated by regional development.

UNICEF's Conceptual Framework

In 1998, UNICEF developed a conceptual framework to highlight the multifactorial causality of undernutrition. It serves as a tool to identify the varied causes

of malnutrition and develop effective interventions (*Figure 3.4*). In this framework, malnutrition is viewed as a manifestation of a complex problem that can be analyzed in terms of immediate, underlying and basic causes. The immediate causes are inadequate dietary intake and infectious disease, and these interact with each other to create a cycle of illness and deteriorating nutritional status.

The immediate causes are influenced by the underlying causes - household food insecurity, inadequate maternal and childcare, and inadequate health services and health environment. Optimal nutritional status results when children have access to affordable, diverse, nutrient-rich food; appropriate maternal and child-care practices; adequate health services; and a healthy environment including safe water, sanitation and hygienic practices. These three factors overlap with each other suggesting a complex interrelationship between these factors (Pelletier, 2002). For instance, it is hard for mothers to provide adequate care during illnesses if there exist no medical facilities in the area. The underlying causes operate at the household, community and district levels and are affected by broader social, economic and political forces.

The basic causes influence the direct and underlying causes of child malnutrition and include formal and non-formal institutions, political and ideological superstructure, economic structure and potential resources. More refined versions of the framework have further categorized potential resources into economic, human, and social capital. The relative importance of these factors can differ across regions.

The UNICEF framework provides a broad and comprehensive framework that can be applied to diverse settings. It incorporates both biological and socioeconomic causes of malnutrition at several levels. Additionally, it specifies the distinct levels at which the

different causes of malnutrition are expected to operate. This dissertation builds on the basic framework and expands it to include specific resources, namely social capital, as affecting underlying determinants of care (Smith & Haddad, 2000; Engle, Menon, & Haddad, 1999).

The conceptual map for the dissertation incorporates key determinants of malnutrition as outlined by the UNICEF framework (*Figure 3.3*). It seeks to understand if and how social capital impacts nutritional status of children in India. Social capital according to the UNICEF framework would be viewed as a basic cause of malnutrition and hence affecting the underlying determinants of malnutrition. The underlying determinants of child nutrition that are hypothesized to be impacted by social capital include resources of care for mother and children and include greater health knowledge, maternal empowerment, and practice of healthy behaviors, such as, hand washing and exclusive breastfeeding at the level of the household. Additionally, social capital is hypothesized to impact the health environment through greater provision of healthcare facilities. Lastly, it may also improve household food security by making food transfer programs more effective. The mechanisms overlap with the underlying resources of care for mother and children in the UNICEF framework.

CHAPTER IV: DATA AND METHODS

In the previous chapter, I presented the conceptual map and research questions. In this chapter, I discuss the data source, the dependent, independent and control variables, and the research methods used in the analyses undertaken in the dissertation.

Data

The India Human Development Survey (IHDS) is a nationally representative face-to-face survey conducted in 41,554 households (Desai et al., 2008). The households are spread across 33 states and union territories, 384 districts, 1,503 villages and 971 urban blocks in 276 towns and cities. It covers all the states and union territories of India, with the exception of Andaman, Nicobar, and Lakshadweep islands. Villages and urban blocks (comprising of 150–200 households) formed the primary sampling unit (PSU) from which the households were selected. The sampling procedure was aimed at ensuring a nationally representative sample (see Desai et al. 2010:214-216 for detailed information on sampling). Urban and rural PSUs were selected using a different design. The rural sample contains about half the households that were interviewed initially by National Council of Applied Economic Research (NCAER) in 1993–4 in a survey titled Human Development Profile of India (HDPI), and the other half of the sample was drawn from both districts surveyed in HDPI as well as from districts that were not. The fieldwork was carried out from September 2004 to August 2005 under the supervision of the NCAER, New Delhi. The questionnaires were translated into 13 Indian languages and were administered by pairs of local interviewers; women respondents were interviewed by women interviewers whenever possible.

This dissertation uses only secondary analysis of publicly available data. The data do not contain any information, which can identify the individuals. The original survey received IRB approval at the University of Maryland in the United States and at NCAER in India.

The IHDS household questionnaire asked a knowledgeable informant, typically the male head of the household, about the socioeconomic condition of the household, its level of social capital as measured by association memberships, and employment and education histories of all household members. An interview with an ever-married woman, in the age group of 15-49 years asked about her health, medical care utilization, her reproductive history, and information about her children's health. Anthropometric data were collected for children under the age of 5 years, children between the ages of 8-11 and women in the reproductive age group.

The IHDS developed separate questionnaires to measure village characteristics of 1,454 villages through interviews with key informants, such as village officials and elders. Even though IHDS surveyed 1,503 villages, there were 1,454 completed village questionnaires, as 49 (3.3 per cent) of them were not completed. The village questionnaires focus on a range of topics, including connectivity via road, rail, telephone; availability of electricity, public services such as schools, health care and water – these provide data on the level of development of the village. Most importantly, they provide information on the community based organizations that work in the area. The IHDS is unique in having collected such detailed community level data; this allows us to model community social capital, hierarchically together with household-level social capital. It also allows us to control for relevant community level factors.

Sample

The survey collected health histories for the last-birth and the next to last birth of the ever-married women interviewed. There are a total of 10,508 children under the age of five who have complete data on anthropometry. This analysis is limited to rural India, as it models village level contextual factors sourced from the village questionnaire. Parallel information is not available for urban areas. Hence, the sample comprises of 6,120 children for this rural analysis.

Sample weights

To make the sample representative of the Indian population, sampling weights made available by IHDS have been included in the analysis. These weights however have been adjusted to represent eligible women that were not interviewed in households. This strategy makes joint families adequately represented in the sample.

The Dependent Variable

Anthropometric indicators for children are typically based on age, height and weight. Three standard indicators are ‘height-for-age’, ‘weight-for-height’, and ‘weight-for-age’. Low height-for-age is often referred to as ‘stunting’, low weight-for-height as ‘wasting’, and low weight-for-age as ‘underweight’.

Underweight or ‘weight- for-age’ is seen as a comprehensive indicator of malnutrition, which captures stunting (a long term indicator of nutritional deprivation) as well as wasting (indicator of short-term nutritional status): both stunted and wasted

children are likely to fall in the ‘underweight’ category. It is hence viewed as a ‘summary’ indicator for child malnutrition (Deaton & Drèze, 2009). Some argue that underweight may not be a sufficient predictor of undernutrition and a more comprehensive indicator capturing all forms of undernutrition ought to be used (Nandy, Irving, Gordon, Subramanian, & Smith, 2005). However most adverse health consequences, mortality and morbidity, are associated with underweight (Nandy et al., 2005; Fishman et al., 2004). An underweight child is one that has a ‘weight-for-age’ z -score that is at least 2 standard deviations (SD) below the median of the World Health Organization (WHO) Child Growth Standards.

WHO has made available a macro called *igrowup* and accompanying data that converts the raw anthropometry measures into z -scores. The macro takes into account sex, age (measured in IHDS by difference in date of birth and date of interview), height in centimeters, and weight in kilograms (precise to 100 grams). Z -scores refer to how far and in what direction measures deviate from the median of the WHO International Reference Standard.

WHO Child Growth Standards describe how healthy children should grow in optimal circumstances. These standards are based on the WHO Multicentre Growth Reference Study of approximately 8500 breastfed infants and appropriately fed children raised in healthy environments across widely diverse ethnic backgrounds and cultural settings (Brazil, Ghana, India, Norway, Oman and the USA). Their mothers do not smoke, and the children are nourished with recommended feeding practices (exclusive breastfeeding for the first 6 months and appropriate complementary feeding from 6 to 23 months) and measured in a standardized way. The Growth Reference Study was

undertaken between 1997 and 2003, to generate new growth curves for assessing the growth and development of infants and young children around the world.

According to WHO, these standards can be used anywhere in the world since the study showed that children everywhere grow in similar patterns when their nutrition, health, and care needs are met. The effect of ethnic differences on the growth of infants and young children in populations is small compared with the effects of the environment. There may be some ethnic differences among groups, just as there are genetic differences among individuals, but for practical purposes they are not considered large enough to invalidate the general use of the WHO growth standards population as a standard in all populations (WHO, 2006).

Figure 1 shows the distribution of ‘weight-for-age’ z-scores in the IHDS data. The underweight statistics from IHDS (2004-05) are comparable to that from the National Family and Health Survey (2005).⁴ The national prevalence rate of underweight in the NFHS is 43% whereas it 45% in the IHDS; for rural India the prevalence is 46% in NFHS and 48% in the IHDS.

----- Figure 1 about here-----

The WHO Growth Standard Controversy

The use of these growth curves has led to an intense debate recently questioning the validity of this method for assessing child malnutrition in India. Panagariya (2013) argues that the problem with current methodology is “the use of common height and weight standards around the world to determine malnourishment, regardless of differences that may arise from genetic, environmental, cultural, and geographical

⁴ The National Family and Health Survey is the Demographic and Health Survey for India.

factors”. Even though he mentions environmental, cultural, and geographical factors, he primarily underscores the role of genetics in explaining these differences. According to him, the WHO ignores genetic factors when recommending globally uniform height and weight cut-off points against which all children are compared. Moreover, he believes that the sample selected by them to create these growth charts is excessively “sanitized” as it excludes those that are premature, sick or both.

There are many reasons why Panagariya’s arguments are conceptually inadequate. He frames his argument in a comparative context by comparing maternal and child health indicators across Sub-Saharan Africa and India. He finds that India performs better than Sub-Saharan Africa on most indicators except for child nutrition. He argues that since India is doing better on other health indicators, the malnutrition rates are an anomaly and must be explained by genetics. However, his choice of indicators is limited as most pertain to health services outreach or their consequence, such as infant and maternal mortality, which benefit hugely from greater provision of health services. India does considerably better on these indicators as compared to Sub Saharan countries. Community level health infrastructure determines mortality, but that it is not sufficient to improve nutritional outcomes suggests the role of other factors such as disease environment and health information.

Panagariya (2013) focuses on food elements of child malnutrition but does not acknowledge many of the other underlying determinants of malnutrition. Infectious diseases coupled with inadequate sanitation and drinking water facilities are deleterious for health of children, often resulting in depressed growth, if not death. The disease profiles of the two regions might explain the differences in malnutrition rates across the

two regions. Coffey, Deaton, Drèze et al. (2013) suggests that malaria and HIV/AIDS are more prevalent in Sub-Saharan Africa and influence mortality much more than they influence nutrition. Similar is the case for diarrhea where mortality from diarrhea appears to be much higher in Sub-Saharan Africa than India (Santosham et al., 2010). Indian children are medically treated for such diseases thereby preventing mortality, but it nevertheless takes a toll on their nutritional status. Spears (2013) shows that a large fraction of the difference in average child heights between Africa and India can be explained by the prevalence of open defecation. Children living in impoverished and crowded environments, with poor sanitation and water facilities as well as high contagion are caught in a vicious circle of infectious diseases, impaired immune function and increased susceptibility to be malnourished (Calder & Jackson, 2000).

Given the importance of communicable diseases, it is clear that environmental factors have a role to play in determining the nutritional status of regions. If environmental factors are important, it is more likely that social capital would be important also. It is possible that one of the distinguishing factors between the two regions is the variable presence of social capital in the community, especially if linked to increased health knowledge, health service utilization and healthier behavior.

Defining community

There are many different ways in which community is defined across studies. Many studies are based on administratively defined units (such as school districts) that have often been used as rough proxies for communities or neighborhoods (Sampson, Morenoff, & Gannon-Rowley, 2002). Many researchers using nationally representative

samples have to rely on administrative definitions, sampling clusters, for which standard data are available. This is done for convenience, as there may be little theoretical justification for this selection. They may not necessarily be relevant for the outcome or process under study nor represent perfect operational definitions of neighborhoods (Duncan, Jones, & Moon, 1998; Sampson, Morenoff, & Gannon-Rowley, 2002).

Theoretically, the definition of community can vary by the processes and outcomes under study.

For contextual determinants of child malnutrition, community defined at the village level is pertinent as a lot of processes affecting child development happen at this level. Infection can spread at the village level; public transportation can affect connectivity and improve time to reach school or hospitals; electricity can determine TV viewing and increase agriculture productivity; polluted village water source or unhygienic sanitation facilities can affect the health of the entire village. Social capital, especially when it pertains to interactions within village-based networks, can be better understood at the level of the local community. In this study, the number of village-based organizations is utilized as a measure of contextual social capital. It is important to remember that there isn't a perfect 1-to-1 match between social capital at the village level and aggregated household data. Some households belong to organizations that are not present in the immediate village; and not all organizations reported in the village questionnaire are represented in the household sample. However, the number of organizations operating in the village is nevertheless a good measure of contextual social capital.

Independent Variable: Social Capital

IHDS households were asked nine questions about their family members' participation in social organizations. "Does anybody in the household belong to 1) women's group 2) youth club, sports group, or reading room; 3) trade union, business or professional group; 4) self help group; 5) credit or savings group; 6) religious or social group or festival society; 7) caste association; 8) Development group or NGO; and 9) Agricultural, milk, or other co-operative?" This information is used to construct two continuous variables indicating if the household has associational memberships in development organizations and in religious or caste based groups. These two separate membership variables permit testing whether their impacts might be in opposing directions. Additionally, IHDS does not provide information on the frequency of contact or who in the household is active. Hence, there is no way to model the strength of social contact emanating from these organizations.

In the following section, I present a few examples of the different types of organizations being captured by these questions. This description will not do justice to the sheer variety of organizations that get classified under these categories. These groups could be formed spontaneously, or under the aegis of government, non-governmental or international agencies. These classifications could also have some overlap depending on what aspect of the organization's work the household familiar with, for instance, it is possible that some households report a self-help group as a women's group or as a savings or credit group. Development based organizations are discussed first followed by a description of religious and caste based groups.

Women's groups (Mahila Mandals): Women's groups are typically a group of women

that organize themselves or are organized by an external agency for a cause. Six per cent of the households were participants of women's groups. One of the groups that has grabbed the nation's attention in the last few years has been the '*Gulabi gang*', literally translated to mean the pink gang. The *Gulabi gang* is a group of Indian women vigilantes and activists originally from Bundelkhand, Uttar Pradesh, but now active in different parts of North India. These women come from a highly feudalistic, patriarchal and corrupt part of India and have taken up the cause of equality, domestic violence and corruption. They work in groups and have trained themselves in *laathi* (bamboo sticks) warfare. The gang has attacked men who have been physically abusive towards their wives as well as protested the demands for dowry in their villages. They have also attacked corrupt government officials and ensured proper functioning of government programs such as public distribution of food-grains to people below the poverty line. However, this group is quite unique in its high level of activism.

Other women's groups, such as those set up by *Ekjut* in Jharkhand and Orissa are probably more typical. This non-governmental organization has formed women groups with the explicit agenda of improving maternal and child health outcomes. Working through local teachers, they educate women about pregnancy, childbirth and postnatal care, as well as mobilize them to find solutions for the problems they face. Following a "participatory learning and action cycle" through regular meetings these groups have been shown to have reduced neonatal mortality by 45 per cent through improved hygiene and care in home deliveries (Tripathy et al., 2010).

Youth club, sports group, or reading room: Three per cent of the households had

members who were associated with a youth group. One of the largest network of youth clubs in India have been set up or aided by the *Nehru Yuva Kendra Sangathan* (NYKS), an autonomous organization under Ministry of Youth Affairs and Sports, the Government of India. Youth clubs engage in a number of activities in India such as organizing sport events, cultural activities and creating resources for young people such as libraries. Additionally, they provide a volunteer base for local developmentally oriented activities. For instance, along with UNICEF in Chandrapur district of Maharashtra, the Nehru Yuva Kendra volunteers participated in a birth registration drive to increase the number of births that get registered in their villages (UNICEF, 2004). Youth groups may also get organized without any support from governmental or non-governmental agencies. For instance, a group of students from a neighborhood in Chandigarh have formed a group called PETAL (Protect Environment Tress and Land) that protests deforestation in their locality as well as encourages and undertakes planting of new trees (Bedi, 2013).

Trade union, business or professional group: Three per cent of the rural households are connected to trade unions, business or professional groups in rural areas but this number is higher in urban areas (4.8 per cent). These groups typically entail trade unions, associations of businessmen, traders, teachers, lawyers and other professionals. Trade Unions are often strongly associated with political parties, which provide them with greater clout and bargaining power and political parties also gain a larger support base. It is therefore no surprise that the one of the oldest trade union is a wing of the oldest political party in India, the Indian National Congress. *Indian National Trade Union Congress* (INTUC) was established in 1947 to represent the interests of organized and

unorganized workers in a democratic and peaceful manner. It was in response to the communist *All-India Trade Union Congress* (AITUC), which was viewed as being more aggressive in its approach. Its main aims include obtaining full employment and a living wage, regulating working conditions, provision of benefits such as maternity leave, adequate sick leave, and accident insurance among others for its members. It is affiliated with many industry-based trade unions such as Indian National Municipal and Local Bodies Workers Federation, Indian National Paper Mill Workers Federation and Indian National Plantation Workers Federation. *Centre of Indian Trade Unions* is another large trade unions' federation operating under the aegis of the *Communist Party of India* (Marxist) and having a registered membership base of over 3.2 million workers. Not all trade unions necessarily have political backing as independent groups such as NGOs have also set them up. SEWA (*Self Employed Women's Association*) is a trade union of poor, self-employed women workers. These women are self-employed or part-time workers and hence do not have benefits received by workers in the organized sector. SEWA provides various services such as childcare, legal aid, banking and vocational instruction to its members.

Credit or savings group: These are voluntary, community-based and self-managed groups of 10 to 20 individuals who meet regularly and contribute to their own savings. Seven per cent of the sample participated in a credit or savings group. Members deposit an amount regularly in a common fund to meet emergency needs and to provide collateral free loans to other members. These groups are often set up by private entities such as microfinance institutions (MFI) or banks that guide the members in the due processes of

managing such funds. Savings Groups may also provide important financial services, such as micro loans for small businesses, health and educational loans, and even life insurance, and pension schemes. These groups also have a powerful social impact as they provide socio-economic and emotional support to its members and organize them for collective action (Sanyal, 2009).

Bandhan is one of the most successful microfinance institutions in India and has set up several credit and savings group across the country. Its primary objective is women empowerment and poverty alleviation through the provision of microcredit. As most of the micro-loan borrowers belong to the lower socio-economic stratum, they often lack the necessary knowledge to build and sustain an enterprise. Hence, it also provides its members training in enterprise management and financial literacy. *Bandhan* is operating across 22 States and Union Territories through a network of 2,013 branches, catering to more than 4.8 million deprived women. The loan book stands at nearly 45 billion rupees and the repayment rate is recorded at above 99 per cent.

Self-help group (SHG): These groups are typically small economically homogeneous groups of the rural poor coming together to form savings and credit organizations.

Roughly nine per cent of the households have members connected to self-help groups.

These groups can be set by the government or through private entities such as microfinance institutions or both. For instance, the government of India established the *Swarnajayanti Gram Swarajgar Yojana* in 1999 to provide self-employment to rural families living below the poverty line. These families were organized into SHGs and supported through government subsidy and credit from investment banks. The SHGs are

supported and trained by a variety of organizations such as NGOs, community based organizations and microfinance institutions. The activities of SHGs often include a strong development agenda like health or education of participating members. NGOs like the SEWA have also promoted health related activities through SHGs aimed at income generation and housing development. It is possible that some SHGs do not have a savings or credit group such as *Ekjut* women's groups where support is provided through the group for better delivery care.

Development group or NGO: The voluntary sector includes non-governmental and non-profit organizations. Only 1.5 per cent of the households have associations with development groups or NGOs. There are many development groups that work across India on a wide range of issues. The issues range from health, education, and women empowerment to sustainable development, livelihoods and natural resource management. The sources of funding for NGOs are as varied as the issues they work on. They range from large international donor groups such as the Gates foundation, Indian corporate philanthropists such as Azim Premji, to religious charities, private individuals and trusts.

The Child In Need Institute (CINI) is a broad based non-governmental agency working in West Bengal and Jharkhand with a special emphasis on health care, nutrition, education and service delivery. It is well known in the region. One of their primary areas of work has been a community based life cycle approach to tackle the problem of childhood malnutrition. The approach encompasses action during the three critical stages of the life cycle i.e. pregnancy, the first two years of the child's life and adolescence. CINI-trained health workers visit families regularly to encourage healthy

behaviors and provide support to pregnant women to ensure adequate nutrition during pregnancy, antenatal care and safe delivery. The focus is on improving the capacity of caregivers to provide adequate health and nutrition care at home by bringing about behavioral changes, birth spacing and access to medical care. Frequent visits further ensure exclusive breast-feeding, immunization, nutrition supplementation at six months, and growth monitoring till the child is 2 years of age. Adolescent girls and boys are provided health and nutrition education through trained peer educators.

Agricultural, milk, or other co-operative: About five per cent of the sample is associated with a co-operative. Amul (*Anand Milk Federation Union Limited*) is an internationally renowned Indian dairy cooperative, in the state of Gujarat. It was set up 65 years ago by farmers to fight the exploitative practices of the local trade cartel. Under the guidance of local leaders, the farmers set up their own cooperative in two villages in 1946, which has now expanded to include 16,914 villages in 24 districts. It works through a three-tier structure that links milk cooperative societies at the village level to a milk union at the district level, which is in turn is linked to the State Cooperative Milk Federation. Milk collection is done at the village level through local milk cooperative societies, milk procurement and processing is done at the District Milk Union and product marketing through the state federation. The cooperative also provides additional support to the farmers such as veterinary first aid, artificial insemination services, fodder and fodder seed sales and conducting training on animal husbandry and dairying for all its members. This structure has been replicated all over the country under Operation Flood, a national project of the National Dairy Development Board. This movement has been extremely

successful in generating income and providing gainful employment especially to women.

Religious or social group or festival society: Fifteen per cent of the sample was associated with a religious or social group or festival society. The religious organizations are diverse and consist of temples, mosques, churches, *gurudwaras* (sikh temples), religion-based NGOs, religion-based trusts (*samitis* or *parivars*), religion-based communes (*ashrams*), other religion-based groups (*mandals* and *sabhas*), and religion-based charities (e.g. *madrasas*), committees, and welfare societies. These organizations are varied in their scope and their ideology and can range from right wing fundamentalism, such as *Rashtriya Swayamsevak Sangh* (RSS), to milder and more progressive forms of religious practice such as *Ramakrishna Mission*. A large number of religious groups are often associated with their local place of worship such as temples, mosques, churches, and *gurudwaras*. Although, most religious groups do not have political linkages, the more fundamentalist ones are often linked to political parties.

The RSS is perhaps the most widely known such group. Literally translated to mean national volunteer organization, *Rashtriya Swayamsevak Sangh* is a rightwing, paramilitary, volunteer Hindu nationalist group. This group is strongly associated with the *Bhartiya Janata Party* (BJP) and has provided it with organizational support and strong cadre of workers. They recruit young volunteers via local *shakhas* (branch offices) and cultivate a strong Hindu nationalist fervor among them. This group has strong anti-Muslim sentiments and a history of violence against them. *Ramakrishna Mission*, on the other hand, is also based on Hindu philosophy but is highly secular and peaceful in its approach. They also have a significant social welfare agenda as they run schools, colleges,

hospitals and clinics for rural and tribal populations.

Caste association: The highest memberships among rural households were in caste-based organizations (Sixteen per cent). Caste associations are formal organizations, which often encompass several endogamous castes or *jatis* of similar name and rank. Caste is a defining characteristic of India, dominating the entire gamut of its social and political landscape. Caste organizations are also as varied as religious organizations. Caste *Panchayats* can be particularly virulent - these are caste specific juries that typically set norms or adjudicate in open meetings on disputes related to marriage, dowry, separation, and property that occur in a village. Literally, a *panchayat* (from Sanskrit *pañca* meaning five) consists of five members' usually elderly men from the village. Historically, village *panchayats* have been instrumental in conflict resolution among members of the same caste and continue to do so even with functioning state civil and criminal courts. Caste *panchayats* continue to be relevant for many reasons: state courts consume a great deal of time and resources whereas caste *panchayats* offer quick resolutions using local social and cultural norms; the *panchayats* are embedded in a familiar social milieu whereas state courts are impersonal and daunting and lastly caste *panchayats* offer social capital, builds stronger social ties that can be called upon in the future for personal use (Randeria, 2006).

Randeria has convincingly argued that caste organizations are not vestiges of the past but very much “constitutive feature of modern life”. (Randeria 2006:238). However, even though caste juries have been seen as an alternative to modern state vehicles for adjudication, they have often been highly oppressive and parochial in outlook. Khap

panchayats, caste panchayats of *Jats* (an agrarian caste) in Haryana, Rajasthan and western Uttar Pradesh have gained attention due to the notorious “honor killings” carried out by them. Three types of marriages are considered inappropriate and punished severely: inter-caste marriages (marriage to a person belonging to a separate caste), intra-*gotra* marriages (it is not permissible to marry within one own’s clan or *gotra*, which is separate from caste) and intra-village marriages (Haryana practices “village exogamy”, i.e., people must marry outside the village, even if marrying outside one’s clan or *gotra*). The *panchayats* have in the recent past ordered the killing of couples that have transgressed these boundaries.

There also exist caste organizations that are unobjectionable in character. Generally caste associations have a governing body operating under a constitution and they undertake several activities such as publishing newspapers reporting on the activities of the association and its caste members, organizing events to promote interaction among youth and intra-caste marriages, publishing caste directories, endorsing political candidates and the like. Caste associations are important platforms for mobilization and coordination of collective effort to achieve the goals of their members especially among low caste groups.

Table 4.1 reports the percentage of households connected to each organization. The highest membership in development based groups is in self-help groups (8.5%), then in credit/savings groups (7%) followed by women’s groups (6%). 4.5% of the households are members of cooperatives and a little over 3% each for trade unions and for youth and reading groups. Just 1.5% of the households have members in NGOs or development groups. Of the religious and caste-based organizations, 16% are member of caste groups

and 15% of religious or festival societies.

-----Table 4.1 about here-----

Table 4.2 displays Cramer's V statistic, which is used to measure the strength of association between two nominal variables (Agresti, 2002). It ranges from 0 to 1. The closer it is to 0, the smaller is the association between the two independent variables of interest and a statistic of 1 indicates a perfect relationship between the two. The strongest association is between memberships in religious and caste organizations ($V=.47$) suggesting that those households that have an association with religious organizations are also likely to have linkages with caste organizations.

Moderately strong associations also exist between memberships in women's groups and self-help groups ($V=.34$), self-help groups and credit and saving groups ($V=.31$) and women's groups and credit and saving groups ($V=.24$). This is not surprising because the functions of these groups - women's groups, credit and saving groups and self-help groups - often overlap. It is also possible that some groups, such as credit and saving groups morph into or extend into a new women's group to work on certain causes. Additionally, certain microfinance institutions may organize multiple groups in the same neighborhood such as a self-help group and a credit and savings group which the same household members access. For example, *Bandhan*, an MFI group has started development initiatives on health, education, and unemployment in communities where their saving groups are already operational. Membership in youth groups is moderately associated with membership in women's groups ($V=.25$), trade unions ($V=.22$), self-help

groups ($V=.21$) and cooperatives ($V=.20$). Memberships in self-help groups and trade unions is also strongly associated ($V=.31$).

There is considerable variation in associations between development organizations (women's group; youth club; trade union; self help group; credit or savings group; development group or NGO; and co-operative) given the diversity of organizational types. It ranges from strong (between women's groups and self-help groups, $V=.34$) to weak (between NGOs and cooperatives, $V=.07$). It is somewhat surprising to see that correlations of membership in NGOs with other development organizations are weak, ranging from .09 to .17. This could be because there are only a few NGOs to begin with (1.5%).

-----Table 4.2 about here-----

Figure 4.2 shows the distribution of membership in organizations across households. The distribution appears to be highly skewed as the majority of households (64.3 per cent) are not connected to any organization. About 20 per cent of the households are connected to only one organization, 10 per cent of the households are connected to two organizations and only 3.2 per cent of the households have membership in three or more organizations.

Creation of Independent Variables:

As mentioned earlier, the two measures of social capital are defined on the basis of the *type* of groups or associations that anybody in the household participates in. Households connected to developmentally oriented organizations, namely a women's

group, youth group, trade unions, self help group, credit or savings group, NGOs and agricultural, milk, or other co-operative, are categorized together. Religious and caste based organizational memberships are classified together. Separating these two types of memberships allows testing for whether their impact might be in different directions.

The social capital variables are based on the *number* of groups or associations that the households are connected to. The first variable is a count of the total number of types of memberships that the household has in development organizations and the second is a count of memberships in religious or caste-based organizations. These household social capital variables have been used in earlier research and shown to have the expected differential relationships with immunization (Vikram, Vanneman, & Desai, 2012), mortality (Vikram, Vanneman, & Desai, 2011) and fertility (Vikram, 2012).

The two neighborhood measures of social capital are based on similar counts from the village questionnaire of the kinds of associations that exist in the village. The village questionnaire asked about all the organizations that function in the village. The two village-level variables are also continuous: one indicates the number of development organizations, and the other indicates whether religious or caste-based organizations or both that exist in the village.

Cronbach's alpha and division into bridging and bonding social capital:

As theorized in Chapter two, bridging social capital, especially when it entails participation in development organizations, can potentially improve child health outcomes at existing levels of socio-economic status and service delivery by making more information available about health, local services, as well as ways to access them.

On the other hand, associations with religious or caste-based organizations can be viewed as a form of bonding social capital as it limits individual choice to prior beliefs; demands conformity to religious and caste based norms and may prevent expression of autonomous behavior. Therefore, a household's association with traditional social capital may be regressive, leading to poorer child health outcomes.

Table 1 shows a strong relationship between religious and caste organizations ($V=.47$) suggesting that these organizations are suggestive of an underlying conservative, orthodox dimension. Approximately half of those households who are members of a religious group are also members of a caste group. Additionally, the associations between memberships in religious or caste based groups and development organizations are moderate to low (ranging from .17 to .07) suggesting that the two categories are capturing different constructs. A cross tabulation of religion or caste based social capital with development social capital shows that only 37 per cent of those belonging to a religious or caste association are also linked to development organizations. In total, only 8.3% of the sample is connected to both, bridging and bonding social capital.

----- Table 4.3 about here-----

Cronbach's alpha is a measure of how closely the items are related as a group, that is, of internal consistency. Cronbach's alpha suggests that both indexes have reasonable estimates of reliability: Religious or caste group index has a reliability of .63 and development memberships index has a reliability of .59. Inter-correlation between the two scales is 0.20, which is a non-negative relationship. Even though these two measures

are theorized to capture distinct and even opposing dimensions, they do not appear to be opposites. Overall results, however, show that these are indeed different from each other as they are weakly correlated with each other.

Bivariate relationships between the two measures of social capital and socio-economic variables

Organizational memberships were more common in households with higher standards of living as is evident in Figure 3. Development social capital is strongly correlated with standard of living. The greater the standard of living, the richer people are with respect to development social capital. People on the lower end of the socio-economic distribution have greater access to religious or caste-based social capital as compared to development social capital but are still the most marginalized overall. The richer groups also have greater access to bonding capital but this association is much weaker than that for development social capital.

-----Figure 4.3 about here-----

More educated mothers were more likely to be in households with more social capital, both development organizations and religious or caste organizations (Figure 4.4). 14 per cent of households with uneducated mothers were connected to religious or caste based social capital. Mothers with no education also had limited access to development social capital (17 per cent). Mothers with primary education were better endowed with both types of social capital as compared to those with no education but it was still low

compared to those with higher education. Mothers with senior secondary or higher education have the greatest access to both development social capital (40%) and religious or caste-based groups (25%). However, they have more bridging than bonding ties. The picture is similar to that we see earlier for standard of living – those that are more educated also have greater access to social capital, especially bridging social capital.

-----Figure 4.4 about here-----

Figure 5 describes the distribution of social capital by religion. Christians have disproportionately greater access to both types of social capital. This is not surprising as Christian groups have a very active development agenda and often provide several welfare services in the areas they serve. Muslims have lower access to development social capital but are the better endowed with religious or caste based social capital. 25% of the Muslims are connected to a religious organization. More Hindus are connected to bridging capital than religious or caste based organizations.

-----Figure 4.5 about here-----

The next figure shows the distribution of social capital by caste. Social capital seems to be quite evenly distributed across the various castes. Scheduled castes and Brahmins are the least connected as compared to other castes and other backward classes seem to best endowed. There is a strong socio-economic gradient in the distribution of social capital but not one with respect to caste.

-----Figure 4.6 about here-----

Controls

Child characteristics

Research has shown the disadvantaged position of girls on a range of demographic outcomes in India. In India, girls suffer from neglect and discrimination reflected in higher mortality among girls as well as skewed sex ratios at birth (for instance, Das Gupta, 1987; Das Gupta & Bhatt, 1997). With respect to nutritional outcomes, the evidence is more complicated. Mishra, Roy, and Retherford (2004) find a significant bias against girls in feeding and nutritional status only when the outcome is evaluated by birth order. Like Pande (2003), they find that children with two or more surviving same sex siblings are worse off in terms of nutritional outcomes. However, the harmful effect of having surviving older siblings of the same sex alone is harsher for girls than it is for boys while the protective effect of having only opposite-sex surviving older siblings is weaker for girls than it is for boys. Jayachandran and Pande (2013) find that parents disinvest in higher order pregnancies by reducing food consumption and health care, especially after a son is born.

It is possible that families connected to religious or caste based organizations are more likely to discriminate against daughters because of their traditional and patriarchal outlook. For this analysis, we include two variables to indicate the number of boys and girls born before the focal child. This was also interacted with the gender of the child to get at the differential effects of parity by gender. However, it was not significant and was dropped from the analyses.

Desai and Thorat (2013) have shown that the deficits in nutrition grow after 6 months of age for children in India. We include a variable to indicate the child's age in months as a control and its squared term to test for non-linearity of this relationship.

Maternal Characteristics

Maternal education has long been known to be one of the most critical correlates of child health (Caldwell, 1979; Cleland & Van Ginnekin, 1988), but questions have been raised about the causality of this relationship (Desai & Alva, 1998). Research shows that the impact of maternal education on child's nutritional status declines substantively with the introduction of socioeconomic and geographic controls, but retains statistical influence (Desai & Alva, 1998; Frost, Froste, & Haas, 2005; Waters, Saadah, Surbakti, & Heywood, 2004) indicating that education is positively associated with nutritional outcomes of children. This variable is coded in four categories: illiterate, primary education from the grades one to five, secondary education (grades six to ten), and higher secondary and college (eleven or more years of schooling). As shown above, maternal education is positively associated with social capital at the household level so this is a possibly strong confounding factor for analyzing the social capital – undernutrition relationship.

Mother's age also needs to be controlled, especially in the Indian context, as early marriage leads to early motherhood, which is associated with increased likelihood of low birth-weight infants and consequently child morbidity and mortality (Save the Children, 2012). Her total fertility is *not* directly included as a control as the number of surviving girls and boys born before the last born (index) child are already present in the analysis.

Maternal employment can affect the child's nutritional status in several ways. Earnings can be seen as a form of empowerment so it can lead to increased decision making by women and give her more control of household finances (Kishor, 2000). It can also increase her social capital outside of the family, expose her to knowledge and new norms of behavior. A review of evidence reveals that a clear relationship between women's work and children's nutrition does not exist (Glick, 2002). This is because of the complexity of this relationship, the variability introduced by the diversity in contexts as well as the wide variation in methodological approaches adopted for its study. For this dissertation, I create four mutually exclusive categories. These include women who are employed outside the household, this includes women who exclusively engage in wage and salaried work; women employed within the household, this includes those who engage in household businesses, animal care or work on their own farms; and lastly those women who have held multiple jobs over the last one year. The omitted category comprises of housewives.

Household characteristics

Household characteristics may be important determinants of both social capital and children's nutrition so not controlling for these variables may bias the social capital coefficient.

Father's education is an important determinant of child health (Caldwell, & McDonald, 1982; Pebley, Goldman, & Rodríguez, 1996; Moestu & Huttly, 2008) although it is of less significance than that of the mothers (Glewwe, 1999). This variable is coded in four categories: illiterate, primary education from the grades one to five,

secondary education (grades six to ten), and higher secondary and college (eleven or more years of schooling).

As everywhere, there exists a strong socio-economic gradient in child undernutrition in India (Gwatkin et al., 2007; Subramanyam, Kawachi, Berkman, & Subramanian, 2010; Pathak & Singh, 2011). Poverty leads to household food insecurity, maternal undernutrition, unhealthy environments and inadequate health care among other child health outcomes. All these factors are associated with immediate determinants of childhood undernutrition (UNICEF, 1998), such as low birth weight, inadequate dietary intake of nutrients and frequent infectious diseases (Baqui & Black, 2002). This analysis will include two measures of economic status: household income (logged) which reflects a more volatile annual measure of economic position as well as a more long-term economic status as measured by a count of 30 possible housing amenities and household goods (Filmer & Pritchett, 2001).

I also experimented with a measure of household consumption expenditure, as expenditures may be a better representation than income of the total resources available to household. Total expenditure is often used as the best measure of the household's current economic level as households smooth their consumption in times of crisis. The measure is constructed using monthly consumption or annual expenditures on 47 types of goods designed to cover all household expenditures and consumption. However, the expenditure coefficient lost significance once standard of living was added to the model suggesting that standard of living and consumption might be collinear. In the results reported here, only income and household assets are included.

A control for the amount of agricultural land was also added to see if these

families are more nutritionally secure. Farm income has been seen to have a positive effect on child nutrition indicators, suggesting that growing at least some food within the household has a protective effect on nutrition (Kumar, 1977). Research also shows that farmers continue to practice subsistence farming even while producing cash crops to provide nutritional insurance for their families (von Braun & Kennedy, 1994). Studies have found that agricultural households recovered better nutritionally from poor crop yields than market-oriented agricultural households (Babu, Thirumaran, & Mohanam, 1993).

India is deeply stratified by caste and religion. There is evidence to show that people from lower castes are more likely to experience poorer health outcomes as compared to higher caste groups, albeit with some regional variation (Roy, Kulkarni, & Vaidehi, 2004). Children belonging to Scheduled castes and Scheduled tribes are more likely to be undernourished, experience higher mortality and have lower access to health care as compared to children from higher castes (IIPS & Macro International, 2007). Caste will be controlled in five broad categories: Brahmins, other forward castes, other backward classes, scheduled castes and scheduled tribes.

Even though Muslims are less educated and poorer, on average, than upper caste Hindus, they exhibit a substantial advantage in child survival over high-caste Hindus in India (Bhalotra, Valente, & Van Soest, 2010). This is much like the Mexican paradox in the U.S. where cultural factors are associated with a survival advantage of a certain ethnic group that is counter-intuitive, given their socio-economic disadvantage. However, even though there is an advantage in mortality rates, there is little reported Muslim advantage with respect to malnutrition. Muslim children are worse off than most other religious and

caste groups with respect to under-nutrition in India. They experience the highest rate of stunting and the second highest rate of underweight among scheduled castes and tribes, upper-caste Hindu and others (Deolalikar, 2010). To account for these differences, religion will be divided into three categories: Hindus, Muslims and other religions.

Controls for Village Socio-Economic Status: Well-developed communities may have a greater likelihood of developing social organizations and this development may also independently reduce child undernutrition. Controlling for local socio-economic development should be able to partially correct for this selection. Thus, in evaluating the causal role of village social capital, the analysis controls for local infrastructure development and female literacy.

Village Infrastructure Index

Development is a known determinant of child health. Economic status of the neighborhood, education level and infrastructure, have been shown to impact children's health and nutrition above and beyond the households' standard of living in developing countries (Montgomery & Hewett 2005; Fotso & Kuate-Defo 2005). For instance, Fotso and Kaute-Defo (2005) note that the relative advantage of child nutrition in urban areas in Africa as compared to those in rural areas is entirely due to better community and household socio-economic status (SES) in urban areas such as access to electricity, telephone and clean water. The importance of environmental factors, such as a safe source of drinking water, electricity, and public transportation, for child well-being is well established (Sastry, 1996; Fotso & Kuate-Defo, 2005; Van de Powel et al., 2009).

Road accessibility has been shown to impact child underweight in Nepal (Bishwakarma, 2011). It can be seen as important not just for seeking health services but for better distribution of food and resources. The availability of basic services and foods in deprived areas may be meaningless without adequate transportation systems that link people to these services (Mosley & Chen, 1984). Research shows that both distance to health facility and travel time have a significant impact on health service utilization (Acharya & Cleland, 2000). Improvement in roads has been found to increase agricultural production (Binswanger, Khandker, & Rosenzweig, 1993) and to improve accessibility to health and educational services (Levy, 1996), leading both to increased use of services as well as better staffing of these institutions. These factors could increase food availability as well as treatment of morbidities that directly impact nutritional status of children.

This analysis requires a broad based index that indicates the level of development of the village. The index will be developed by counting access to infrastructure facilities within the village—electricity, paved road, grocery shop, bus stop, landline and mobile access to telephone, post office, police station, bazaar, and bank. The presence of these resources is an indication of the overall development of the village that might have a direct impact on malnutrition.

Female Literacy

Maternal education has long been known to be one of the most critical determinants of child health (Caldwell, 1979; Cleland & van Ginnekin, 1988), but it is not only the education of the child's own mother that matters but also the education of women in the community (Kravdal, 2004; Parashar, 2005). Educated women can diffuse

important information regarding childcare, disease treatment and prevention and even improve accessibility to health services (Das, Das, & Coutino, 2000; Kravdal, 2004; Parashar, 2005). A separate variable indicating the percent women literate in the community will also be included using data from the 2001 census, approximately four years prior to the IHDS sample. District positions on these measures are quite stable across censuses, so the amount of lag makes little difference for the analysis. The variable will be continuous.

Statistical Methods

Development in India has been highly uneven across regions and is affected by the historical, social and cultural milieu of the region. Similarly, the implementation of government programs across states and even across districts is variable. Desai and Vanneman (2005) have suggested that poor households have worse outcomes not only because they are poor but because they are more likely to live in poor villages located in backward districts of less developed states. Therefore, it is reasonable to expect health outcomes to be clustered within communities, districts and states in India. This clustering encourages a focus on contextual as well as household determinants of health.

Secondly, the data structure of IHDS is hierarchically clustered by design, with children clustered within households, households clustered within communities and communities clustered within states. The individual observations in hierarchical data structure are not completely independent, and the results of the analysis can be affected by this clustered nature of the underlying data. Standard regression models have problems dealing with the hierarchical structure because they assume independent and

normally distributed errors with a constant variance. This has consequences in the estimation of results. The estimated coefficients are unbiased but not efficient because the standard errors are downwardly biased which results in misleading significance effects. Hierarchical linear models (HLM) explicitly address the clustered nature of data and model it to give efficient estimates, thereby eliminating the likelihood of type I error (McCoach, 2010).

Hierarchical linear modeling permits simultaneous estimation of the impact of both household (or lower-level) and community (or higher-level) variables on the dependent variable of interest. These models can be conveniently expressed as a system of equations at separate levels (Bryk & Raudenbush, 1992; Goldstein, 1995).

Individual-level social capital measures are often aggregated to give estimates for higher-levels such as neighborhoods or districts. This can be problematic as it may not necessarily be representative of the social interaction at the community level and sampling errors of the aggregate measures are more likely to be correlated with errors from the individual level measures. This leads in many cases to a loss of within-group information that researchers are interested in. Aggregation ignores lower level individual differences making it hard to draw inferences about individual and household relationships. Independent measures of social capital at the contextual level provide an excellent alternative as it enables modeling social capital predictors at multiple levels as well as detecting complex cross-level interaction effects (Duncan et al., 1998). Fortunately, IHDS provides information on social capital at multiple levels—the household and the community.

In this dissertation, we are concerned with the role of both contextual and

household social capital on children's nutritional status. Multilevel analysis helps estimate the relationship between children's nutritional status and individual/household characteristics (fixed parameters) and regional variables (random-intercept parameters). The joint estimation provides a means of assessing the relative contribution of compositional and contextual effects. Compositional effects refer to variation across communities because of the characteristics of people and households within those communities, and contextual factors refer to determinants at higher levels that have an ecological impact, once controls for the household level effects (i.e, for the compositional effects) are added to the equation. Additionally, the technique provides a way of showing how, and for which types of people, contextual effects matter (Duncan et al., 1998).

CHAPTER V: THE IMPACT OF SOCIAL CAPITAL ON CHILDHOOD UNDERNUTRITION IN INDIA

Only a limited number of studies have explored the association between social capital and child health outcomes in developing countries (De Silva & Harpham, 2007; Harpham, De Silva, & Tuan, 2006; Nobles & Frankenberg, 2009; Favara, 2012). Assessing the impact of social capital on child health should be an important priority for study in resource-constrained countries as a disproportionate number of children in deprived regions suffer from ill health and malnutrition in India (IIPS & Macro International, 2007; Roy, Kulkarni, & Vaidehi, 2004). If social capital substitutes or complements human and economic capital, then policy efforts should focus on building social capital along with human and economic capital.

This chapter evaluates the impact of social capital on underweight among children under five in India. A distinction is made between the types of social capital, namely development and religious or caste based social capital conceptualized as forms of bridging and bonding social capital respectively. The first objective will be to examine how these two kinds of social capital are each related to nutritional outcomes of children.

The benefits of social capital have been envisaged as available to all members of a community that have collective or voluntary organizations (Putnam, 2000). Social organizations can be seen as resources for the entire community whose benefits can be shared by all and not just participating members. Hence, this chapter assesses if social capital has a contextual impact, net of household levels of

social capital. That is, the chapter evaluates if benefits of social capital are shared among non-participating members residing in the village.

Social capital can be an important determinant of child nutrition by influencing several of its underlying determinants -- food security through influencing educational attainment, standard of living, and uptake of nutritional programs; resources for care for mother and children by impacting health knowledge and beliefs, nutritional status, autonomy and well-being of the mother among others; and finally, through affecting health services and the local environment such as water supply and sanitation (UNICEF conceptual map 1998). These mechanisms are discussed in greater detail in chapter six and this chapter focuses on the basic relationship first.

The Evidence on Social Capital and Child Health in Developing Countries

The Indonesian Family Life Survey and Young Lives Study (Peru, Ethiopia, Vietnam and the state of Andhra Pradesh in India) have been the primary source of data for studies of social capital and child health in developing countries. Majority of the studies find a weak link between structural social capital of the mother, participation in organizations, and child nutrition (Harpham, De Silva, Jones et al., 2006; Harpham, De Silva, & Tuan, 2006; De Silva & Harpham, 2007; one exception: Sujarwoto & Tampubolon, 2013). In Andhra Pradesh, the relationship is not significant and in Vietnam, it is associated with an increased risk of stunting (Harpham, De Silva, Jones et al., 2006). The results are more consistent for cognitive social capital where trust, social harmony, perceived fairness and sense of belonging are associated with better anthropometric

indicators across countries (De Silva & Harpham, 2007).

Other studies find social capital to be of relevance for certain groups alone (Nobles & Frankenberg, 2009; Favara, 2012). Nobles and Frankenberg (2009) find a positive association between maternal participation in voluntary organizations and child health only for mothers with low education. Kana'iaupuni et al. (2005) find that mothers' social networks are associated with child health especially among economically marginalized families. Informal sharing within a community has also been found to mediate the impact of economic shocks on stunting of South African children (Carter & Maluccio, 2003).

However, none of these studies make the distinction between bridging and bonding social capital. Utilizing the India Human Development Survey (2004-05), Vikram, Vanneman, and Desai (2012, 2012a) find that bridging and bonding social capital impact childhood immunization and infant and child mortality in different ways in India. Story (2014) also makes this important distinction and finds the differential impact of these on childhood immunization using the same data. Since the two kinds of social capital can behave in opposite ways, combining these different forms in a single measure may lead to erroneous conclusions.

Additionally, Story (2014) emphasizes the importance of community social capital and how it might operate differently at the household and neighborhood level. Sujarwoto and Tampubolon (2013) also highlight the importance of activities carried by neighborhood associations such as cooperatives and women's associations in preventing underweight in Indonesia. Hence, evidence and theory directs us towards the explicit modeling of community social capital in analyses of child health. The India Human

Development Survey (2004-05) also provides a comprehensive assessment of social capital in India – different components of social capital as well as their measures at the household and at the village level that make such an analysis possible.

This analysis makes three important distinctions that other studies in developing countries have generally ignored – an emphasis on bridging and bonding social capital, distinction between contextual and household level social capital and lastly and most importantly focusing on the structural component of social capital. Studies pertaining to child health include a large number of variables measuring different components of social capital (for instance, De Silva & Harpham, 2007) that makes it hard to assess the true impact of social capital. Certain “kinds” of social capital can very possibly be antecedents or consequences of other forms of social capital. For instance, involvement in community-based activities can lead to increased social support from other members of the community and vice-versa. Inclusion of all these variables in one analysis can confound the true impact of social capital on child nutrition.

Bridging and Bonding Social Capital

Bonding social capital refers to trusting and co-operative relations between members of a network who have similar social identities (Putnam, 2000; Szreter & Woolcock, 2004). In the Indian context, religious or caste-based social capital can be viewed as a form of bonding social capital as it helps bond members of the community, impact social norms and provide information and support to its members. At the same time, it may limit individual choice to prior beliefs, demand conformity to religious and caste based norms and prevent expression of autonomous behavior.

Association with religious or caste organizations may inhibit the spread of new and useful information regarding nutrition, health and hygiene by promoting counter-productive beliefs regarding childcare and feeding practices of children. For example, there is a belief in many parts of India, rooted in religious texts and traditional practices, that colostrum is harmful for the newborn child so the practice of discarding the first milk, which is very rich in nutrition and antibodies, is rampant (Laroia & Sharma, 2006).

Bonding social capital in the Indian context may lead to lowered use of modern medical care. It is important to note that there is evidence to show that bonding social capital is positively related to overall improved health care access and utilization across countries (Derose & Varda, 2009). However, this role may depend on the norms or beliefs of members within the network (Derose & Varda, 2009; Pescosolido, Wright, Alegria et al., 1998). When the beliefs or experiences of the network are not conducive to health care access, bridging and linking ties may become more important. If ties to religious and caste based groups in India support traditional attitudes and behavior regarding usage of modern health services, we would not see the positive association observed across other countries. Story (2014) demonstrates that bonding social capital is negatively associated with health seeking behaviors, namely antenatal care and childhood immunizations, in India.

We also know that in developing countries, social capital can sometimes impede the adoption of modern behavior by reinforcing traditional attitudes. They may reinforce patriarchal norms restricting maternal autonomy, which is a known contributor of child malnutrition (Shroff et al., 2011). Caldwell and Caldwell (1987) documented for sub-Saharan Africa that social networks and extended family reinforced traditional fertility

norms. Paek and colleagues (2008) found that community-level social capital, an index of generalized trust, perceptions of reciprocity and civic participation, had a negative effect on family planning behaviors in Uganda due to existing norms and values that discouraged the use of family planning methods. Vikram (2012) finds that bonding social capital, defined as linkages to religious and caste based groups in India, is associated with lower contraceptive use and higher desired fertility. In this chapter, resources and information shared via religious and caste-based organizations are theorized to be associated with *worse* child health outcomes.

The second form of social capital, bridging capital, refers to connections between heterogeneous individuals or groups who are ‘more or less equal in terms of their status and power’ (Putnam, 2000). As discussed earlier, involvement in associations and participatory behavior in a community is a form of social capital (Macinko & Starfield, 2001). Since such involvement often utilizes connections between heterogeneous individuals or groups and sharing of information and resources, it can be viewed as a form of bridging social capital. Development organizations, such as non-governmental organizations, cooperatives, saving groups, and self-help groups, can be valuable forms of bridging social capital. These organizations have the potential to connect a large and diverse group of people who may not have interacted on any other platform. These interactions may lead to the acquisition of a variety of resources that are not bound by sectarian concerns. The ethnic identity of people may be of less importance in these interactions as compared to religious and caste based groups. These groups often have a development agenda, which by definition engages its participants in new, more secular and often modern ideas. However, the content of activities carried out within these

organizations are important as long as they are able to engage a diverse, broad based crowd. This interaction may lead to greater sharing of information and resources, greater cohesion in communities and hence, community-based action. In this chapter, resources and information shared via community based development organizations are theorized to be associated with *better* child health outcomes.

Bridging social capital can potentially improve child health outcomes at existing levels of socio-economic status and service delivery by making more information available about health, local services and ways to access them. It may also lead to adoption of healthy norms and behavior within a community such as support for institutionalized care and lower fertility (Manandhar et al., 2004; Vikram, 2012), increased use of formal health services such as immunization (Cassell, Leach, Fairhead, Small, & Mercer, 2006; Steele, Diamond, & Amin, 1996; Story 2014; Vikram, Vanneman, & Desai, 2012) and improved economic outcomes (Lin, 1999), although establishing causality for this relationship is especially difficult (Mouw, 2006).

Maternal associations with community-based organizations have been found to be negatively associated with child stunting (Harpham, De Silva, & Tuan, 2006; Favara, 2012). It is possible that these studies have underestimated the impact of social capital by not differentiating between the types of social capital as they may be operating in opposing directions. However, the positive benefits of being connected to organizations have been seen across countries.

Contextual and Household Based Social Capital

There are disagreements among researchers about the appropriate context to investigate the effects of social capital on health (Macinko & Starfield, 2001; Kawachi, Kim, Coutts et al., 2004). Kawachi and Berkman (2000) have discussed the “nonexcludability” of social capital i.e. the benefits of social capital being available to all members of a community.

From a contextual perspective, the benefits of social capital can be envisaged to be available to all members of a community that have collective or voluntary organizations. For instance, development organizations may function as an overseer for government welfare programs – they may approach government offices to demand more services or rectify existing ones. This would entail a benefit for all residents of a community. Additionally, community organizations can facilitate relationships and trust between service providers and marginalized communities, protecting them from discrimination and improving overall utilization of services (Derose & Varda, 2009). Therefore the impact of structural social capital may also be indirect - leading to better utilization of governmental services regardless of particular ties to each household. In these ways, social capital may have positive externalities for the entire community. At the individual-level, social capital has been studied as providing personal social networks for social support, social influence, new knowledge, and increased access to scarce resources (Macinko & Starfield, 2001; Portes, 1998; Kawachi, Kennedy, & Wilkinson, 1999).

Subramanian, Lochner, and Kawachi (2003) have elucidated on the importance of distinguishing between individual and community-level impacts because they have

important implications for health policy -- If the mechanisms primarily operate at the individual level, then people ought to be targeted but if the benefits accrue to communities, then places or communities should be the focus of intervention.

Research Questions

The first question pertains to how the two kinds of social capital, namely development associations and religious or caste-based associations, are differentially related to nutritional outcomes of children. The second objective pertains to testing whether social capital has an impact at the household level, or the village level, or both.

The research design entails examining whether each type of social capital is associated with child health outcomes at each level. Village-level social capital predictors are expected to be independently associated with child malnutrition, net of community socioeconomic status. Household social capital is expected to be associated with malnutrition, net of village levels of social capital and household and community level controls.

Thirdly, this analysis would test who benefits more from village-level social capital. Does village-level social capital largely benefit those households participating in these civic organizations more, or do the benefits reach all those who reside in areas with these organizations equally? The test here would calculate an interaction between the presence of social capital at the village level and the presence of social capital at the household level.

Data and Methods

Data

This analysis uses the India Human Development Survey that provides measures of both types of social capital, development and religious or caste based, at both the household and community (village) levels.

Independent Variables

I include both types of social capital, namely development and religious or caste based, at the household and community level. These household variables are continuous indicating the number of associational memberships in development organizations and in religious or caste-based groups for each household. The two neighborhood measures of social capital are also continuous variables indicating the number of development organization and the number of religious or caste-based groups present in the village.

This information is indeed unique as mostly all the studies that have examined social capital as a community-level variable measure this through aggregating individual behaviors, attitudes or memberships rather than through community-level measures that do not necessarily rely on individuals (Harpham, Grant, & Thomas, 2002).

Dependent Variable

Underweight or 'weight- for-age' is seen as a comprehensive indicator of malnutrition, which captures stunting (a long term indicator of nutritional deprivation) as well as wasting (indicator of short-term nutritional status): both stunted and wasted children are likely to fall in the 'underweight' category. It is hence viewed as a 'summary'

indicator for child malnutrition (Deaton & Drèze 2009). An underweight child is one that has a 'weight-for-age' z score that is at least 2 standard deviations (SD) below the median for WHO Child Growth Standards.

Controls

Child characteristics

Child level controls include child's sex, child's age in months and its squared term. I also include two variables to indicate the number of boys and girls born before. This is also interacted with the gender of the child to get at the differential effects of parity by gender.

Household level

Maternal controls include maternal education, maternal age and maternal employment. Maternal education is coded in four categories: illiterate, primary education from the grades one to five, upper primary and secondary education (grades six to ten), and any senior secondary and college education (thirteen or more years of schooling). Household level controls include father's education (coded also in four categories as maternal education), standard of living, household income as well as caste and religion.

Caste will be controlled in five broad categories: Brahmins, other forward castes, other backward classes, scheduled castes and scheduled tribes. Religion will be divided into three categories: Hindus, Muslims and other religions.

The square of (logged) household income as well as consumption were included in earlier analyses but removed, as they were not statistically significant, not important

theoretically independent of the other measures of economic position, and potentially introducing collinearity into the models.

Community level

This analysis will utilize the index indicating the level of development of the village. The is a count of infrastructural facilities within the village—electricity, paved road, grocery shop, bus stop, landline and mobile access to telephone, post office, police station, bazaar, and bank. A separate variable indicating percent women literate in the community is derived from the 2001 Indian census, approximately four years prior to the IHDS sample.

Statistical Methods

In this analysis, we are concerned with the role of contextual and household social capital on children's nutritional status, but since it is influenced both by household and village level factors, we would need to control for them. Multilevel analysis helps estimate the relationship between nutritional status and individual/household characteristics (fixed parameters), with regional variables (random-intercept parameters). The joint estimation provides a means of assessing the relative contribution of compositional and contextual effects. Compositional effects refer to the characteristics of people and households explaining the area-level variation on the dependent variable, and contextual factors refer to determinants at higher levels that have an ecological impact, once controls for the household level effects (i.e, for the compositional effects) are added to the equation. Additionally, the technique provides a way of showing how, and for

which types of people, contextual effects matter (Duncan et al., 1998).

At the first level, child nutritional status in household h in community c is modeled as a function of social capital at household-level and other household-level characteristics. We start by including the development (β_{1h}) and religious or caste based social capital indicators (β_{2h}), we will then include a vector of household controls such as standard of living, paternal education, and caste and religion (β_{3h}); child characteristics (β_{4h}) such as age, sex and the number of older brothers and sisters; maternal characteristics such as maternal education, employment and age (β_{5h}). These controls will be centered at the grand mean to gain intercepts that estimate the adjusted grand mean. While child factors might be considered as nested within households, in this analysis only the youngest child born within the last five years of the survey is selected per household and hence there is no need to include an extra level of analysis.

$$\text{Log}[p_{hc}/(1 - p_{hc})] = \beta_{0h} + \beta_{1h} DvptSC_{hc} + \beta_{2h} RelSC_{hc} + \beta_{3h} hhchars_{hc} + \beta_{4h} childchars_{hc} + \beta_{5h} maternalchars_{hc}$$

The dependent variable is a dichotomous variable indicating whether the child is undernourished. It represents the probability that a child in household h and community c is underweight. β_{0h} Refers to the intercept (adjusted nutritional status for a child) in community c .

At the second (village) level, I investigate the effects of contextual social capital, γ_{01} and γ_{02} , on the adjusted nutritional status of the child, β_{0h} i.e. the constant term modeled to randomly vary among communities. We are primarily interested in the effects of social

capital in the community on the adjusted nutritional status of the child, β_{0h} , and in the impact of household social capital, β_{1h} and β_{2h} , after controlling for other characteristics of the community.

$$\beta_0 = \gamma_{00} + \gamma_{01} \square \text{Development social capital}_c + \gamma_{02} \square \text{Religion and caste social capital}_c + \sum \gamma_{0k} \square \mathbf{Z}_{kc} + u_{0c}$$

The intercept γ_{00} refers to the overall mean. The u_{0c} term allows us to model the dependence of observations from the same cluster because u_{0c} is the same for every child within community c (Raudenbush & Bryk 2002). u_{0c} randomly varies across communities and has a mean of 0 and a variance of σ^2_c . γ_{0k} is the slope for all the village level control variables. \mathbf{Z}_{kc} refers to a vector of control variables at the village level such as the village development index and women's literacy.

In the final model, the aim is to examine cross level interactions. The most interesting cross-level effect is interacting household social capital with social capital at the community level. This will determine if the benefits of a community-based organization are shared among all or especially among those households connected to the organization.

$$\text{Log}[p_{hc}/(1 - p_{hc})] = \beta_{0h} + \beta_{1h} \text{DvptSC}_{hc} + \beta_{2h} \text{RelSC}_{hc} + \beta_{3h} \text{hhchars}_{hc} + \beta_{4h} \text{childchars}_{hc} + \beta_{5h}$$

*maternalchars*_{hc}

$$\beta_{0h} = \gamma_{00} + \gamma_{01} \square \text{Development social capital}_c + \gamma_{02} \square \text{Religion and caste social capital}_c + \sum \gamma_{0k} \square \mathbf{Z}_{kc} + u_{0c}$$

$$\beta_{1h} = \gamma_{10} + \gamma_{11} \square \text{Development social capital}_c + \sum \gamma_{1k} \square \mathbf{Z}_{kc} + u_{1c}$$

$$\beta_{2h} = \gamma_{20} + \gamma_{21} + \gamma_{22} \square \text{Religion and caste social capital}_c + \sum \gamma_{2k} \square \mathbf{Z}_{kc} + u_{2c}$$

β_{0h} is the constant term modeled to randomly vary across villages; it might be interpreted as the effect on the average child in the village. In this interaction model, β_{1h} and β_{2h} is allowed to vary randomly across villages, as we test whether the effect of social capital at the village varies by household's possession of social capital.

Calculating models without household or without community-level effects can provide important information about the micro- and macro- processes that determine health outcomes. Models without household level factors provide a kind of “reduced form” macro-level model. When compared to the full model that also includes household characteristics, it explains how much of the macro-level relationships are explained by compositional characteristics of the population and how much are contextual level relationships because of inherently macro-level characteristics.

Methodologically, we achieve the goals of the study through six models. The first, base, model is helpful in measuring how much of total variance is explained by household characteristics and by village characteristics. In this analysis, I include only child level controls, namely child's age, child's age squared, and controls for parity as these can be viewed as biological predictors of underweight. In the second model, I include level 2 variables for community social capital, namely development social capital and religious or caste based social capital. The model will enable us to assess if community social capital is associated with nutritional outcomes of children. In the next model (Model 3), I add community level controls to evaluate if the impact of community level social capital is explained by the socio-economic status of the village measured with the infrastructure development index and the percent of literate women in a community.

In Model 4, household level social capital is added to the equation to test whether the impact of social capital is significant at the community level, at the household level, or both. Model 5 expands Model 4 by adding household level controls to the model to see if household social capital continues to remain significant after the addition of controls for the social and economic position of the household. In the final model (Model 6), a cross level interaction is included to test the conditional effect of community social capital according to household social capital. The focus of the analysis throughout is on how the social capital coefficients change across models.

Results

We start with a baseline model with no covariates except for child characteristics (Model 1), namely the child's sex, age (centered at 3 years), age (centered) squared, and the number of older brothers and sisters. This is the equivalent to a null model and explains how much of the variability in the dependent variables lies between households and communities. When data are dichotomous, such as children's underweight status, within-group variability is defined by the sampling distribution of the data, typically the Bernoulli distribution. When the logistic model is applied, the level-one residuals are assumed to follow the standard logistic distribution, which has a mean of 0 and a variance of $\pi^2/3=3.29$. This variance represents the within-group variance for interclass correlations (ICC) calculations for dichotomous data (Snijders & Bosker, 1999). For Model 1, the intra-class correlation (ICC) is:

$$\begin{aligned} \text{ICC} &= \tau_{00} / (\tau_{00} + 3.29) \\ &= 0.33 / (0.33 + 3.29) = 9.1 \end{aligned}$$

This suggests that 9.1% of the variability in underweight lies between villages.

Of the child characteristics in the model, child's age squared is significant confirming a curvilinear relationship of age with underweight. The inflection point is 39.5 months suggesting that until the child is three and a quarter years old, Indian children become increasingly underweight⁵.

Child's sex is not significantly associated with underweight. The non-significant result for sex of the child is not unexpected as evidence highlights the need to assess the role of gender differentiation by birth order (Jayachandran & Pande, 2013; Mishra, Roy, & Retherford, 2004). I find that having older siblings is harmful for the child. First order births typically receive greater parental attention and may have better nutritional status than higher order births (Behrman 1988). Higher order births may also represent the adverse effects of higher fertility, shorter birth intervals and household poverty. In this analysis, the log odds of being underweight are quite similar for those with older sisters and those with older brothers. Previous research shows that the presence of older sisters is especially deleterious for the well being of girls (Pande, 2003) but this is not evident in our analyses⁶.

The second model includes variables for community social capital, namely development and religious or caste based social capital at level 2. The model helps assess if social capital at the community level is associated with child underweight. Here we

⁵ $Y = b_0 + b_1X + b_2X^2$ where Y is childhood underweight and X is child's age in months. The inflection point is equal to $-b_1/2b_2$. $b_1 = -0.007$, $b_2 = -0.001$. The age was mean centered at age 36 months.

⁶ In other models not reported here, I also include two variables interacting the sex of the child with the number of older brothers and older sisters. The interaction terms were not significant in this analysis and were dropped.

find that development social capital at the village level is associated with 7% lower odds of being underweight ($e^{-0.077} = 0.93$). Religious or caste based social capital is marginally significant in this model and also decreases the odds of being underweight by 12% ($e^{-0.129} = 0.88$, $p < 0.10$). This is contrary to the initial hypothesis that predicted traditional social capital to be associated with higher underweight. However, socio-economic development is argued to be systematically associated with social capital and hence this result could be capturing the positive externalities of local development. In the next model, I introduce controls for local development to assess if the impact of contextual social capital is indeed ecological.

The addition of social capital at the village level reduces the between-village variance by 8.8%. This suggests that part of the reason why outcomes differ across villages is due to the different levels of community social capital across villages. There is little change in child characteristics in this model.

In Model 3, community level controls are added to evaluate if the impact of community level social capital is explained by the socio-economic status of the village. The two measures of socio-economic status - community development index and percent women literate are significant and their effects are in the expected direction. With a one unit increase in the development index, there is a 5% decrease in the odds of being underweight, holding other variables constant ($e^{-0.05} = 0.95$). With one percentage point increase in women literacy at the village level, there is a 0.67% decrease in the odds of children's underweight ($e^{-1.097} = 0.33$). The beneficial association of development social capital and traditional social capital with underweight is no longer significant in this model. This suggests that social capital is highly correlated with overall community

development. This is plausible as voluntary organizations and civic societies are more likely to form in areas where a certain degree of co-operation occurs. This co-operation may lead to better governance resulting in more educated and developed societies. Hence, the presence of social capital could be capturing the overall development effect. The addition of overall development of the village reduces the between-village variance by an additional 6.03%. However, since social capital is highly correlated with local development, it is important to assess the change from the base model. It turns out that local development and social capital at the village level can reduce the between village variance by 14.3%.

This result is stark contrast with Story (2014) that finds a strong contextual impact of social capital in India on a number of health utilization measures. One of the potential reasons could be that Story (2014) does not utilize independent measures of community based social capital that the India Human Development Survey offers but instead relies on an aggregate of the household based measures. His sample is also larger as he includes the study of urban India as well.

In Model 4, household level social capital indicators, development social capital and religious or caste based social capital, are added to the equation. At the household level, development social capital emerges as a significant predictor of underweight. With each additional development organization, the odds of being underweight reduce by 17% ($e^{-0.19} = 0.83$), holding constant other predictors, averaging over the distribution of level-2 random effects. Religious or caste based social capital at the household level is not significant in this model. At the village level, infrastructure index and female literacy remain negatively associated with underweight and the coefficients change only

marginally. As in the earlier model, community social capital variables are not significant. There is little change in child level variables or between village variance. With the addition of household level socio-economic controls in the next model however, the between-village variance in underweight goes down further by 14%.

Model 5 expands Model 4 by adding household level controls to the model to see if social capital continues to remain significant after the addition of controls.

Development social capital at the household level continues to be significant but reduced in magnitude with the addition of controls. The odds of being underweight decrease by 14% with each additional connection to development organizations ($e^{-0.152} = 0.86$). Upon the addition of controls for socio-economic status of the household and parental characteristics, religious or caste-based social capital also becomes a significant predictor of underweight at the household level. When compared with families of the same socioeconomic status, being in a traditional organization actually signals *worse* outcomes for children. As hypothesized, the relationship between underweight and this form of bonding social capital is a positive one ($e^{0.164} = 1.18$). None of the variables are significant at the village level in this model.

Higher standard of living is associated with less underweight and so is education. Compared to children of mothers with no education, the odds of being underweight decrease by 40% ($e^{-0.488} = 0.61$) among those children with primary educated mothers and by 27% ($e^{-0.311} = 0.73$) for those with any secondary education. Senior secondary education and above is not significant in the model. This could be due to other controls for socio-economic status in the model or due to a small sample of college educated women. As compared to children of fathers with no education, the odds of being

underweight decrease by 35% ($e^{-0.435} = 0.65$) for those whose fathers have college education.

Even with all the socio-economic controls, children belonging to scheduled tribes are more disadvantaged as compared to forward caste children but this result is only marginally significant. Children who are Muslims and those that belong to other religions are less likely to be undernourished as compared to equivalent Hindu children. The odds of being underweight are 25% ($e^{-0.293} = 0.75$) lower among Muslim children and 38% ($e^{-0.474} = 0.62$) lower among children of other religions, holding all the other variables constant. This result is not expected, as Muslim children are more likely to be undernourished as compared to Hindu children (Deolalikar, 2010). However, Muslims experience a survival advantage over Hindus (Bhalotra, Valente, & Van Soest, 2010) so it is possible that some advantage persists in underweight as well. This sample is rural and a disproportionate percentage of Muslims reside in urban areas and this might be the reason why these results differ from national estimates.

Age of mother is negatively associated with underweight. This is expected, as younger mothers (within the same cohort) are more likely to have low birth weight children (Hirve & Ganatra, 1994), which in turn is associated with greater morbidity and mortality among children. They are also less likely to be educated and empowered within their households (Sen, Rastogi, & Vanneman, 2014). As compared to women who do not work, those who work outside their homes and are not self-employed are less likely to have underweight children. However, this result is only marginally significant.

Of the child level variables, child's age and age squared remain significant. Only the number of older sisters is positively associated with underweight. This result is in line

with previous research, which finds that the presence of older sisters is problematic particularly for later born girls.

In a model not shown here, cross level interactions between village and household social capital are investigated. From the interaction coefficients in this model, we derive the conditional effect of community social capital according to household social capital. The cross level interactions are not significant suggesting that a family's social capital is equally effective in villages with and without development organizations⁷. That is, belonging to a development organization helps, whether that organization is located in the village or not.

Discussion

Some argue that if social capital is viewed as a form of capital, which can substitute or complement other forms of capital, it may be a particularly advantageous resource within a developing country where human and economic capitals are often found wanting (Kunitz, 2004; Woolcock, 1998). However, it is often the case that social capital is intertwined with development. Portes (1998) has brought to our attention the logical circularity present in discussions pertaining to the benefits of social capital - areas that are more civic, developed and better governed - are more likely to have social capital and are also more likely to enjoy positive outcomes such as economic development, health and lower crime. The positive correlations between social capital and healthier outcomes might be reflective of endogeneity. One-way to address this, although quite imperfectly, is to include a measure of local development in analyses of social capital. In

⁷ The cross-level interactions were not significant and hence are not shown.

this analysis, we find that that the impact of community-level social capital is explained entirely by variables capturing local development. Other studies of neighborhood, state or national level of social capital have also not found significant effects of social capital on health outcomes (Han, 2013; Poortinga, 2006).

However, once the presence of social capital in the village as well as local development is accounted for, personal connections with these organizations may nevertheless bring specific benefits or disadvantages. We find that being connected to bridging ties is especially beneficial to families - households that are connected to development-oriented organizations are less likely to have undernourished children. On the other hand, those households that have ties to religious or caste-based organizations are more likely to have undernourished children. This result has been replicated by other studies in India. Bridging social capital, measured as associations with development organizations, are positively associated with a range of outcomes -- immunization (Vikram, Vanneman, & Desai, 2012; Story 2014), mortality (Vikram, Vanneman, & Desai, 2011), ante-natal and delivery care (Story, 2014), and even lower desired fertility and higher contraception use (Vikram, 2012). Connections with religious and caste-based organizations have the opposite impact, especially pertaining to fertility (Vikram, 2012).

This work on social capital and its effects on underweight is the first step to understanding the relationship between social capital and child health. To deepen this understanding further, it is important to assess the tangible benefits or losses that households are able to derive from these connections. How do they impact thoughts, attitudes and behavior of its members? It is amply clear that the two constructs of social capital capture two very distinct underlying schemas but there is little evidence on how

these actually function. In my next chapter, I explore the pathways through which the two forms of social capital impact underweight among children.

CHAPTER VI: LINKAGES BETWEEN SOCIAL CAPITAL AND MALNUTRITION AMONG CHILDREN IN INDIA

The evidence on the positive association between social capital and health has been convincing (Subramanian, Kim, & Kawachi, 2002; Kawachi, Kennedy, & Glass, 1999; Lomas, 1998). Chapter 5 further supports that conclusion for India. However, there is little research that provides evidence on the specific mechanisms through which social capital impacts health outcomes. Several plausible pathways have been discussed in the literature. These include the more rapid diffusion of health information, increased likelihood that healthy norms or behaviors are adopted, social control over deviant health-related behavior (collective efficacy), increased access to local services and amenities and psychosocial processes such as affective support, self-esteem and mutual respect (Kawachi, Kennedy, & Wilkinson, 1999; Sheffler & Brown, 2008).

At the neighborhood level, the mechanisms include informal social control, maintenance of healthy norms, provision of various forms of social support, better functioning systems due to responsive governments, improved quality of life in the neighborhood, increased resources via bridging ties and improved cohesion through bonding ties (Kawachi, 1999; Putnam et al., 1993; Saegert, Winkel, & Swartz, 2002; Carpiano, 2006).

Even though these mechanisms have been discussed, there is limited empirical evidence of the same. This paucity is partly due to the cross-sectional nature of data that makes it difficult to determine the direction of causality and hence, teasing out the mechanisms. Additionally, there is lack of data that provide

detailed measures of social capital and the pathways through which it operates. Despite the preliminary nature of this evidence, there are strong theoretical reasons to believe that social capital could affect the health of individuals and communities. In this analysis, we use the India Human Development Survey, which is a unique national dataset that provides detailed measures of social capital, the various pathways through which it might operate and a number of health outcomes. Additionally, it provides independent measures of social capital at the household and village level allowing for an assessment of contextual and household mechanisms through which social capital operates at these two levels.

In the following sections, I discuss the different mechanisms through which social capital might be related to children's nutritional status in India (refer to conceptual map 2). Health knowledge, female empowerment, greater use of health services, adoption of healthy behaviors and reduced fertility are the pathways through which household social capital is hypothesized to affect malnutrition. At the village level, social capital is hypothesized to impact the functioning of health related infrastructure such as health services and the national child nutritional program. Evidence on how each of the pathways is linked with child health and undernutrition is also presented.

The results show that bridging social capital operates via improved health knowledge and access to services, primarily health care and nutrition supplementation program. These pathways collectively explain about 20% of the bridging social capital impact. Ties with religious or caste-based groups reinforce traditional fertility ideals and discourage the use of contraception. These pathways are able to explain away entirely the

impact of bonding social capital on child underweight.

Mechanisms

Health Knowledge

One of the primary mechanisms through which social capital may impact health is diffusion of health information. According to Coleman (1995) social relationships contain information potential or the capability to provide its members with information. He argues that information can be gathered relatively easily through relationships that are maintained for other reasons. Development based social capital, a form of bridging social capital, may lead to increased knowledge regarding health and nutrition such as the importance of colostrum feed, nutritional intake during pregnancy, and causes of diseases and modes of transmission. This information helps problematize crucial practices and conditions that would remain unidentified as contributors of malaise and undernutrition among children. Greater information may also enable adoption of healthy norms and behavior, such as hand washing and greater health seeking behavior.

Parents' health and nutrition knowledge has been shown to have a positive association with nutritional status of children (Glewwe, 1999; Block, 2007). The relationship exists independent of maternal education (Webb & Lapping, 2002; Glewwe, 1999). Nutritional knowledge, in particular, has been found to be particularly salubrious for children's nutritional status (Webb & Lapping, 2002; Webb & Block, 2003). One of the most widely cited examples pertain to the World Bank's community nutrition loan to Indonesia in the 1970s which significantly improved the nutritional status of 40 percent of target children through nutrition education alone (Berg, 1987; Andersen, 1994).

Maternal nutrition knowledge has been found to substitute for schooling, particularly at lower levels of income and schooling (Block, 2007).

Empowerment

Community-based programs, such as microfinance self-help groups, saving groups and community based development organizations may directly or indirectly lead to empowerment of women who participate in these organizations. Dominguez and Watkins (2003) find that social service organizations in neighborhoods serve to bolster women's social support networks. These networks also serve as social mobility bridges providing access to quality resources connecting low-income mothers with different strategies and tools to cope with problems. Sanyal (2009) finds that participation in microfinance groups, even in socially restrictive climate of rural West Bengal, stimulated women to undertake group-based collective actions on a range of issues such as domestic violence, provision of public goods and ban on liquor. Participation in microfinance meetings fostered feelings of solidarity and group commitment, which led to an increased involvement in issues that impacted group members and their villages.

Women may attain greater economic independence as well as access to information leading to more autonomous and informed household decision-making (Holvoet, 2005; Lyngdoh, & Pati, 2013). More recent work has found mixed evidence on the impact of microfinance on female empowerment (Banerjee et al., 2013). It is hard to evaluate causality using cross-sectional data because of the endogenous nature of this relationship – those women who are more empowered are more likely to participate in such organizations outside of their homes in the first place.

Research shows that women's decision-making power within households is positively associated with child nutritional status in India (Shroff et al., 2011; Smith, Ramakrishnan, Ndiaye, Haddad, & Martorell, 2003; Coffey, Spears, & Khera, 2013). The low status of women is considered one of the primary determinants of undernutrition across the life cycle of women and their children (UNICEF, 2009). Gender inequality has convincingly been argued to lie at the heart of India's malnutrition problem (Ramalingaswami et al., 1996; Smith et al., 2003). Women's status impacts child nutrition because high-status women have better nutritional status themselves, are better cared for, and provide higher quality care to their children (Smith et al., 2003). More recently, Coffey (2015) finds that India's extremely low levels of pre-pregnancy maternal weight is an important factor in explaining the relatively high levels of child stunting and underweight. Part of the reason for their low weight is women's poor bargaining power in the intra-household allocation of resources (Coffey, Spears, & Khera, 2013). Women are also more likely to allocate marginal resources to their children than are men, but they are less able they are to do so when they have less autonomy and control over those resources (Haddad, Hoddinott, & Alderman, 1997).

Practice of Healthy Behavior

Hygienic and healthy practices could be an important mechanism through which social capital impacts nutritional status of children. Adoption of sanitary practices, such as hand washing, may make a significant impact on the spread of

infections and fecal contamination and reduce contagion, which in turn would be associated with less nutrient loss and malnutrition among children.

Shortage of clean and potable water, and inadequate facilities for the disposal of human excreta, water and solid wastes contribute to the development of gastrointestinal infections, such as diarrhea and facilitate the spread of infectious disease (Esrey, Potash, Roberts, & Shiff, 1990). Even though the infrastructure of the community and household is hard to modify, practices at home can make a significant difference in how infrastructure impacts child health. For instance, even though the prevalence and duration of diarrhea among children in rural India was significantly lower on average for families with piped water, the health gains of water infrastructure were found to mainly by-pass children in poor families, particularly when the mother was poorly educated (Jalan & Ravallion, 2003). This suggests that health behaviors adopted by educated mothers make a crucial difference in how resources impact child health.

The impact of hygiene and sanitation measures such as hand washing, health education, water quality and treatment has been assessed as reducing the incidence of diarrhea by 30% and consequently increasing the odds of stunting (Black et al., 2008). Each additional episode of diarrhea is estimated to increase the odds of stunting by 4%. Frequent and prolonged untreated illness has been found to be one of the most important factors behind child malnutrition (Black et al., 2008; Victora et al., 2008).

Biological mechanisms that impact child health are colostrum intake and exclusive breastfeeding (Black et al., 2008).⁸ The practice of these behaviors could be a result of increased information and support gained through participation in development organizations. Optimal infant and young child feeding – initiation of breastfeeding within one hour of birth, exclusive breastfeeding for the first six months of the child’s life and continued breastfeeding until the child is at least 2 years old, together with age-appropriate, nutritionally adequate and safe complementary foods – can have a major impact on child survival (Jones, Steketee, Black, Bhutta, & Morris, 2003). Exclusive breastfeeding is a practice known to reduce infant morbidity and mortality, enhance development and also protect maternal health by lengthening pregnancy intervals (Black et al., 2008). Complementary feeding for infants refers to the timely introduction of safe and nutritionally rich foods in addition to breast-feeding at about 6 months of age and typically provided from 6 to 23 months of age (WHO, 2002). There is strong evidence that the promotion of appropriate complementary feeding practices reduces the incidence of stunting (Bhutta et al., 2013) especially during the first two years of life (Ramakrishnan, Nguyen, & Martorell, 2009).

⁸ This research mainly pertains to neonatal and infant mortality and not nutritional indicators. The few randomized controlled trials of breastfeeding promotion (for instance, Haroon, Das, Salam et al. 2013) that included nutritional status outcomes did not show any effects on the weight or length of infants (Black et al. 2013). Breastfeeding, however, may show a deferred effect through indirect mechanisms such as lower morbidities.

Health Seeking Behavior

Participation in development-based organizations may lead to greater use of health services during pregnancy, such as pre- and post- natal care, resulting in better nutritional status of children. The decision of an individual to seek out medical care is derived from a sense of need influenced by social and cultural factors like ethnicity and community norms (Mechanic, 1986). For instance, neighborhood patterns of social interaction and information exchange make a critical difference in how city residents assess the risks of childbirth and whether the residents feel comfortable with medical professionals and are motivated to pay for modern services (Hewett & Montgomery, 2005).

There is evidence to show that targeted intervention in rural Nepal, predominantly entailing women's groups meetings to increase prenatal and delivery care reduced neonatal mortality by 30% (Manandhar et al., 2004). Women in intervention areas were more likely to have had antenatal care, taken iron-folic acid supplements, and given birth in a health facility with a trained attendant or a government health worker among others. Although, this example does not purely relate to the efficacy of social capital, as this was a concerted public health effort with an explicit agenda of improving neonatal survival with service side provisions, it nevertheless is a testament to the power of sharing knowledge locally through regular interaction that facilitated a change in health behavior. Research also shows that mothers' social networks promote visits to clinics and immunization uptake in developing countries (Cassell, Leach, Fairhead et al., 2006; Steele, Diamond, & Amin, 1996; Vikram, Vanneman, & Desai, 2012).

While many studies suggest that improving accessibility to and quality of public health care services has a substantial effect on the utilization of health care, particularly among the poor, only a few studies have examined the influence on health outcomes. Healthcare supply environment is associated with maternal health care in rural India (Sunil, Rajaram, & Zottarelli, 2006). The study found that the presence of services did not necessarily improve utilization, but health worker visits during pregnancy were vital in increasing the use of maternal care services. This is important as antenatal care, particularly adequate supplementation of micronutrients for the mother and growth monitoring; along with food supplementation can considerably reduce the risk of undernutrition (Adair, 1989; UNICEF, 2009).

The impact of healthcare supply environment on nutritional status investigated through a series of policy simulation exercises show that increasing availability and quality of health services could be expected to have substantial effects on children's weight and height in Nepal (Hotchkiss, Mock, & Seiber, 2002). However, a study in rural India found that the presence of health facility, availability of health professional in the village, and distance to nearest government/private health facility were not significant determinants of nutritional status of children (Rajaram, Zottarelli, & Sunil, 2007).

Fertility

Increased knowledge, exposure to modern ideas and empowerment through exposure to development organizations and their participants may lead to reduced fertility. Research from Nepal shows that participation in a range of voluntary development associations and

living in a neighborhood with a voluntary association increased permanent contraceptive use. Interestingly, participation in different types of voluntary associations had a similar relationship with contraceptive use (Barber, Pearce, Chaudhury, & Gurung, 2002). The presence of association in a neighborhood having a positive impact on contraceptive prevalence suggests that norms and values are also transmitted through networks in a village.

There is evidence that the presence of community-based organizations in the community, which engage in a variety of development and financial issues, is associated with lowered desired fertility and higher contraceptive use in India (Vikram, 2012). Hence, it is possible that interaction with modern organizations leads to alterations of norms through increased exposure to knowledge and ideas, and more importantly, affective support to adopt those ideas.

Repeated pregnancies in high fertility populations might cause maternal undernutrition and morbidity (Conde-Agudelo, Rosas-Bermudez, & Kafury-Goeta, 2007). Family planning could help to reduce maternal undernutrition and intrauterine growth restriction (Black et al., 2008). The intergenerational nature of nutritional deprivation is well known; low maternal pre-pregnancy body mass index is a known determinant of low birth weight (LBW), which in turn is the most powerful predictor of child malnutrition as it is associated with poor growth in infancy and childhood (Ramalingaswami, Jonsson, & Rohde, 1996). The problem of maternal undernutrition is exacerbated in a context of low age at marriage and first birth, high fertility and lack of spacing. These factors draw on bodily resources of the mother and eventually lead to deterioration of maternal and child health.

Integrated Child Development Service

The national early childhood development program in India, the Integrated Child Development Service (ICDS), aims to improve the nutritional outcomes of children in the age group of 0-6 years by providing services to pregnant and lactating women and their children. They are supposed to provide a variety of services apart from nutritional supplementation such as early childhood education, health check-ups and referrals, nutrition education and immunization.

A number of studies have evaluated the role of ICDS on the nutritional status of children, but most studies have focused on small geographical areas, had small sample sizes, and were limited to evaluating certain components of the program (Rao, 2005). Few studies have been conducted so far with randomly selected samples. In 1990, a study by the National Institute of Public Cooperation and Child Development compared children receiving ICDS services with matched control children from non-participating blocks and found that the birth weight of children was significantly better in the ICDS areas but nutritional status of children was no different from the control area (National Institute of Public Cooperation and Child Development, 1992). More recent studies using national level data find a weak positive impact of ICDS on nutritional outcomes of children (Lokshin, Das Gupta, Gagnolati, et al. 2005; Deolalikar, 2005; Kandpal, 2011; Jain, 2013).

Potential Negative Effects of Social Capital

In India, an association with religious or caste organizations may reinforce traditional ideas about medicine or orthodox norms discouraging mothers from venturing out to making use of modern health facilities. They may reinforce Indian patriarchal norms restricting maternal autonomy, which is a known contributor of child malnutrition (Shroff et al., 2011). It may be associated with lower medical care for the mother especially during pregnancy (Story, 2014), which impacts the nutritional status of the mother and child.

Additionally, they may inhibit the spread of new and useful information regarding nutrition, health and hygiene by promoting counter-productive religious beliefs regarding childcare and feeding practices of children and pregnant women. For example, prelacteal feeding of honey and purified butter is considered beneficial for the child and is recommended in certain religious texts (Laroia & Sharma, 2006). Reinforcing such beliefs and practices through religious or caste associations will inhibit the spread of scientific knowledge such as the importance of exclusive breastfeeding and the damage associated with prelacteal feeds.

It is also well established that strong ties with families, ethnic groups and traditionally oriented groups is associated with higher fertility and lower use of contraceptive services in developing countries (Caldwell & Caldwell, 1987; Paek, Lee, Salmon et al., 2008; Vikram, 2012), which impacts health of mothers and children. Therefore, a household's association with traditional social capital may be regressive, leading to lower knowledge regarding health, hygiene and high fertility.

The Impact of Contextual Social Capital

Neighborhood associations may function as an overseer for governmental welfare programs or may approach government offices to demand more services, rectify existing ones or organize residents of a community to take action. Increased trust and solidarity emanating from religious and caste-based groups might also serve the same function. Therefore, the impact of structured social capital may also be indirect, leading to better provision of governmental services to the entire community, regardless of particular ties to each household. Social capital is conceptualized as benefitting integrated child development services and health infrastructure⁹. The presence and quality of infrastructure influences the extent to which residents of a community are able to use and benefit from these services.

However, in chapter 5, contextual social capital did not emerge to be a significant predictor of child nutrition as it was primarily operating as a proxy for local development. Hence, this next set of analyses does not include a test for mechanisms hypothesized at the village level: improved infrastructure such as medical facilities, ICDS and water. Instead, this chapter focuses on social capital at the household level and how that might enable better utilization of services.

Methods

Data

⁹ The Child Development Service (ICDS) is a national program aimed at improving the nutritional, health and educational outcomes of children in the age group of 0-6 years by providing services such as nutrition supplements for pregnant and lactating women and their children, growth monitoring and early childhood education among others.

The study uses the India Human Development Survey (2004- 2005). The sample includes 6120 children under the age of five years.

Dependent Variable

This analysis uses child underweight as the dependent variable.

Independent Variables

Social Capital

The analysis includes both types of social capital, namely development and religious or caste based, at the household and community level. These household variables are continuous indicating the number of associational memberships in development organizations and in religious or caste-based groups for each household. The two neighborhood measures of social capital are also continuous variables indicating the number of development organizations and the number of religious or caste-based groups present in the village.

Mechanisms

Health and Nutrition Knowledge

Eligible women were asked five questions about reproductive and child health. These were, (1) if it was harmful to drink 1-2 glasses of milk every day during pregnancy, (2) do men become physically weak even months after sterilization? (3) if colostrum was beneficial for the child, (4) is smoke from a wood/dung burning from traditional chulha (stove) harmful for health? and (5) if the

child needs to be given more than usual water to drink during diarrhea. The responses were coded as dichotomous indicating correct and incorrect answers. The people who stated that they did not know the answers were coded as not having accurate health knowledge. Responses to these questions can be indicative of their generalized knowledge related to care during pregnancy, child nutrition and child health.

I had attempted to combine the health knowledge questions to create a scale but the intercorrelations between the three items were rather low (ranging from .02 to .142) with a scale reliability coefficient of only 0.361. This suggests that a unidimensional construct of health knowledge is not appropriate.

Empowerment

I include two variables, both dichotomous, which capture dimensions of women's autonomy with respect to child health - if the respondent has a say in the decision when the child is ill and whether she does not need to seek permission to go to the local health center. There is a low correlation of 0.19 between the two variables. The practice of veiling is also included in the model as it may be indicative of curtailment of physical autonomy.

Greater Health Seeking Behavior

Three aspects of medical care utilization related to child health will be included in the analysis. The first variable will be a summative index (0-3) of antenatal care - (1) whether the mother received three or more antenatal care check-

ups during her pregnancy (2) whether the mother consumed iron folic acid for more than 90 days, and (3) whether she received tetanus toxoid injections.

The second variable will indicate if the child received a postnatal check up in the first two months of his life.

Reproductive Behavior

Two variables will be used to assess the impact of reproductive health on malnutrition among children. The first variable is a measure of the number of children desired by the mother. This is not a measure of actual pregnancy but indicative of fertility intention. It is not possible to measure actual fertility since the mothers may not have completed childbearing. Another variable indicating if the mother is practicing any form of contraception is also included.

Practice of Healthy Behaviors

For this analysis, I shall model two important indicators of breastfeeding that affect the nutritional status of children. The first variable indicates if the child was exclusively breastfed for a minimum of 6 months. The second indicates the practice of complementary feeding, having started complementary feeding at 6 months after exclusive breastfeeding for the first six months.

Practice of hygienic behavior is modeled with a dummy variable indicating if the mother washes her hands with soap after defecation. A second variable indicates if the household always purifies their drinking water before consumption by boiling, filtering (purchased water filters) or treatment with chemicals. Filtration using cloth

or strainer is excluded.

IHDS collected the morbidity history of all members of the household for the previous one month. A variable indicates whether any children suffered from fever, cough or diarrhea during this time.

Integrated Child Development Service

Two variables are developed to assess if ICDS food distribution and its frequency is associated with underweight. The first variable captures whether the child received food supplementation daily or weekly. The second variable indicates if the child received food supplementation on a biweekly or monthly basis. The omitted category includes those that did not receive any supplementation or once or twice in a year.

Child characteristics

Child level controls include child's sex, child's age in months and its squared term. I also include two variables to indicate the number of boys and girls born before the index child.

Household level

Maternal controls include maternal education, maternal age and maternal employment. Maternal education is coded in four categories: illiterate, primary education from the grades one to five, upper primary and secondary education (grades six to ten), and senior secondary and college education (ten or more years of schooling). Maternal

employment categories include women who are employed outside the household; women employed within the household, either household farms or other enterprise; and lastly those women who have held multiple jobs over the last one-year. The omitted category comprises of housewives.

Other household level controls include father's education (coded also in four categories as maternal education), standard of living (a count of household assets), household income, as well as caste and religion. Caste is controlled in five broad categories: Brahmins, other forward castes, other backward classes, scheduled castes and scheduled tribes. Religion will be divided into three categories: Hindus, Muslims and other religions.

Community level

This analysis utilizes the index indicating the level of development of the village. The is a count of infrastructural facilities within the village—electricity, paved road, grocery shop, bus stop, landline and mobile access to telephone, post office, police station, bazaar, and bank. A separate variable indicating the percent women literate in the community is also included. The variable is derived from the 2001 Indian census, approximately four years prior to the IHDS sample.

Statistical Methods

The study uses a multilevel framework for this analysis. I start with the base model (Model 1) of the association between social capital, at both the household and community levels, with undernutrition controlling for household and community level

characteristics described above. I then compute stepwise regressions adding each type of hypothesized pathway to this base model. In the second step, the variables for health knowledge and empowerment are added to the equation (Model 2). The analysis then includes each of the four mediating pathways – health-seeking behavior (Model 3), fertility intentions and behavior (Model 4), healthy behavior (Model 5) and utilization of ICDS (Model 6), separately to the last model (Model 2). The focus of the analysis will be the change in the social capital coefficients with the introduction of each hypothesized pathway. The final model includes all hypothesized pathways together (Model 7).

Results

As shown in the previous chapter, for the base model, both religious and caste based social and development social capital are significant predictors of underweight at the household level. The next five models test each of the pathways hypothesized above.

Health Knowledge and Empowerment

In the second model, five questions on reproductive and child health and three facets of women's empowerment are added to the equation. Two pathway variables emerge as significant in the analysis. The knowledge of smoke being harmful for health is negatively associated with underweight. Having accurate knowledge reduces the odds of underweight by 20% ($e^{-0.22} = .80$). The practice of veiling increases the odds of underweight by 41% ($b=0.338$). No other measures of health knowledge or empowerment are significant predictors of underweight.

However, the addition of health knowledge and empowerment did not make a large impact on either social capital coefficient at the household level. These two pathways explain less than a tenth of the household social capital effect. In separate model (not shown), it was determined that the reduction in social capital coefficient was due to health knowledge alone. The development social capital coefficient declined 7 percent and there was little change in religious or caste based social capital coefficient.

Greater Health Seeking Behavior

Receiving antenatal care during pregnancy reduces the odds of underweight by 10% ($e^{-0.10} = 0.90$) and receiving postnatal care by 20% ($e^{-0.22} = 0.80$). Addition of these measures again leads to a 7 percent decrease in the development social capital coefficient but no difference is observed in the religious or caste based social capital coefficient. The results suggest that increased health care utilization is a mechanism through which bridging social capital operates to impact child health (Story 2014; Derose & Varda 2009) but the evidence is not especially strong.

Reproductive Behavior

Lack of contraception and higher fertility intentions appear to be important routes through which religious or caste based social capital impede children's growth. Using contraception reduces the odds of being underweight by 38% ($e^{-0.48} = 0.62$). Additionally, the higher the number of children desired by the mother, the greater the likelihood that the child is underweight (OR=1.15). This variable captures traditional preference for larger families. The coefficient for religious and

caste based social capital is reduced by 13% and is no longer significant. No change is observed in development social capital indicators.

Practice of Healthy Behaviors

Despite widespread consensus that healthy and hygienic environments are important for child health, none of the IHDS measures are significant predictors of underweight, and hence make no difference to the magnitude of social capital coefficients.

Functioning of Integrated Child Development Services

As compared to those who did not receive any food from ICDS or receive it once or twice a year, those who get food on a regular or even monthly basis benefit from this service. Receiving food on a daily or weekly basis reduced the odds of underweight by 27%. Even receiving food from ICDS on a fortnightly or monthly basis is negatively associated with underweight (OR=0.70). Adding ICDS usage to the model leads to a 7 percent reduction in the development social capital coefficient. Participating in development organizations may make these services more accessible to members as they learn about the different services available in the neighborhood. Additionally, they can organize themselves and demand accountability from the government, which results in better service provision. However, the addition of ICDS measures to the model makes no difference to the religious or caste based social capital coefficient.

Final Model

When all the pathways are included in one model, most of coefficients for each of the intervening pathways remained statistically significant as in the previous models. The one exception is the antenatal care index, which is no longer significant. As compared to the base model, the coefficient for development social capital is reduced by 20% in the full model but continues to be statistically significant. Religious or caste based social capital is no longer significant in the final model and is reduced by 13%. Three pathways appear to be most important in explaining how development social capital benefits childhood nutrition – better health knowledge, more health seeking behavior, and more ICDS usage. Religious or caste based social capital appears to operate through higher fertility norms and lower contraceptive use.

Discussion

The results find that development social capital enhances child nutrition by increasing access to medical services and by expanding health knowledge. These pathways through which social capital works are well established in the literature as ways through which the risk of undernutrition is reduced (UNICEF, 2009).

However, together these pathways are able to explain only 20% of the development social capital effect. And other pathways – health behavior and empowerment – do not appear to be significant predictors of child nutrition. This could be due to several factors. Even though norms of behavior regarding food preparation, personal hygiene, and household cleanliness are likely to be practiced at the household level, their success will nonetheless be influenced by the general availability of water and sanitation facilities. No amount of water filtration is likely to protect a child from

infection present in the open drain next door. Hence, a change in household behaviors is not likely to overcome structural barriers. The importance of these structural constraints behooves us to model community infrastructure and practices such as open defecation and quality of water more explicitly. Additionally, children are likely to be impacted by contagion present in the neighborhood and an aggregate measure of contagion at the neighborhood can be created using household level data. Future work might focus more on these community level indicators of housing quality, sanitation, defecation and contagion.

We find that bonding social capital, religious and caste-based organizations, impedes child nutrition primarily through increased fertility. High fertility and small birth intervals can be very damaging to mothers and their children. Harttgen and Misselhorn (2006) have shown that nutritional sources of the mother are instrumental in determining child nutrition. Low pre-pregnancy weight and poor weight gain during pregnancy could possibly be one of the primary reasons behind the south Asian enigma (Coffey, 2015).

These bonding social capital organizations have been found to be associated with lower contraceptive use and high desired fertility in India (Vikram, 2012). Interestingly, these organizations are especially important for fertility behavior in low fertility regions, where higher fertility runs against the grain of conventional practice. It appears that the social capital resources are not so much conduits of new fertility norms (as they have appeared in much of the demographic literature) but sources of strength to help resist the prevailing pressures towards smaller families. The next chapter also investigates how the impacts of social capital resources act differently in different regions of India.

CHAPTER VII: THE IMPACT OF BRIDGING AND BONDING SOCIAL CAPITAL
ON CHILD NUTRITION IN INDIA: THE MODERATING ROLE OF
DEVELOPMENT

Often empirical studies of social capital do not take into account the broader socio-economic and historical context of the community in which social capital operates. Different forms of social capital are theorized to operate in similar ways across regions. Studies often report contradictory results between social capital and health outcomes (for health services, see Derose & Varada, 2009; for health outcomes, see De Silva, McKenzie, Harpham, & Huttly, 2005; Islam, Merlo, Kawachi, Lindstrom, & Gerdtham, 2006) raising questions about the consistency of these relationships. Even otherwise excellent studies that engage in cross-country research or literature reviews, do not discuss how and why the relationships between social capital and outcome of interest might differ across regions or countries (for instance, De Silva & Harpham, 2007; Derose & Varada, 2009; exceptions include Islam et al. 2006). The focus is primarily on the total stock and the kind of social capital available to the community and not on other factors that might determine how social capital might operate in the first place¹⁰. One of the reasons behind the discrepancy in the findings across studies could be the contextual factors that moderate this relationship¹¹.

¹⁰ Prior research has identified income inequality as an important structural factor affecting the relationship between social capital and health (Kawachi, Kennedy, Lochner, and Prothrow-Stith 1997).

¹¹ Although, Derose and Varada 2009, Macinko and Starfield 2001 and Islam et al. (2006) have highlighted that the myriad ways in which social capital is conceptualized and operationalized makes the task of comparing across studies challenging.

The larger context of a community, such as its history, culture and socio-economic status, may influence the structure, functions, and effectiveness of social networks, and in turn, influence health outcomes differently (Kunitz, 2004). Hence, it is imperative to understand the interplay between social capital and socio-economic and cultural institutions within which it is embedded. Social capital does not arise in a vacuum but is shaped by a range of contextual factors, the same factors that can also impact health outcomes. Hence, a comprehensive study of social capital should assess its relationship with the outcome of interest in conjunction with the broader structural forces that might influence the presence and development of social capital. Therefore, it is important to map the presence of social capital across diverse communities before studying its relationship with the outcome of interest.

In this chapter, I first assess how socio-economic development is related to the presence of social capital. Do developed regions have greater access to bridging and bonding social capital? Or are less-developed regions also rich in particular forms of social capital. Secondly, I ask if the impact of social capital on child health varies by the level of development in the region? Are developed regions, with stronger public amenities and health systems, and higher literacy rates more likely to benefit from social capital? Or are deprived communities more likely to benefit from social capital? The focus is on how social capital interacts with community resources.

This dissertation has made a distinction between two types of social capital, namely development (bridging) and religious or caste (bonding) based social capital, on the basis of resources they offer to people and communities. It is conceivable that the impact of these two types of social capital varies by region as well. Specifically, how

does development moderate the relationship between bridging and bonding social capital and child nutrition?

If social capital is viewed as a form of capital, which can substitute or complement other forms of capital, it may be a particularly advantageous resource within a developing country where human and economic capitals are found wanting (Woolcock, 1998; Kunitz, 2004). In a context mired in structural failures, it is possible that social capital provides especially valuable resources that are not readily available to people. These resources can potentially improve health outcomes at existing levels of socio-economic status and service delivery by making more information available about health, local services and ways to access them. The normative functions of social capital may also be even more important where healthy practices are not so universally observed. Social capital might also act as a buffer in places of extreme deprivation where it facilitates the provision of public goods through informal networks that are not available from institutional sources.

Bridging capital refers to connections between heterogeneous individuals or groups that help in the acquisition of greater and more diverse information and resources. Bridging social capital, such as non-governmental organizations, may even provide certain services such as immunization camps in India. Access to these services through social capital may be especially important in poorer areas where this access is most difficult. On the other hand, it is also possible that bridging social capital may fail to show a significant impact in communities with meager resources; the provision of information and contacts may prove to be inadequate if basic systems are not in place. For instance, if a community has no or little access to safe water, pharmacy, and health

services, then information and norms shared via networks about diarrhea and its treatment may be able to do little by themselves to impact its treatment in a village.

Bonding social capital, the kind that develops from cooperative relations between members of a network who have similar social identities (Putnam, 2000), provides solidarity and support, a strong within-group identity and a vehicle for exchange of information and resources. In deprived regions, provision of valuable resources like support and cohesion may be quite useful to facilitate community action towards betterment of quality of life, increasing generalized trust as well as providing the means to survive other forms of extreme deprivation. There is evidence to show that bonding social capital can be helpful in providing strong social support and resources to needy members especially in disadvantaged areas. Stack (1974) finds that bonding ties may help extremely poor families survive on a day-to-day basis. Similarly, the presence of religious and caste-based organizations may be particularly useful in preventing nutritional shocks to families thereby leading to lower underweight among children.

On the other hand, a high level of bonding social capital (ties with others of a similar racial and educational background) has been found to be associated with higher levels of mental distress in deprived communities of Alabama (Mitchell & LaGory, 2002), higher behavioral and mental health problems among children in Maryland (Caughy, O'Campo, & Muntaner, 2003), and worse physical health in Australia (Ziersch & Baum, 2004). These studies highlight that bonding capital within disadvantaged communities can be a detriment to better health, as we saw for India in chapter V. The key to improving health therefore appears to lie in disadvantaged residents' ability to access resources outside their immediate social milieu, i.e. bridging social capital.

It is also possible that *only* developed communities are able to utilize the benefits of social capital. With adequate infrastructure in place, social capital, especially bridging social capital, can be effective by making demand side adjustments. It may be able to better facilitate the use of services, use of existing infrastructure correctly (such as safe water storage practices), increase health knowledge and serve marginalized groups leading to improved outcomes. Bridging social capital that transcends traditional boundaries of interaction can be valuable in spreading information and norms across diverse groups as well as in increasing social cohesion (Varshney, 2002). Alternatively, social capital may have a limited impact in villages with a high stock of education, infrastructure, and health amenities where the services and resources provided by social capital may be redundant. In these villages, social capital may not prove to be particularly helpful, as those communities may not need the resources provided by social organizations because they are readily available and everybody has easy access to them.

In developed regions, bonding social capital can be particularly harmful. In the less developed region, which is also more traditional in India, these ties may not necessarily suggest a disadvantage. In the developed region however they may be an indicator of being backward in an otherwise more progressive region. It is likely that the norms and information shared in these organizations go against the grain of conventional practice, which is beneficial for child health.

Lastly, the impact of social capital can be very different at the household and village level. From a contextual perspective, the benefits of social capital can be envisaged to be available to all members of a community that have associational organizations. For instance, certain organizations may function as overseers for

governmental programs, public works and other services and demand governmental intervention in times of need. Additionally, community organizations can facilitate relationships and trust between service providers and marginalized communities, protecting them from discrimination and improving overall utilization of services (Derose & Varda, 2009). Therefore the impact of structural social capital may also be indirect leading to increased cohesiveness, creating opportunity to be organized and engaging in collective action. In these ways, social capital may have positive externalities for the entire community.

Negative externalities are also possible from religious and caste based groups. They may work through creating divisions based on religious and caste lines, inhibit collaboration and exchange involving diverse groups and advantaging one group over another. It can also transmit norms and information that are explicitly harmful for child health. Prior research has identified income inequality as an important structural factor affecting the relationship between social capital and health (Kawachi, Kennedy, Lochner, & Prothrow-Stith, 1997). Inequality may hinder the formation of social capital, as people are less likely to interact with others who belong to different socio-economic classes and have dissimilar tastes and preferences. This reduced interaction may lead to lowered cooperation among people to achieve political gains, such as public services and other resources. These might also be the pathways through which religion and caste based groups operate to harm child health. All people suffer from living in a less cohesive society, as they are more likely to be exposed to greater violence, mistrust and lowered bargaining power. Groups defined on the basis of caste and religions are likely to cause cleavages in society resulting in the above-mentioned effects.

Research questions

In this paper, I examine the distribution of social capital in two regions of India, divided on the basis of socio-economic development, before examining if the regional context moderates the relationship between social capital and health outcomes. The first objective of the paper will be to examine how the two different kinds of social capital, namely development associations and religious or caste-based associations are differentially distributed in more developed and less developed regions in India. I also assess how social capital is correlated with economic development in India.

The second objective of the chapter will be to assess the differential impact of the two types of social capital by the level of development in a region. Specifically, I ask if the two kinds of social capital, development associations and religious or caste-based associations, have different impacts on child health in poorer regions of India than in more affluent regions.

Less Developed and More Developed Region in India

In India, the north and central region comprised of Chhattisgarh, Rajasthan, Madhya Pradesh, Bihar, Jharkhand, Uttar Pradesh and Orissa are considered to be the least developed states (Bose, 1985; Bose, 2007). Historically, these states have been referred to as *bimaru*¹² (literally meaning “sick” in Hindi) states as they share common problems of social and economic underdevelopment (Bose, 1985). Human development

¹² BIMARU is an acronym formed from the first letters of the names of the four backward states: *Bihar*, *Madhya Pradesh (M.P)*, *Rajasthan*, and *Uttar Pradesh*. It was revised to read BIMAROU when *Orissa* was added to the list. The state of *Bihar* was split into *Bihar* and *Jharkhand* in 2005 and the state of M.P. into M.P and *Chhattisgarh*. U.P was also split into two but *Uttarakhand* has been on a steeper growth curve and is quite different in character from its original state of U.P. I do not include *Uttarakhand* in my categorization.

indicators across these states have been amongst the worst in the country (Bose, 2000; 2007). Drèze and Sen (2013) find that the intensity of human deprivation here, defined as deprivation across various sectors such as health, education and sanitation, is comparable to that found in the poorest nations in the world.

Between 1991 and 2000, these states accounted for 40 percent of India's population, but 47 percent of the country's population growth (Haub & Sharma, 2006). Today, these states comprise roughly half of India's population (Drèze & Sen, 2013). They fare poorly across a range of health and educational indicators such as infant mortality, child nutrition, female literacy and school completion (Bose, 2007; Drèze & Sen, 2013). National programs such as the National Rural Health Mission have included these states in the list of "high focus" states, as they are in need of more intensive development work. Table 7.1 shows how these states have fared compared to the rest of the country on child health indicators in 2005. I classify the *bimaru* states as less developed and the non-*bimaru* as developed on the basis of these indicators. The more developed non-*bimaru* region comprises of northern, western and eastern region of India as well as the southern peninsula.

Table 7. 2 shows these states continue to be laggards with respect to education, nutrition and social capital in the IHDS data. Villages in the *bimaru* regions have fewer resources and are poorly educated as compared to their counterparts in the non-*bimaru* regions. The infrastructure index, which indicates the village's access to electricity, paved roads, grocery shops, bus services, telephones, post offices, police stations, bazaars, and banks, shows that the *bimaru* regions have one and a half fewer of these resources on average. Map 1 shows the distribution of the infrastructure index districtwise across the

country and demonstrates how the *bimaru*-region is especially deprived in infrastructure. Additionally, only 33% of the women in this region are literate as compared to 48% in the more developed non-*bimaru* region.

The IHDS household characteristics also narrate a similar tale of underdevelopment. With respect to income, standard of living and education, the households of the *bimaru* states lag behind those in the non-*bimaru* region. More than 50% of the children are underweight in the region as compared to 38% of children in the rest of the country. In Map 2, it is evident that the less developed regions are the most underweight. Lastly, the *bimaru* region has lower development social capital compared to religious and caste based social capital. However, connections to both types of social capital are higher in the non-*bimaru* region. This is ironical, although not surprising; development organizations might be expected to serve the more deprived regions better but are less likely to form in these regions in the first place. In the less developed areas, the main type of social capital available is the more tradition-bound caste and religious organizations (Map 3).

The presence of bridging social capital is correlated with social and economic development in Indian villages. Bridging social capital is strongly correlated with economic development in villages ($r = 0.52$) and moderately correlated with women's literacy ($r = 0.33$). On the other hand, the presence of religious or caste-based groups is less strongly determined by local economic development ($r = 0.30$) and weakly by women's education ($r = 0.15$).

Data and Methods

Data

This analysis uses the 2005 India Human Development Survey that provides measures of both types of social capital, development and religious or caste based, at both the household and community (village) levels.

Sample

The analysis will utilize the entire rural sample (n=6427 and 1335 village records), and will also run subsample analysis in the more and less developed regions of India i.e. *bimaru* (n=3143 in 540 villages) and non-*bimaru* regions (n= 3284 in 795 villages). This sample is larger than the sample for earlier analyses because it does not limit itself to non-missing cases of mechanisms. It only limits itself to non-missing cases on independent and control variables. This was done to attain slightly larger samples for the two regions.

Independent Variables

I include both types of social capital, namely development and religious or caste based, at the household and community level. These household variables are continuous indicating the number of associational memberships in development organizations and in religious or caste-based groups for each household. The two neighborhood measures of social capital are also continuous variables indicating the number of development organization and the number of religious or caste-based groups present in the village.

This information is indeed unique as almost all the studies that have examined social capital as a community-level variable measure this through aggregating individual behaviors, attitudes or memberships rather than through community-level measures that do not necessarily rely on individuals (Harpham, Grant, & Thomas, 2002).

The Dependent Variable

This analysis uses child underweight as the dependent variable. An underweight child is one that has a 'weight-for-age' z score that is at least 2 standard deviations (SD) below the median for WHO Child Growth Standards.

Controls

Child characteristics

Child level controls include child's sex, child's age in months and its squared term. I also include two variables to indicate the number of boys and girls born before.

Household level

Maternal controls include maternal education, maternal age and maternal employment. Maternal education is coded in four categories: illiterate, primary education from the grades one to five, upper primary and secondary education (grades six to ten), and senior secondary and college education (ten or more years of schooling). Household level controls include father's education (coded also in four categories as maternal education), standard of living, household income as well as caste and religion.

Caste will be controlled in five broad categories: Brahmins, other forward castes,

other backward classes, scheduled castes and scheduled tribes. Religion will be divided into three categories: Hindus, Muslims and other religions.

The square of household income as well as consumption were added earlier but removed, as they were not significant, not important theoretically, and potentially collinear with household assets and log income.

Community level

This analysis will utilize the index indicating the level of development of the village. This is a count of infrastructural facilities within the village—electricity, paved road, grocery shop, bus stop, landline and mobile access to telephone, post office, police station, bazaar, and bank.

A separate variable indicating percent women literate in the community is also included. The variable is derived from the 2001 Indian census, approximately four years prior to the IHDS sample.

Statistical Methods

Multilevel analysis is utilized to get an estimate of the relationship between nutritional status and household and neighborhood characteristics in the more developed and less developed region of India. The following model will be run for *bimaru* and non-*bimaru* regions separately (although later I will combine the regions and test for statistical significance of an interaction across the two regions). At the first level, child nutritional status in household h in community c is modeled as a function of social capital at household-level and other household-level variables. We include development (β_{1h})

and religious or caste based social capital indicators (β_{2h}), we will then include a vector of household controls such as standard of living, paternal education, household income and caste and religion (β_{3h}); child characteristics (β_{4h}) such as age and number of older siblings; maternal characteristics such as maternal education, employment and age (β_{5h}). These controls are centered at the grand mean to gain intercepts that estimate the adjusted grand mean.

$$Child\ nutritional\ status_{hc} = \beta_{0h} + \beta_{1h} DvptSC_{hc} + \beta_{2h} RelSC_{hc} + \beta_{3h} hhchars_{hc} + \beta_{4h} childchars_{hc} + \beta_{5h} maternalchars_{hc}$$

β_{0h} Refers to the intercept (adjusted nutritional status for a child) in community c . The dependent variable is a dichotomous one indicating whether the child is undernourished.

At the second level, I investigate the effects of village social capital, γ_{02} and γ_{03} on the adjusted nutritional status of the child, β_{0h} i.e. the constant term modeled to randomly vary among communities while controlling for infrastructure and women's literacy in the village.

$$\beta_{0h} = \gamma_{00} + \gamma_{01} \square Development\ social\ capital_c + \gamma_{02} \square Religion\ and\ caste\ social\ capital_c + \gamma_{03} \square Infrastructural\ Index_c + \gamma_{04} \square Women\ Literacy_c + u_{0c}$$

The third model utilizes the whole sample with interactions at level 2 as well as cross level interactions. This is done in order to see if the diverse effects also show up in the all India sample. We include two cross level interactions to test if the impact of household based social capital measures varies according to development. The way to

test for cross-level effects is through interacting the coefficients for household social capital with an indicator for more developed region (non-*bimaru* region) at level 2. This will test if the impact of household based social capital varies in the two regions.

Level 1 Equation:

$$\text{Log}[p_{hc}/(1-p_{hc})] = \beta_{0h} + \beta_{1h} \text{DvptSC}_{hc} + \beta_{2h} \text{RelSC}_{hc} + \beta_{3h} \text{hhchars}_{hc} + \beta_{4h} \text{childchars}_{hc} + \beta_{5h} \text{maternalchars}_{hc} + r_{hc}$$

Level 2 Equations:

$$\beta_{0h} = \gamma_{00} + \gamma_{01} \square \text{Development social capital}_c + \gamma_{02} \square \text{Religion and caste social capital}_c + \gamma_{03} \square \text{Infrastructural Index}_c + \gamma_{04} \square \text{Women Literacy}_c + \gamma_{04} \square \text{Non-Bimaru Region}_c + \gamma_{04} \square \text{Development social capital}_c \square \text{Non-Bimaru Region}_c + \gamma_{04} \square \text{Religious social capital}_c \square \text{Non-Bimaru Region}_c + u_{0c}$$

$$\beta_{1h} = \gamma_{10} + \gamma_{11} \square \text{Non-Bimaru Region}_c + u_{1c}$$

$$\beta_{2h} = \gamma_{20} + \gamma_{21} \square \text{Non-Bimaru Region}_c + u_{2c}$$

β_{0h} is the constant term modeled to vary randomly among villages. In this model, β_{1h} and β_{2h} are allowed to vary randomly across villages, as we test whether the effect of social capital, development social capital as well as religious or caste based social capital, at the household level varies for the two regions i.e. non- *bimaru* and *bimaru region*. At the second level, I investigate if the impact of contextual social capital variable also varies by region on the adjusted nutritional status of the child.

$$\beta_{0h} = \gamma_{00} + \gamma_{01} \square \text{Development social capital}_c + \gamma_{02} \square \text{Religion and caste social capital}_c + \gamma_{03} \square$$

$$\begin{aligned}
 & \text{Infrastructural Index}_c + \gamma_{04} \square \text{Women Literacy}_c + \gamma_{04} \square \text{Non-Bimaru Region}_c + \gamma_{04} \square \text{Development social} \\
 & \text{capital}_c \square \text{Non-Bimaru Region}_c + \gamma_{04} \square \text{Religious social capital}_c \square \text{Non-Bimaru Region}_c + u_{0c}
 \end{aligned}$$

The intercept γ_{00} refers to the overall mean. γ_{04} refers to the interaction between development social capital and non-*bimaru* region (development social capital is continuous and non-*bimaru* is nominal) and γ_{05} refers to the interaction between religious and caste based social capital and non-*bimaru* region (social capital is a continuous measure).

Methodologically, the goals of the study will be achieved through three models. The first model is run for the non-*bimaru* region where social capital is modeled at the contextual and household level along with all the aforementioned controls. The second model, identical to the first, is run on the *bimaru* sample alone. The third model utilizes the whole sample with interactions at level 2 as well as cross level interactions. I also run null models for the *bimaru* and non-*bimaru* region to see how much of the variability in the dependent variables lies between communities in the two regions.

Results

The results show that socio-economic development moderates the relationship between social capital and child health. In this analysis, we find that social capital works in the expected ways in the more developed region of India. The bridging ties provided by a range of associational memberships are beneficial to child health. With each additional development organization, the odds of being underweight reduce by 16% ($e^{0.18}$

= 0.84), holding constant other predictors, averaging over the distribution of level-2 random effects.

Bonding ties i.e. religious and caste based social capital, also work in the hypothesized manner however it has an impact only at the contextual level suggesting that those villages, which have such organizations, are quite different from those without them in this region. With each additional religious or caste organization in the village, the odds of being underweight increase by 20% ($e^{-0.18} = 1.20$). The presence of bonding organizations is probably indicative of a more traditional and backward village in an otherwise more progressive region. These organizations might be catering to a parochial agenda, which might be costing all its residents. For instance, strong ties between specific religious and caste groups might be leading to exclusion of others in the village, thus having a negative impact on child health at the village level. It is also possible that the presence of these organizations are indicative of a fractured mandate in the village, and the lack of cross-community ties reduces bargaining potential and governmental functioning.

In the *bimaru*, less developed region, social capital works in an unexpected manner. This less developed region has less access to development social capital and hence it may not be surprising that it does not have a significant impact. The other possibility is that bridging ties by themselves are not sufficient to bring about a positive impact in the absence of the requisite infrastructure. Bonding social capital is the primary form of social capital available in the region.

It was expected that less developed villages might stand to gain especially from the resources offered by development social capital and not necessarily from those

offered by religious or caste based social capital. However, contextual religious or caste based social capital is found to be beneficial in the *bimaru* region and operating in much the same way as development social capital was originally hypothesized. With each additional religious or caste organization in a village, the odds of being underweight decrease by 26% ($e^{-0.30} = 0.74$). In such resource-deprived regions, even the presence of traditional groups is beneficial for the nutritional status of children. Possibly, these provide at least some opportunity for greater bargaining for collective resources. Since this data is cross-sectional, it is hard to assess the causality of this relationship and hence what this result might be capturing is the selection of villages that are better organized in the first place.

It is important to note that the impact of religious or caste based social capital at the household level is not significant in either of the two regions. This means that it does not matter whether a particular household is connected to these networks but rather that there is a change at the level of community, which is benefitting or harming entire populations. This suggests that bonding social capital is making distinct changes in neighborhood resources available to families perhaps through better provision of public services or increased cohesion.

To test more completely if the impact of social capital varies by region in the entire sample, two interaction terms between the social capital variables and non-*bimaru* region were added at both the village and household levels. The main term for religious and caste based social capital is negative suggesting its positive role for child health in the *bimaru* region. The interaction term between religious and caste based social capital

with non- *bimaru* is significant and positive in the model suggesting that the impact of this form social capital is opposite in the two regions.

The interaction term between development social capital in the village and region is significant. However, the main village-level social capital coefficient is not significant suggesting that this form of social capital is not relevant for child health in the *bimaru* region (consistent with the separate regional results in Table 4), and the calculated effect for the non-*bimaru* region, while opposite, is even smaller. So, the results leave us with the ambiguous conclusion that village-level social capital is not significantly related to child health in either region, even if there is a suggestion that the effects are opposite.

To assess whether the impact of household social capital also varies by region, a cross level interaction model is run where household level social capital variables are interacted with non- *bimaru* region (a level 2 variable). The cross level interactions do not indicate a significant difference in the relationships for household based bridging or bonding social capital between the two regions.

Conclusion

The positive association of social capital with health has been well documented but primarily in developed countries. Developing countries face multiple deprivations – inadequate infrastructure, poorly operated and inaccessible health and education systems, ineffective delivery of government programs, and hence, meager accumulation of human, and economic capitals. The results from chapter 5 suggest that social capital, at least bridging social capital, has much the same relationship with child health in India as elsewhere. But India itself has wide economic diversity so we can ask not only whether

social capital impacts health outcomes in developing countries but also whether social capital is more or less beneficial in the less developed regions of India.

In the social capital rich and developed region, a household's bridging ties with development organizations are beneficial for the health of children in that household. However, in this region, the presence of religious and caste-based associations in the village has the hypothesized harmful association with underweight. These results are congruent with much of the original theory and hypotheses.

In the deprived *bimaru* states however, the processes through which social capital works are quite different. Development social capital does not show a significant impact in these communities. The provision of information and contacts may prove to be inadequate if basic systems are not in place. For instance, if a community has little or no access to safe water, transportation, and health services, then social organizations may be able to do little by themselves to impact nutritional outcomes of children in a village. Alternatively, bridging social capital in *bimaru* states may be so scarce; it is not possible to detect a significant association. *Bimaru* states have little access to this kind of social capital to begin with and hence a lack of a relationship could be just reflecting the relative absence of bridging social capital.

More surprisingly, bonding social capital *is* helpful in reducing the prevalence of underweight among children in this backward region. If religious and caste-based organizations are the primary form of social capital available in these deprived communities, they may be used to local advantage by facilitating resources for the entire village. Social capital is known to act as a buffer in places of extreme deprivation where it facilitates the provision of public goods and mitigates the deleterious effects of the lack

of other resources (Campbell, Wood, & Kelly, 1999). That may be what is happening in the *bimaru* region of India.

Hence, we see evidence here that socio-economic development moderates the relationship between social capital and child health. It is important to situate social capital in the broader socio-economic and historical context as it can operate distinctive ways depending on the context. More importantly, it cannot be assumed that one kind of social capital will function in the same way in all contexts. Social capital's interplay with the larger development context is crucial in determining its impact. Studies of social capital must also pay careful attention to how social capital is distributed and who is able to access this form of capital. The empirical work on social capital might find different results if more attention is paid to the context and the distribution of social capital in the region of study.

CHAPTER VIII: CONCLUSION

Contribution to social capital and child health literature

In this dissertation, we find that three important distinctions in the social capital literature are relevant for India: the different roles of household and community based social capital, the distinction between bridging and bonding social capital, and the positive and negative impact of social capital. Bridging and bonding social capital have opposite relationships with child nutrition in India. Bridging social capital, measured as associations with development-oriented organizations, are negatively associated with underweight whereas bonding social capital, measured as association with religious or caste-based groups, are found to have a positive association with underweight.

We find evidence that bridging social capital improves child nutrition by improving access to medical care, uptake of nutrition supplementation programs, and increased health knowledge. However, these pathways together only provide a weak explanation of how bridging social capital works to impact child nutrition. On the other hand, we find strong evidence that religious or caste-based social capital impacts child nutrition negatively by primarily reinforcing/encouraging higher fertility norms and lower contraceptive use.

However, these relationships are contingent on the level of development in the region. In the more developed region of India, these relationships work as originally hypothesized but in the less developed region, they work in surprising ways. I find that development based social capital is of less utility in communities with meager resources where the provision of information and contacts prove to be inadequate when basic infrastructure is not in place. Bonding social capital in this region works in the same way

as bridging social capital was hypothesized. I argue that there might be two reasons why the main relationships change. First, religious and caste groups are more readily available in the region whereas the presence of development organizations is negligible. Hence, religious and caste groups are the primary form of social capital in the region. Secondly, if these are the primary sources of social capital in the region then these possibly provide some opportunity for bargaining of collective resources and perhaps are indicative of greater cohesion.

I find that social capital has an impact at both the household and village levels. For the national analysis, any of the contextual social capital variables are not significant with controls for local development at the village level but sub-sample analyses show that bonding social capital operates primarily at the contextual level. In the more developed regions, it has the expected negative impact and in the less developed regions it is found to be beneficial. It is interesting that only bonding social capital emerges to be significant at the contextual level suggesting that these organizations are able to make a distinct change in the neighborhood. Development organizations, on the other hand, are making an impact only at the household level.

These findings add to the empirical evidence on social capital and health outcomes in developing countries. This is the first nationally representative study of social capital and health outcomes in India. Earlier research on India has utilized the young lives study data, which is a panel study of 3,000 children in the state of Andhra Pradesh and Telangana. More importantly, this dissertation theorizes and identifies the different forms of social capital in India and how they might operate at the household and village level.

These findings are important for child health as well as they highlight the importance of extra-familial resources that can impact child health. Too often, especially in developing countries, maternal education and household wealth are considered the most important determinants of child health. As the UNICEF conceptual map and this research exemplifies, neighborhood resources are vital to whether children thrive. Desai and Alva (1998) have suggested that external factors (the level of contagion and access to medical care) may be important factors impacting child health and have shown that the role of maternal education is limited for certain child health outcomes where external factors play a stronger role. This is highly relevant for policy, as research on socio-economic determinants at the household level has disproportionately burdened families and not the state for interventions to improve the status of children. These findings add to the body of contextual factors that impact child health.

Secondly, even though social capital has been identified as an important factor impacting health outcomes, relatively little is known about the pathways through which it works. This dissertation is a first step in theorizing and identifying the ways through which social capital works to impact child underweight in India. This is a contribution to both, social capital and child health research.

Limitations

There are issues with interpreting causality in this dissertation, as there is uncontrolled heterogeneity inherent in social capital research. Endogeneity can occur due to the presence of unobserved factors correlated with social capital as well as child underweight. Well connected households and villages may be different in systematic ways from the more isolated households and villages and it may be those other

differences that really cause improvements in child health. It is hard to address this with cross sectional data but a way forward is through advanced modeling techniques such as propensity score matching as well as more qualitative work that parses out mechanisms through which social capital might work to address health outcomes. A big leap forward can also be made with panel data that has followed these villages and households over time. The India Human Development Survey has conducted a follow-up study of these households in 2011-2012, approximately six years after the original survey. This data will be publically available in a few months and can help assess if social capital indeed works through the hypothesized pathways, which impact health outcomes over the long run.

Since the data are cross sectional, we cannot exclude reverse causation, i.e. the possibility that worse child health leads to lower participation of families in local organizations. It is not impossible to imagine that families who have healthier children are more likely to join organizations. Hence, this relationship may overstate the causal relationship between social capital and child underweight. The problem of self-selection in these studies cannot be dismissed, as participation in these organizations is largely voluntary. Those people associated with development organizations may also be more likely to access modern health care and follow scientific norms around feeding and hence experience better health. Also, there is a selection into villages where people choose to live, wealthier and healthier people might choose to live in neighborhoods that are richer, have a larger stock of social capital and have children who are well nourished.

Limitations of measures and pathways and future work

Another limitation of this study is the narrow definitions through which social capital is defined to impact child health. One of the primary causes of underweight is lower intake of nutrients. Social capital can possibly work by improving food security of households but we don't have data to explicitly model this. However, it may be worthwhile to explore if social capital leads to increased consumption of nutritionally rich food such as fruits, vegetables, eggs and milk among others. Diversity in diet can be useful in treating micronutrient deficiencies that are pervasive on the Indian subcontinent.

Social capital can impact several determinants of malnutrition such as educational attainment (Coleman, 1988, 1990), status attainment and improved economic outcomes¹³ (Lin, 1999), which in turn would be associated with better child health. However, these too have not been modeled as a pathway through which social capital operates. I have controlled for socio-economic status of the households as they might be correlated with social capital but this may be leading to an underestimate of its true impact. With the panel data, it will be easier to assess if presence of these organizations in a village has an impact on the socio-economic status of households, which in turn is associated with better child health.

Several theorists and researchers have spoken about generalized trust, increased solidarity and support resulting from social capital (for instance, Varshney, 2002; Kawachi, 1999; Putnam, 2001; Carpiano, 2006; Saegert, Winkel. & Swartz, 2002). I have not added any measures of trust or cohesiveness within the community in this analysis. One of the primary reasons for this exclusion was because it is hard to assess whether it was trust or support that led to the development and successful functioning of these

organizations. Secondly, IHDS does not have specific measures for generalized trust (Vanneman, Desai, & Noon, 2006). However, there are indicators that can be used as indicators of cohesion such as whether people get along with each other and bond together to solve problems. Future work will assess if these measures explain how social organizations impact outcomes.

One of the weaknesses of social capital literature is its inability to recognize the gender-specific nature of social capital. Often, measures of structural social capital such as membership in associations are measured for the entire household. We do not have specific measures for women, and in this case for mothers of children. However, children are raised in households and even though mothers are often the primary caregivers, entire households are impacted by the information, norms and resources that are made available by community based groups. Hence, this analysis is useful in assessing if household and community based social capital is a determinant of child health.

However, I have tried to conceptualize and test the pathways through which social capital can impact children via mothers, specifically by influencing their health knowledge, empowerment, and fertility preferences and hence it would have been beneficial to have specific information about the mother's participation in these organizations. The pathways might have emerged as stronger routes through which social capital operates if they *were* specifically measuring mother's social capital. Similarly, it would be useful to have measures of what father's do and how they impact child health. It is plausible that father's social capital might impact the child's environment through increased resources as well as improved health service utilization among others.

Lastly, while the current study focused on social capital at the village level, others have studied the relationship between social capital and health at the national level (e.g. Poortinga, 2006) and state level (e.g., Kawachi, Kennedy, & Glass, 1999). It is an empirical question as to which is the most important level through which social capital can impact health outcomes but village or neighborhood level might be best suited for this measure of social capital i.e. neighborhood organizations. Some may argue that it is districts and not villages that should be the level at which the impact of contextual level factors should be assessed (Vanneman & Vikram, 2015). The specific mechanisms through which social capital might operate would be very different at different levels. For example, while social capital at the national level probably influences the functioning of health institutions, social capital at the community or neighborhood level may be more about social support or influencing fertility norms.

Future Directions

Even though, I have this unique data that provides us with a great amount of information about social capital and the different pathways through which it operates, it does not provide any information on the specific organizations that work in the village, their agenda, who they service and how they work. My education in family and child welfare in India and subsequent work experience in villages of West Bengal (Child in Need Institute) and slums of Mumbai provided me with an in-depth understanding of how some of these organizations might work to enable change in communities. There is also considerable research that links such organizations with increased community involvement to improved health. However, relatively little is known about how religious

or caste based organizations function in villages and how they might work to impact health and well being in villages. Future work should explore how these organizations work in villages and more importantly how they work differently in the two regions on India.

Figure 3.1: Social Capital and Childhood Undernutrition in India

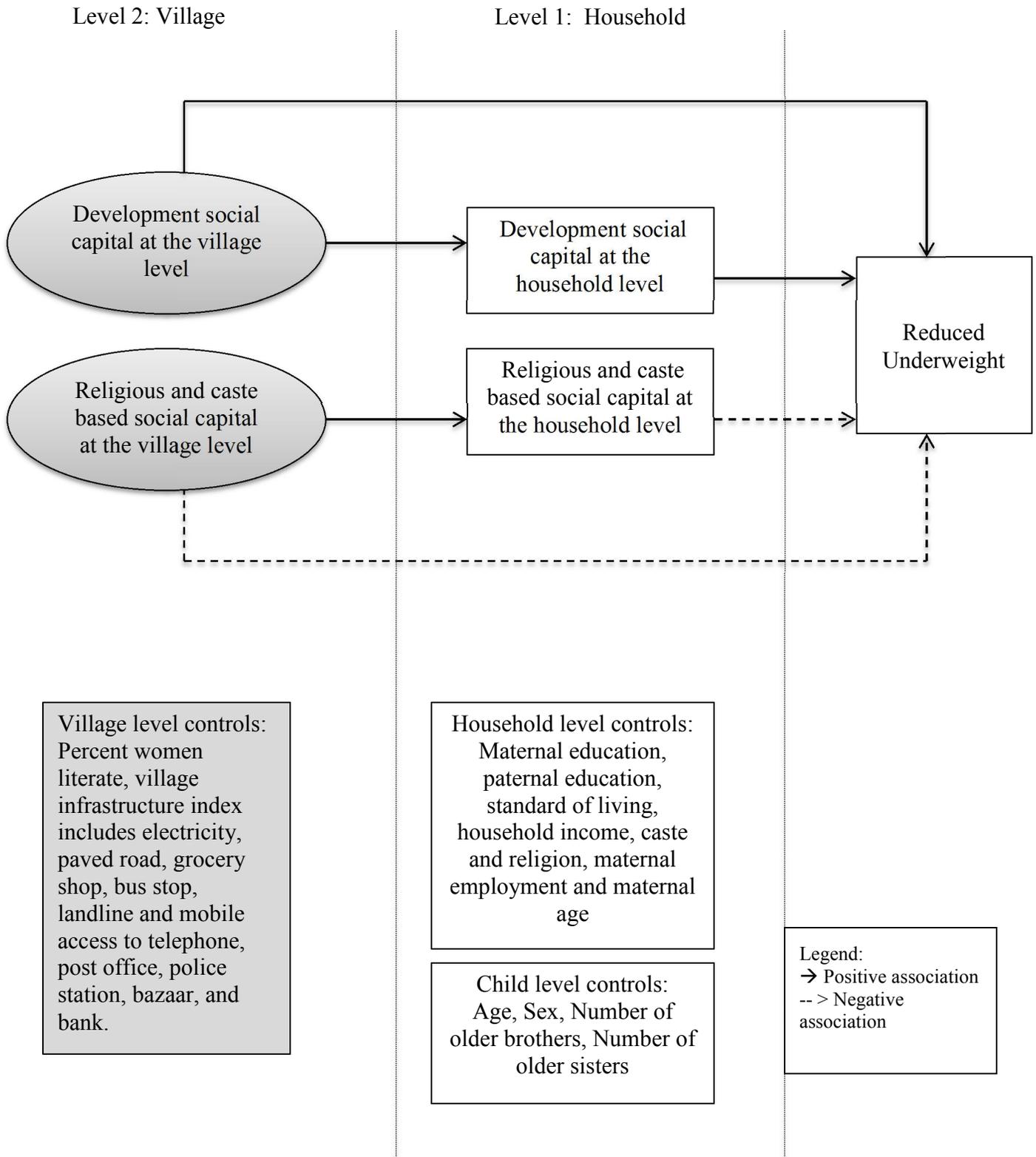
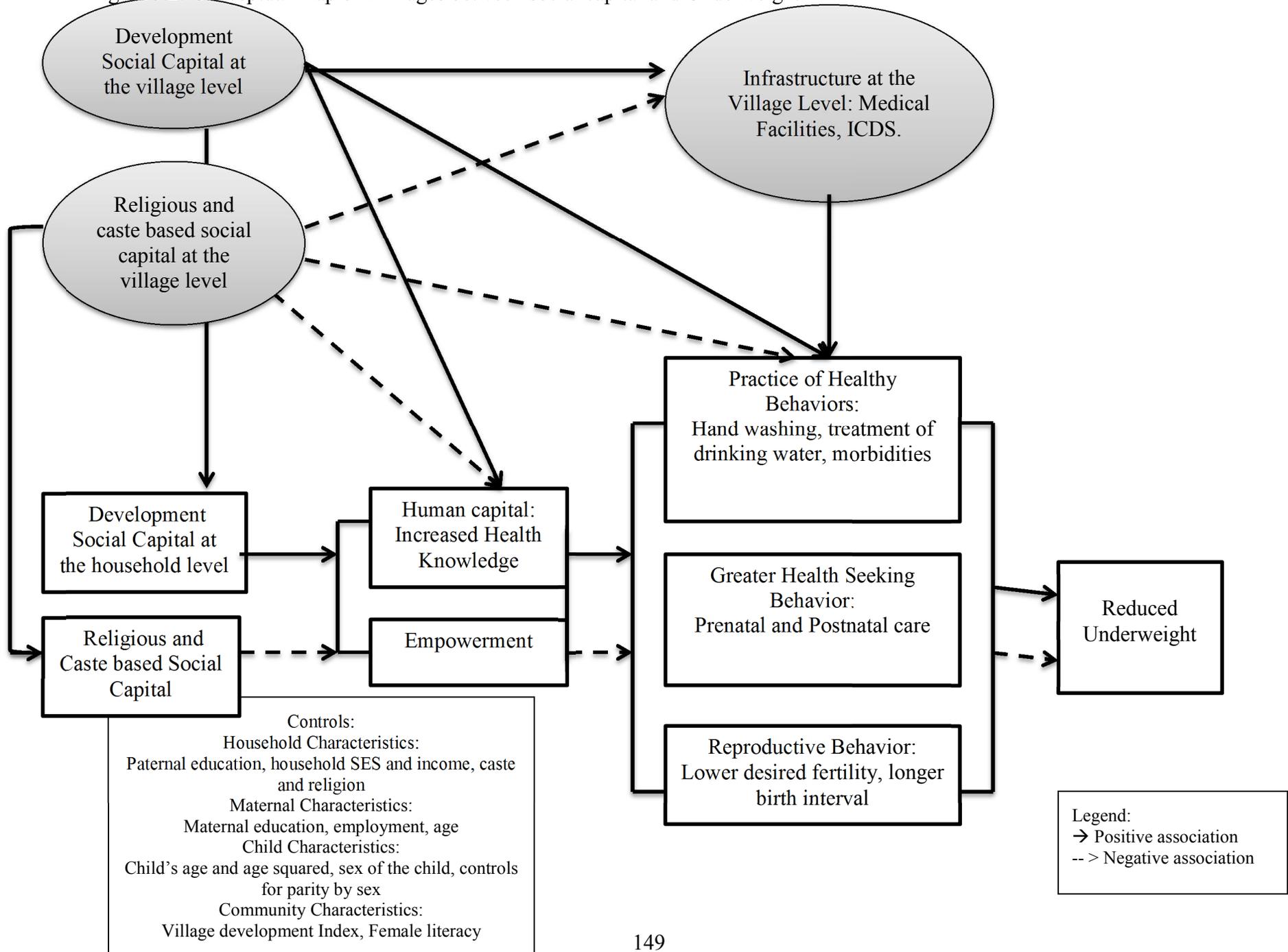
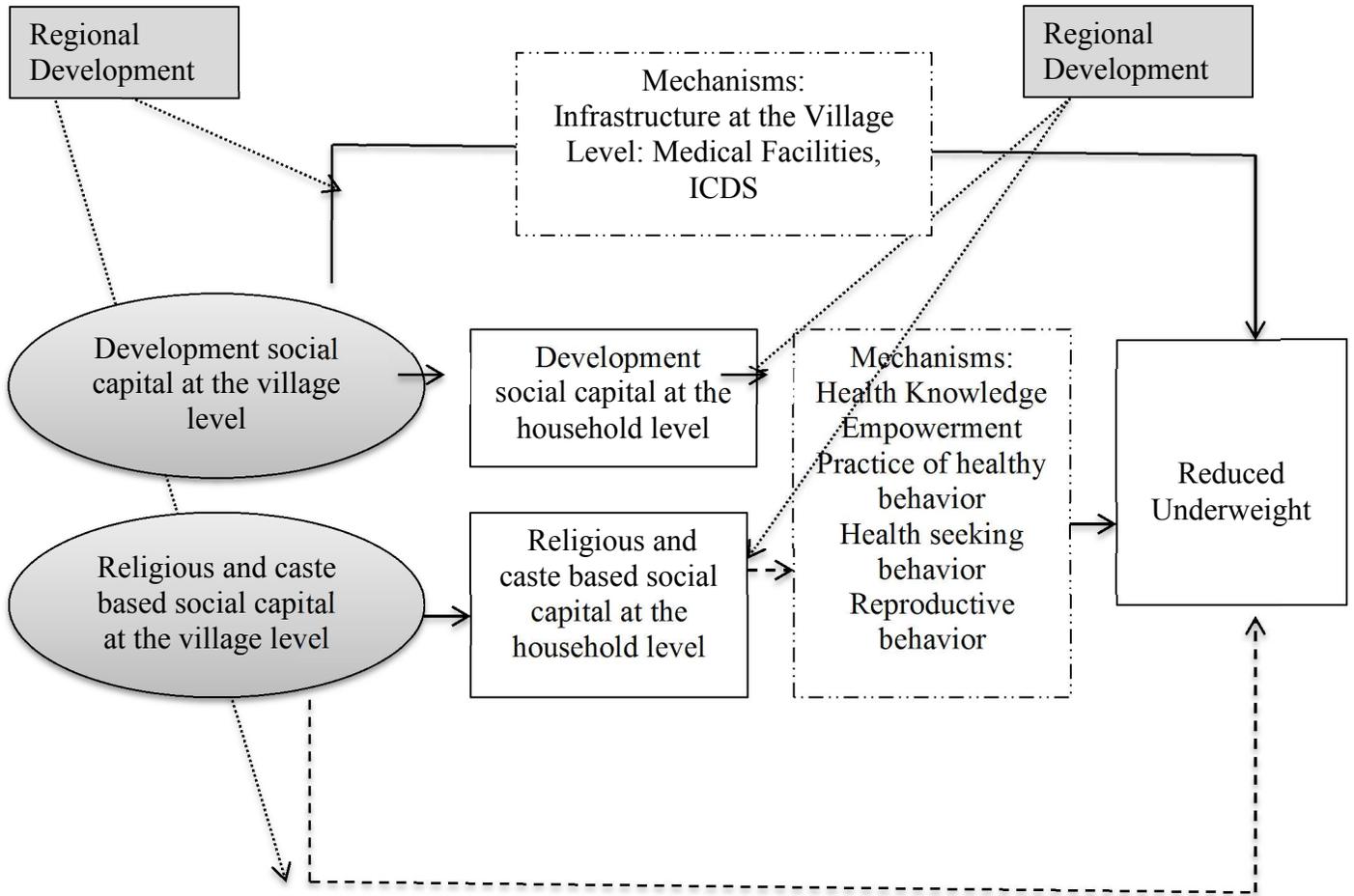


Figure 3.2: Conceptual Map of Linkages between social capital and Underweight





Village level controls:
 Percent women literate, village infrastructure index includes electricity, paved road, grocery shop, bus stop, landline and mobile access to telephone, post office, police station, bazaar, and bank.

Household level controls:
 Maternal education, paternal education, standard of living, household income, caste and religion, maternal employment and age.

Child level controls:
 Age, Sex, Number of older brothers, Number of older sisters

Legend:
 → Positive association
 --> Negative association
 Moderators

Figure 3.3: Map for Dissertation

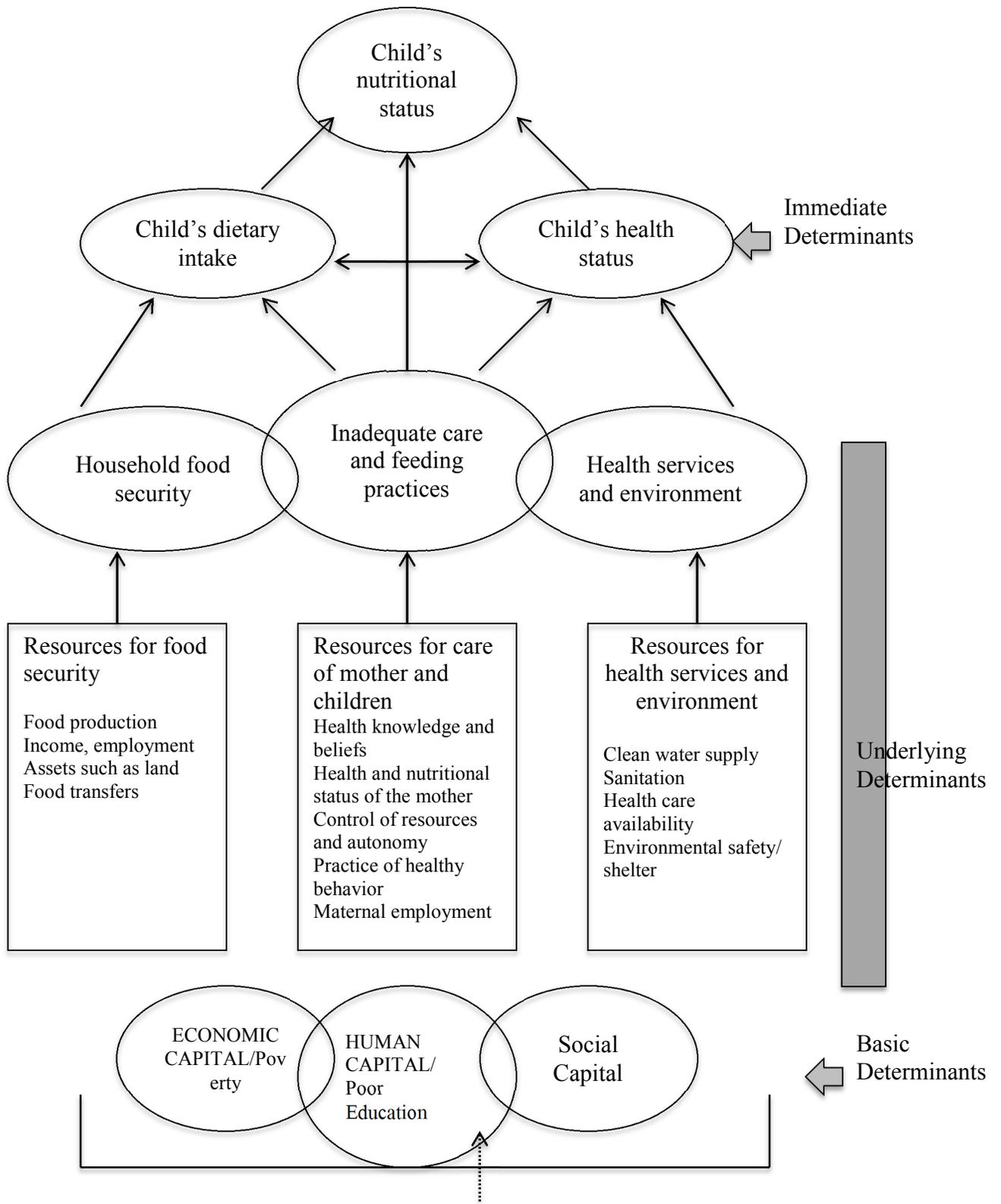
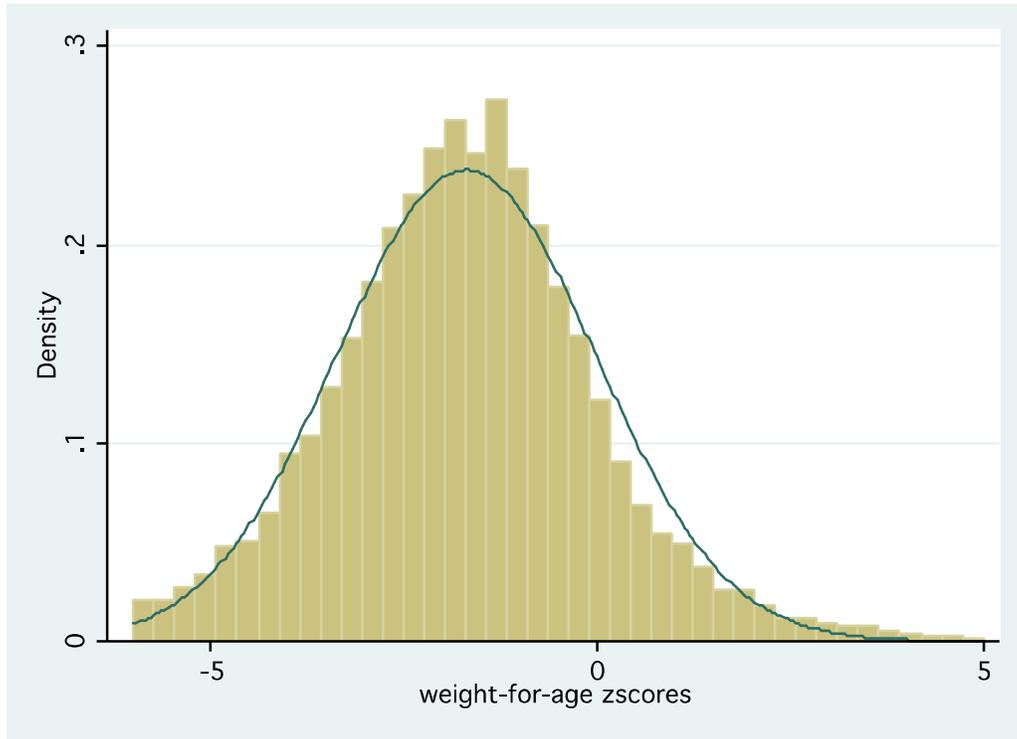


Figure 3.4: Social, Political, Economic, and Cultural Context

Figure 4.1: Distribution of 'weight-for-age' z-scores in children under five



Source: India Human Development Survey 2004-05; n = 10,500

Table 4.1: Percent Households Connected to Different Associations

Women's Groups	6.1
Youth/Sports/Reading Group	3.3
Trade Union/Business	3.0
Self Help Group	8.5
Credit/Savings Group	7.1
Development/NGO	1.4
Cooperatives	4.4
Religious/Social Assn.	15
Caste Association	15.8

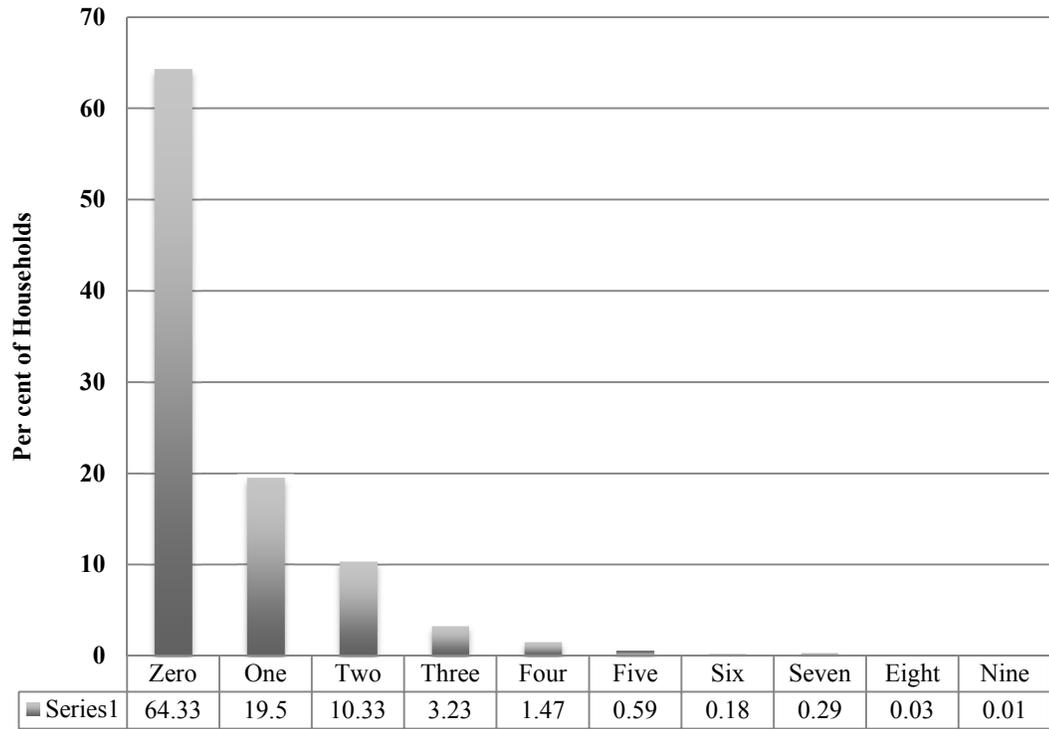
Source: India Human Development Survey 2004-05; n = 6,120

Table 4.2. Strength of Association Across Different Organizations in Rural India (Cramer's V)

	Women's groups	Youth group	Trade Union	Self Help Group	Credit/Savings Group	Development/NGO	Cooperative	Religious Assn.	Caste Assn.
Member Women's Groups	1.00								
Member Youth/Sports/Reading Group	0.25	1.00							
Member Trade Union/Business	0.11	0.22	1.00						
Member Self Help Group	0.34	0.19	0.18	1.00					
Member Credit/Savings Group	0.24	0.17	0.09	0.31	1.00				
Member Development/NGO	0.10	0.17	0.10	0.12	0.09	1.00			
Member Cooperative	0.12	0.20	0.10	0.09	0.13	0.10	1.00		
Member Religious/Social Assn.	0.09	0.17	0.11	0.08	0.15	0.15	0.16	1.00	
Member Caste Association	0.11	0.14	0.16	0.12	0.09	0.13	0.07	0.47	1.00

Source: India Human Development Survey 2004-05; n = 6,120

Figure 4.2: Distribution of Memberships in Organizations Across Households



Source: India Human Development Survey 2004-05; n = 6120

Table 4.3: Distribution of the Sample Across Bridging and Bonding Social Capital

	Households not connected to development groups	Households connected to development groups	Total (Percentage)
Households not connected to religious or caste based groups	4,429 65.4%	960 14.2%	5,389 (79.5%)
Households connected to religious or caste based groups	825 12.2%	562 8.3%	1,387 (20.5%)
Total (Percentage)	5,254 (77.5%)	1,522 (22.5%)	6,776 (100%)

Source: India Human Development Survey 2004-05

Figure 4.3 Distribution of Social Capital According to Household Standard of Living

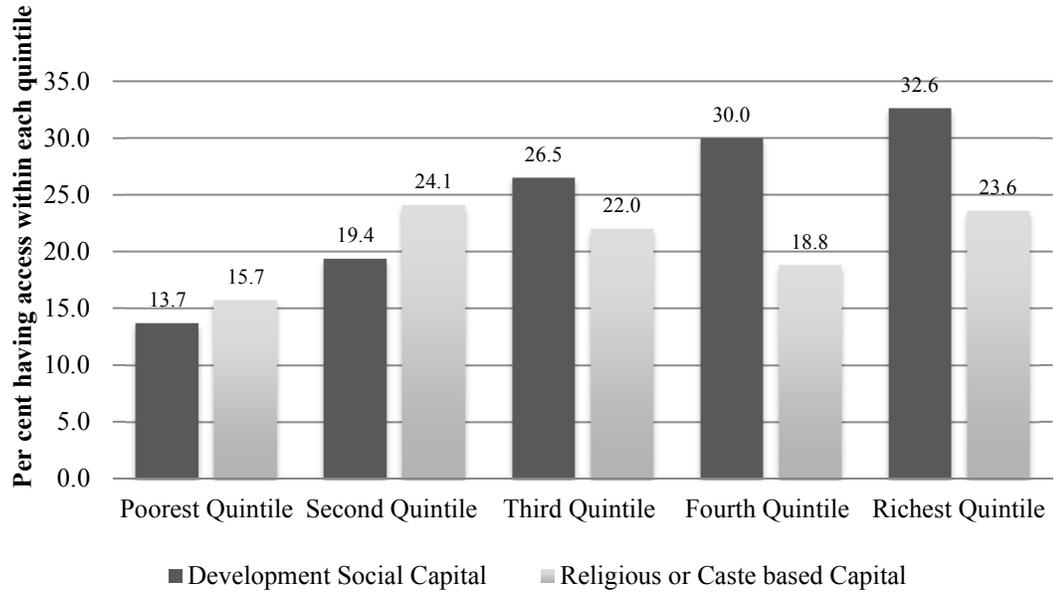


Figure 4.4 Distribution of Social Capital according to Maternal Education

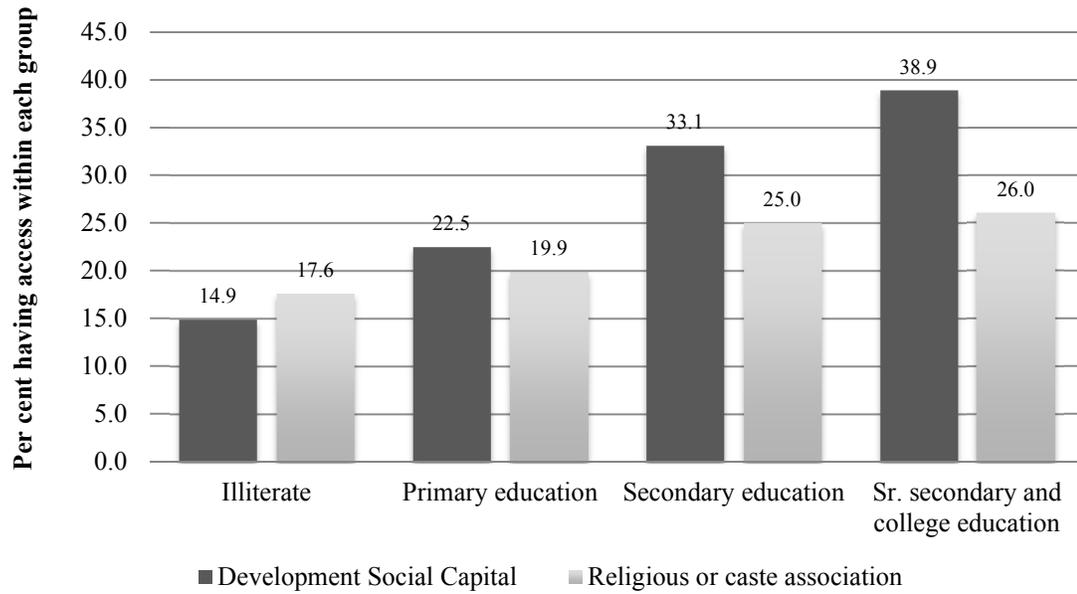
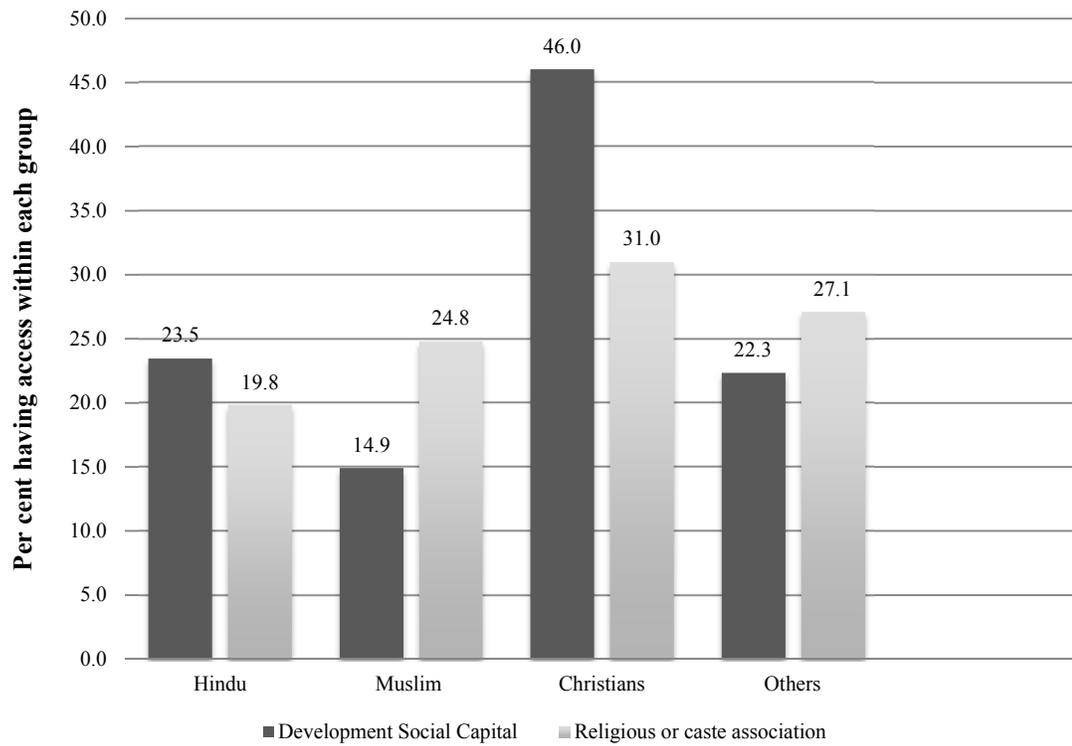


Figure 4.5. Distribution of Social Capital according to Religion



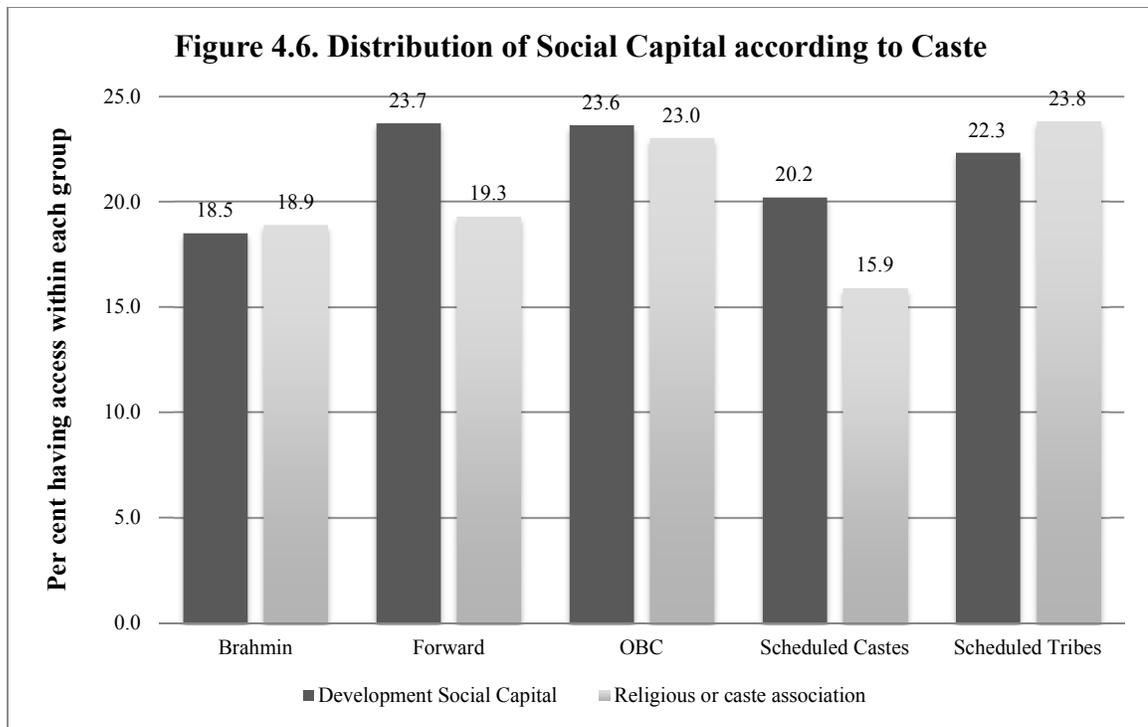


Table 5.1: Table of Means and Standard Deviations

<i>Dependent Variable</i>	Mean	SD	Range
Underweight (children under 5 years of age)	0.46	0.50	0-1
<i>Village Level Variables</i>			
Development Social Capital	2.47	1.86	0-7
Religious or Caste based Social Capital	0.85	0.83	0-2
Village Development Index	5.89	2.71	0-11
Literate Females in Village	0.42	0.17	0-87
<i>Household Level Variables</i>			
Development Social Capital	0.37	0.84	0-7
Religious or Caste based Social Capital	0.27	0.58	0-2
Maternal Education: Illiterate	0.51	0.50	0-1
Primary education	0.16	0.37	0-1
Secondary education	0.26	0.44	0-1
Sr. secondary and college education	0.07	0.25	0-1
Father's Education: Illiterate	0.27	0.44	0-1
Primary education	0.17	0.38	0-1
Secondary education	0.38	0.49	0-1
Sr. secondary and college education	0.15	0.36	0-1
Missing	0.03	0.16	0-1
Caste: Brahmin	0.04	0.19	0-1
Forward Castes	0.21	0.41	0-1
Scheduled Tribe	0.11	0.31	0-1
Scheduled Caste	0.24	0.43	0-1
Other Backward Classes	0.40	0.49	0-1
Religion: Hindu	0.79	0.41	0-1
Muslim	0.12	0.32	0-1
Other Religions	0.09	0.20	0-1
Child Characteristics: Child's Age (Months)	26.05	1.38	0-5
Sex of the Child (Female=1)	0.46	0.50	0-1
Number of boys born earlier	0.72	0.93	0-7
Number of girls born earlier	0.84	1.06	0-8
Household's Economic Status: Log of Income	10.17	0.93	6.91-14.09
Index of Household Goods	9.40	5.22	0-30
Total Agricultural Land (in acres)	1.53	4.29	0-200
Maternal Characteristics: Age	27.40	5.77	15-49
Housewives	0.39	0.49	0-1
Self employed women	0.24	0.43	0-1
Women employed outside households	0.11	0.31	0-1
Women holding more than one job	0.26	0.44	0-1

Source: India Human Development Survey (2004-05). There are a total of 6120 observations in 3129 villages.

Table 5.2: Log odds of Child Underweight, Stepwise Multilevel Models

	Model 1 Null Model	Model 2 Contextua l Social capital	Model 3 Adding Village controls	Model 4 Househol d Social capital	Model 5 Adding Househol d Controls
Fixed effects					
Community-level explanatory variables					
Development Social Capital		-0.077** (0.031)	-0.017 (0.032)	-0.005 (0.034)	-0.018 (0.032)
Religious and Caste based Social Capital		-0.129* (0.066)	-0.103 (0.068)	-0.107 (0.073)	-0.097 (0.065)
Village Development Index			-0.05* (0.023)	-0.055** (0.023)	-0.040^ (0.022)
Women Literacy			-1.097*** (0.302)	-1.118*** (0.313)	-0.003 (0.340)
Individual- and household-level variables					
Development Social Capital				-0.192*** (0.048)	-0.152** (0.048)
Religious or Caste based Social Capital				0.100 (0.068)	0.164* (0.069)
Maternal Characteristics					
Maternal age					-0.024* (0.011)
Employment					0.050 (0.119)
Self employed women (Ref. Housewives)					-0.239^ (0.147)
Women employed outside households					-0.027 (0.150)
Women holding more than one job					
Maternal Education: (Ref: None)					
Primary education					-0.488*** (0.117)
Secondary education					-0.311* (0.148)
Sr. secondary and college education					-0.121 (0.230)
Household Characteristics					
Index of Household goods					-0.041** (0.014)
Log of Income (mean centered)					-0.063 (0.055)

Paternal Education (Ref: None)					
Primary education					0.019 (0.136)
Secondary education					-0.144 (0.121)
Sr. secondary and college education					-0.435* (0.184)
Missing father's education					-0.364 (0.251)
Caste: Brahmin (Ref: Forward caste)					-0.263 (0.288)
Scheduled Tribe					0.329^ (0.203)
Scheduled Caste					0.055 (0.152)
Other Backward Classes					-0.052 (0.119)
Religion: Muslim (Ref: Hindu)					-0.293* (0.162)
Other Religions					-0.474* (0.217)
Agricultural land					-0.002^ (0.001)
Child Characteristics					
Child's age in months (centered)	0.007^ (0.004)	0.007^ (0.004)	0.007* (0.003)	0.008* (0.004)	0.010* (0.004)
Child's age squared	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Child's sex (girl=1)	-0.057 (0.085)	-0.057 (0.085)	-0.061 (0.086)	-0.072 (0.086)	-0.102 (0.089)
Boys born before	0.128** (0.048)	0.128** (0.048)	0.115** (0.040)	0.108** (0.040)	0.111^ (0.058)
Girls born before	0.136*** (0.039)	0.136*** (0.039)	0.128*** (0.039)	0.127*** (0.038)	0.133** (0.047)
Random Effects					
Between village variance	10.5	8.3	7.8	7.8	6.7
Intercept	0.099^ (0.053)	0.513*** (0.106)	1.040*** (0.170)	0.983*** (0.169)	0.589** (0.200)
-2LL	17519.6	17514.6	17584.6	17583.4	17562.6

Note: There were 6120 total observations within 3129 communities. ^ p<0.10* p<0.05, ** p<0.01, *** p<0.001; ICC=Intra-class correlation; LL=Log likelihood.

Table 6.1: Table of Means and Standard Deviations for Mechanisms

	Mean	SD	Range
Health Knowledge (measure of accurate knowledge)			
Milk when pregnant	0.73	0.44	0-1
Sterilization can lead to long term weakness	0.26	0.44	0-1
Colostrum is beneficial	0.74	0.44	0-1
Smoke harmful to the child	0.82	0.39	0-1
Fluids during diarrhea	0.59	0.49	0-1
Female Empowerment			
Visit health center	0.82	0.39	0-1
Decision making regarding child health	0.84	0.37	0-1
Veiling	0.66	0.47	0-1
Health Seeking Behavior			
Antenatal care index (IFA, ANC checkups and TT injections)	1.56	1.01	0-3
Postnatal checkup	0.28	0.45	0-1
Reduced Fertility			
The total number of children desired	2.53	0.96	0-10
Contraceptive use	0.41	0.49	0-1
Healthy Behaviors			
Hand washing after defecation	0.36	0.48	0-1
Treatment of drinking water	0.14	0.34	0-1
Exclusive breastfeeding for 6 months	0.54	0.50	0-1
Start of supplementary feeding after 6 months of exclusive breastfeeding	0.63	0.48	0-1
Morbidities (Percentage of children with diarrhea, respiratory infections or fever)	0.11	0.31	0-1
ICDS services			
Nutrition supplementation daily or weekly	0.17	0.38	0-1
Nutrition supplementation biweekly or monthly	0.07	0.26	0-1

Source: India Human Development Survey 2004-05; n = 6,120

Table 6.2 Log-odds of Child Underweight

Community-level explanatory variables	Base Model		Health Knowledge and Empowerment		Health Seeking		Fertility		Health Behavior		ICDS		All Pathways	
	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE
Development Social Capital	-0.01	0.03	0.00	0.03	-0.01	0.03	-0.01	0.03	-0.02	0.03	0.00	0.03	0.02	0.03
Religious and Caste based Social Capital	-0.09	0.07	-0.11	0.07	-0.10	0.07	-0.11	0.07	-0.10	0.07	-0.11	0.07	-0.12	0.07
Village Development Index	-0.03	0.02	-0.03	0.02	-0.03	0.02	-0.03	0.02	-0.03	0.02	-0.04	0.02	-0.03	0.02
Women Literacy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Individual- and household-level variables														
Development Social Capital	-0.15**	0.05	-0.14**	0.05	-0.13**	0.05	-0.14**	0.06	-0.16**	0.05	-0.13*	0.05	-0.12*	0.05
Religious or Caste based Social Capital	0.15*	0.07	0.15*	0.07	0.15*	0.07	0.13	0.08	0.15*	0.07	0.15*	0.07	0.13	0.07
Health Knowledge														
Milk when pregnant			-0.01	0.11	-0.02	0.11	-0.02	0.12	-0.02	0.11	-0.00	0.11	-0.00	0.11
Sterilization can lead to long term weakness			-0.00	0.09	-0.00	0.09	-0.02	0.03	-0.01	0.09	-0.00	0.10	-0.01	0.09
Colostrum is beneficial			0.12	0.08	0.14	0.08	0.13	0.10	0.13	0.08	0.14	0.10	0.14	0.09
Smoke harmful to the child			-0.22*	0.10	-0.24*	0.10	-0.29*	0.11	-0.18	0.10	-0.20*	0.10	-0.23*	0.10
Fluids during diarrhea			-0.08	0.09	-0.06	0.09	-0.03	0.10	-0.08	0.09	-0.08	0.09	-0.03	0.09
Female Empowerment														
Visit health center			-0.03	0.10	-0.04	0.10	-0.03	0.10	-0.03	0.10	-0.05	0.10	-0.05	0.10
Decision making regarding child health			0.02	0.11	0.03	0.11	0.02	0.11	0.02	0.11	0.02	0.11	0.06	0.11
Veiling			0.35***	0.10	0.32***	0.10	0.35***	0.10	0.35***	0.10	0.32***	0.10	0.30***	0.10
Health Seeking Behavior														
Antenatal care (3 or more checkups)					-0.10*	0.10							-0.02	0.10
Postnatal checkup					-0.22*	0.11							-0.22*	0.11
Reduced Fertility														
The total number of children desired							0.15**	0.06					0.14**	0.05
Contraceptive use							-	0.10					-0.44***	0.10

Secondary education	-0.18	0.12	-0.21	0.12	-0.21	0.12	-0.15	0.12	-0.17	0.12	-0.20	0.12	-0.17	0.13
Sr. secondary and college education	-0.48**	0.18	-0.52**	0.18	-0.54**	0.18	-0.43**	0.18	-0.48**	0.18	-0.52***	0.18	-0.45*	0.18
Missing father's education	-0.43*	0.21	-0.50*	0.21	-0.49*	0.21	-0.54*	0.26	-0.45*	0.21	-0.51*	0.21	-0.59**	0.27
Caste: Brahmin (Ref: Forward caste)	-0.28	0.24	-0.33	0.25	-0.38	0.25	-0.22	0.29	-0.28	0.24	-0.35	0.24	-0.38	0.25
Scheduled Tribe	0.33	0.18	0.34	0.18	0.32	0.18	0.38*	0.18	0.31	0.18	0.40*	0.18	0.45*	0.19
Scheduled Caste	0.08	0.14	0.06	0.14	0.06	0.14	0.04	0.14	0.09	0.14	0.08	0.14	0.04	0.14
Other Backward Classes	-0.05	0.12	-0.06	0.12	-0.06	0.12	-0.09	0.12	-0.05	0.12	-0.06	0.12	-0.11	0.12
Religion: Muslim (Ref: Hindu)	-0.26	0.15	-0.31*	0.15	-0.31*	0.14	-0.33*	0.16	-0.25	0.15	-0.26	0.15	-0.38*	0.16
Other Religions	-0.44*	0.20	-0.34	0.20	-0.33	0.20	-0.55*	0.22	-0.44*	0.20	-0.44*	0.20	-0.44*	0.20
Joint Families (Ref: Nuclear)	0.05	0.09	0.04	0.09	0.04	0.09	0.01	0.09	0.05	0.09	0.05	0.09	0.00	0.09
Child Characteristics														
Child's age in months (centered)	0.01*	0.00	0.01*	0.00	0.01*	0.00	0.01*	0.00	0.01*	0.00	0.01*	0.00	0.01*	0.00
Child's age squared	0.00***	0.00	0.00***	0.00	0.00***	0.00	0.00***	0.00	-0.00***	0.00	-0.00***	0.00	-0.00***	0.00
Child's sex (girl=1)	-0.09	0.09	-0.09	0.09	-0.09	0.09	0.11	0.09	-0.09	0.09	-0.08	0.09	-0.11	0.06
Boys born before	0.11	0.06	0.10	0.06	0.11	0.09	0.13	0.06	0.11	0.06	0.09	0.06	0.09	0.06
Girls born before	0.14**	0.04	0.13**	0.04	0.13*	0.06	0.12*	0.06	0.14**	0.04	0.13**	0.05	0.11*	0.05
Intercept	0.54**	0.19	0.44*	0.18	0.37*	0.18	0.43*	0.18	0.58**	0.19	0.44*	0.18	0.32	0.18
Random Effects														
Between village variance (ICC)	7.0		6.8		5.7		6.5		7.0		7.1		6.2	
-2LL	17862.2		17802.0		17804.0		17075.8		17858.0		17797.2		17022.2	

Source: India Human Development Survey 2004-05; n = 6,120 * p<0.05, ** p<0.01, *** p<0.001

Table 7.1: Child Health Indicators Across *Bimaru* and non- *Bimaru* States

	Stunting (Height- for-age)*	Wasting (Weight- for- height) *	Underweight (Weight-for-age)*	Infant mortality
India	48	19.8	42.5	57
<i>Bimaru states</i>				
Chhattisgarh	52.9	19.5	47.1	70.8
Madhya Pradesh	50.0	35.0	60.0	69.5
Uttar Pradesh	56.8	14.8	42.4	72.7
Bihar	55.6	27.1	55.9	61.7
Jharkhand	49.8	32.3	56.5	68.7
Orissa	45	19.5	40.7	64.7
Rajasthan	43.7	20.4	39.9	65.3
<i>Non- Bimaru states</i>				
Delhi	42.2	15.4	26.1	39.8
Haryana	45.7	19.1	39.6	41.7
Himachal Pradesh	38.6	19.3	36.5	36.1
Jammu & Kashmir	35	14.8	25.6	44.7
Punjab	36.7	9.2	24.9	41.7
Uttaranchal	44.4	18.8	38	41.9
West Bengal	44.6	16.9	38.7	48
Arunachal Pradesh	43.3	15.3	32.5	60.7
Assam	46.5	13.7	36.4	66.1
Manipur	35.6	9	22.1	29.7
Meghalaya	55.1	30.7	48.8	44.6
Mizoram	39.8	9	19.9	34.1
Nagaland	38.8	13.3	25.2	38.3
Sikkim	38.3	9.7	19.7	33.7
Tripura	35.7	24.6	39.6	51.5
Goa	25.6	14.1	25	15.3
Gujarat	51.7	18.7	44.6	49.7
Maharashtra	46.3	16.5	37	37.5
Andhra Pradesh	42.7	12.2	32.5	53.5
Karnataka	43.7	17.6	37.6	43.2
Kerala	24.5	15.9	22.9	15.3
Tamil Nadu	30.9	22.2	29.8	30.4

*Percentage below -2 SD

Source: National Family Health Survey 3 (2005)

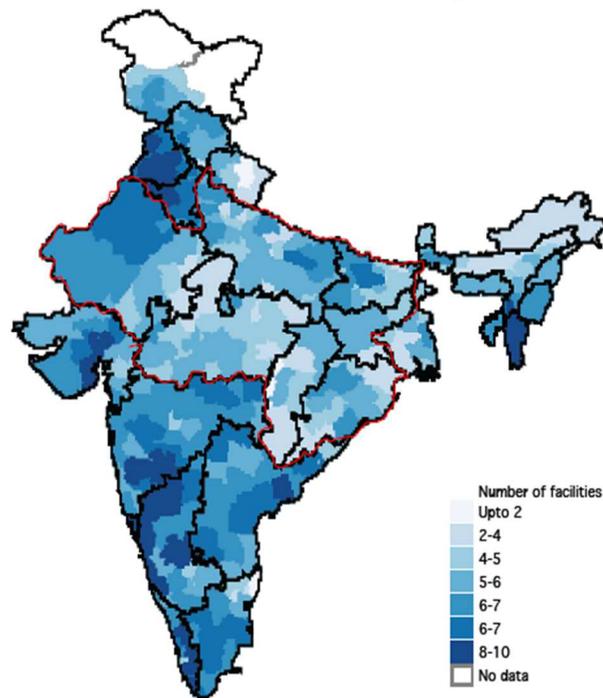
Table 7.2: Village and household characteristics across *bimaru* and non-*bimaru* states

	Less Developed Region		More Developed Region		Range
	Mean	SD	Mean	SD	
Village Level Variables					
Development Social Capital	1.69	1.47	3.01	1.91	0-7
Religious and Caste based Social Capital	0.69	0.79	0.96	0.83	0-2
Village Development Index	5.06	2.62	6.45	2.63	0-11
Percent women literate	33.32	14.94	47.26	16.75	0-87
Household Level Variables					
Development Social Capital	0.19	0.52	0.54	1.02	0-7
Religious and Caste based Social Capital	0.25	0.57	0.30	0.61	0-2
Dependent Variable					
Underweight	0.55	0.50	0.38	0.49	0-1
Maternal Education: Illiterate	0.66	0.47	0.37	0.48	0-1
Primary education	0.14	0.35	0.17	0.38	0-1
Secondary education	0.16	0.37	0.36	0.48	0-1
Senior Secondary and College education	0.03	0.18	0.10	0.30	0-1
Father's Education: Illiterate	0.31	0.46	0.22	0.41	0-1
Primary education	0.19	0.39	0.15	0.36	0-1
Secondary education	0.34	0.47	0.43	0.49	0-1
Senior Secondary and College education	0.13	0.34	0.18	0.38	0-1
Missing cases	0.04	0.19	0.02	0.15	0-1
Caste: Brahmin	0.05	0.21	0.3	0.17	0-1
Forward Castes	0.11	0.31	0.33	0.47	0-1
Scheduled Tribe	0.14	0.35	0.08	0.28	0-1
Scheduled Caste	0.23	0.42	0.25	0.43	0-1
Other Backward Classes	0.48	0.50	0.33	0.47	0-1
Religion: Hindu	0.86	0.35	0.78	0.41	0-1
Muslim	0.11	0.31	0.12	0.33	0-1
Other Religions	0.03	0.18	0.10	0.30	0-1
Child Characteristics					
Child's Age in months	26.09	15.45	26.36	16.67	0-60
Child's age squared	919.37	895.41	972.45	997.86	0-3600
Girl	0.47	0.50	0.44	0.50	0-1
Number of older brothers	0.92	1.03	0.54	0.78	0-8
Number of older sisters	1.00	1.15	0.70	0.95	0-9
Household's Economic Status					
Index of Household goods	11.24	5.31	7.46	4.31	0-27
Log of household income	9.93	0.94	10.36	0.95	6.9-14.09
Maternal Characteristics					
Maternal age	28.22	6.17	26.61	5.21	15-49

Employment categories:					
Housewives	0.33	0.47	0.41	0.49	0-1
Self-employed women	0.26	0.44	0.23	0.42	0-1
Women employed outside households	0.09	0.29	0.12	0.32	0-1
Women holding more than one job	0.31	0.46	0.22	0.41	0-1
Family Structure: Joint Family	0.56	0.50	0.61	0.49	0-1
Total Sample Size (Number of Villages)	3143(540)		3284(795)		

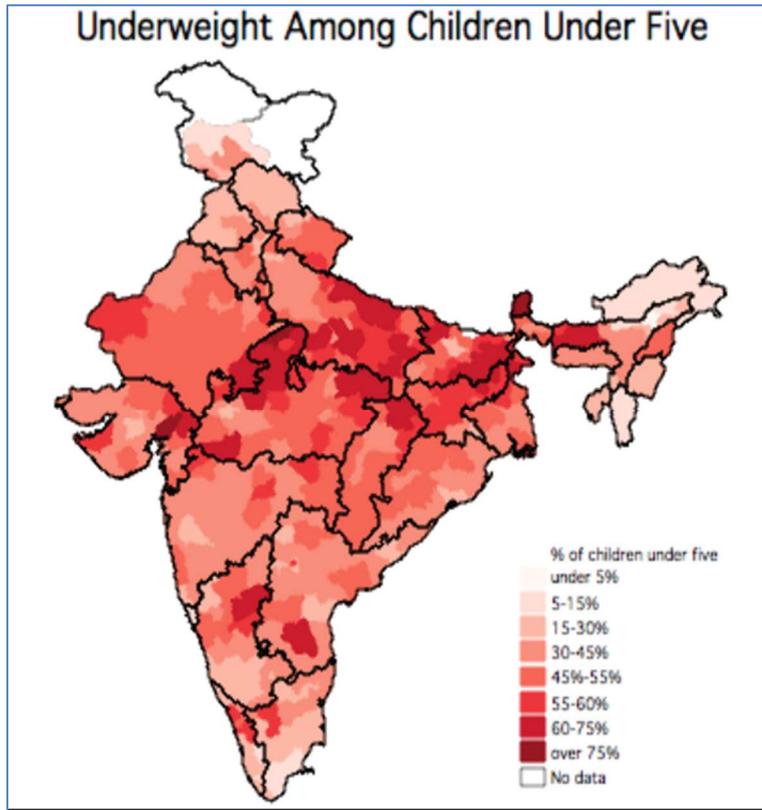
Source: IHDS Data 2004-2005; Note: There were 6120 total observations within 3129 communities

Figure 7.1: Distribution of Infrastructure across Rural India
Rural Infrastructural Development



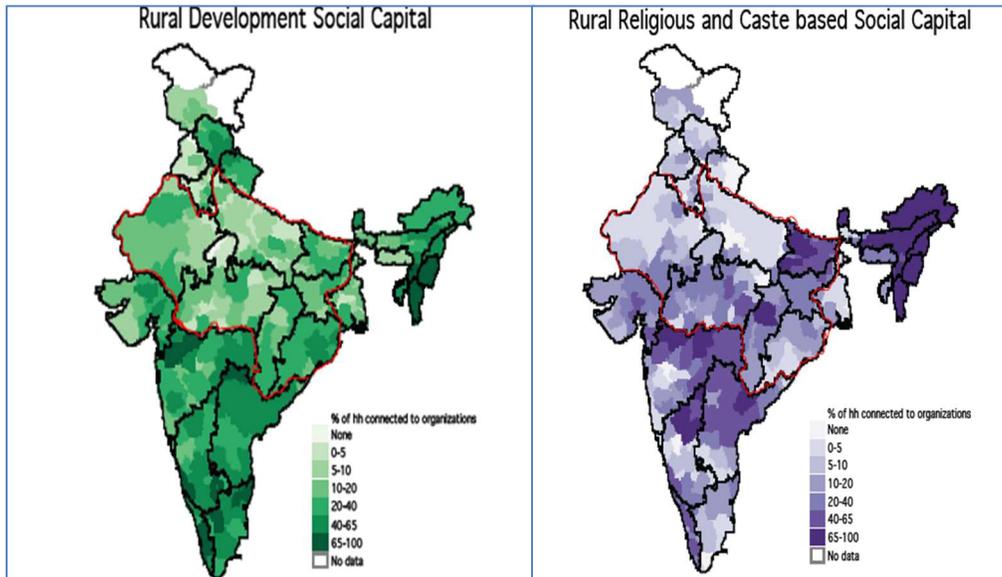
The area marked in red is the *bimaru* region. The map is not representative of the north-eastern region.

Figure 7.2: Distribution of Underweight Among Children Under Five



The map is not representative of the north-eastern region.

Figure 7.3: Distribution of Social Capital Across India



The area marked in red is the *bimaru* region. The map is not representative of the north-eastern region.

Table 7.3: Predictors of Child Underweight in the More Developed Region (non-*Bimaru*) and Less Developed Region (*Bimaru*) Regions of India.

<i>Fixed effects</i>	More Developed Region		Less Developed Region	
	Coefficient	Standard Error	Coefficient	Standard Error
<i>Intercept</i>	-0.17*	0.08	0.42*	0.22
Community-level explanatory variables				
Development Social Capital	0.03	0.04	0.01	0.05
Religious and Caste based Social Capital	0.18*	0.09	-0.30**	0.10
Village Development Index	-0.15***	0.03	0.06	0.03
Women Literacy	0.00	0.00	0.00	0.01
Individual- and household-level variables				
Development Social Capital	-0.19**	0.06	-0.10	0.12
Religious or Caste based Social Capital	0.13	0.10	0.17	0.12
Maternal Characteristics				
Maternal age	-0.03*	0.01	-0.02	0.01
Employment (Ref. Housewives)				
Self employed women	-0.04	0.14	0.06	0.16
Women employed outside households	-0.40*	0.18	0.04	0.24
Women holding more than one job	-0.16	0.17	0.00	0.22
Maternal Education: (Ref: None)				
Primary education	-0.32	0.17	-0.60***	0.18
Secondary education	-0.41*	0.18	-0.26	0.23
Senior secondary and college	-0.34	0.42	0.09	0.35
Household Characteristics				
Index of Household goods	-0.02	0.02	-0.06*	0.02
Log of Income (mean centered)	-0.02	0.08	-0.18*	0.08
Paternal Education (Ref: None)				
Primary education	0.17	0.20	-0.24	0.18
Secondary education	-0.04	0.17	-0.33*	0.17
Senior secondary and college	-0.30	0.24	-0.30*	0.24
Missing father's education	-0.46	0.38	-0.57	0.32
Caste: Brahmin (Ref: Forward caste)	-0.09	0.49	-0.52	0.37
Scheduled Tribe	0.52	0.29	-0.01	0.27
Scheduled Caste	0.26	0.18	-0.17	0.24
Other Backward Classes	0.11	0.16	-0.31	0.20
Religion: Muslim (Ref: Hindu)	-0.12	0.20	-0.37	0.23
Other Religions	-0.31	0.27	-0.46	0.33
Joint Family (Ref: Nuclear Families)	0.01	0.13	0.12	0.13
Child Characteristics				

Child's age in months (centered)	0.02**	0.01	0.00	0.01
Child's age squared	0.00	0.00	-0.00***	0.00
Child's sex (girl=1)	-0.26*	0.12	-0.03	0.13
Boys born before	0.08	0.08	0.09	0.07
Girls born before	0.06	0.07	0.17*	0.06
Random Effects				
Between village variance (ICC)	8.6		9.3	
-2LL	45690.5		43739.5	

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 7.4: Predictors of Child Underweight for Rural India

	Coefficient	Standard Error
Intercept	0.56***	0.18
Community-level explanatory variables		
Development Social Capital	0.07	0.05
Religious and Caste based Social Capital	-0.26***	0.09
Village Development Index	-0.04	0.02
Women Literacy	0.00	0.00
Non-Bimaru Region	-0.22	0.19
Development Social Capital*Non-Bimaru Region	-0.12*	0.06
Religious and Caste based Social Capital*Non-Bimaru Region	0.37**	0.12
Individual- and household-level variables		
Development Social Capital	-0.14	0.10
Development Social Capital*Non-Bimaru Region	0.01	0.12
Religious or Caste based Social Capital	0.14	0.09
Religious and Caste based Social Capital*Non-Bimaru Region	0.01	0.13
Maternal Characteristics		
Maternal age	-0.02*	0.01
Employment (Ref. Housewives)		
Self employed women	0.00	0.10
Women employed outside households	-0.17	0.13
Women holding more than one job	-0.05	0.12
Maternal Education: (Ref: None)		
Primary education	-0.45***	0.12
Secondary education	-0.19	0.12
Senior secondary and college	-0.49**	0.17
Household Characteristics		
Index of Household goods	-0.04**	0.01
Log of Income (mean centered)	-0.10*	0.05
Paternal Education (Ref: None)		
Primary education	-0.04	0.14
Secondary education	-0.30*	0.14
Senior secondary and college	-0.06	0.26
Missing father's education	-0.45*	0.21
Caste: Brahmin (Ref: Forward caste)	-0.27	0.25
Scheduled Tribe	0.30	0.18
Scheduled Caste	0.08	0.14
Other Backward Classes	-0.11	0.12
Religion: Muslim (Ref: Hindu)	-0.23	0.15
Other Religions	-0.47*	0.20
Joint Families (Ref: Nuclear)	0.05	0.09
Child Characteristics		
Child's age in months (centered)	0.01**	0.00
Child's age squared	-0.00***	0.00

Child's sex (girl=1)	-0.09	0.08
Boys born before	0.10	0.06
Girls born before	0.13**	0.04
Random Effects		
Between village variance (ICC)	5.7	
-2LL	17767.0	

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

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