Mothers' Community Participation and Child Health

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Abstract

We use rich data to assess the relationship between mothers' access to social capital via participation in community activities and their children's health in Indonesia. We exploit the advantages of longitudinal data and community fixed effects to mitigate some of the concerns about spuriousness and reverse causality that predominate in this literature. We find that children from families with relatively low levels of human and financial capital fare better with respect to health status when their mothers are more active participants in community organizations. In fact, the association between maternal participation and child health is strong, positive, and statistically significant only for children from relatively disadvantaged backgrounds, as measured by their mother's educational level and economic resources within the household. The results suggest that in resource-constrained settings, community involvement may benefit disadvantaged families, possibly by providing resources and information that would otherwise be inaccessible.

Key Words: social capital, child health, nutrition, volunteer participation, Indonesia

The costs and benefits of social engagement have long been of interest to social scientists. Whether social connectedness results in the accrual of "social capital" that in turn produces positive (or in some cases negative) outcomes for those who hold it, relative to those who do not, remains debated. In the sociological literature the question is often posed in terms of whether, and to what extent, individuals benefit from ties to groups. We investigate this question, asking whether women's links to others in their community translate into benefits with respect to children's health outcomes.

Previous studies link social capital to a number of measures of health and well-being in the developed world (for a review, see Macinko and Starfield 2001). Yet given that social capital is theorized to substitute for other forms of capital in some instances, it may be a particularly relevant concept in environments lacking well-developed infrastructure and access to education, such as rural areas, poorer communities, and developing countries (Kunitz 2004). Very little work has examined the link between social capital and health in resource-poor settings. Accordingly, the setting for our study is Indonesia. By focusing on a developing country, we provide a contrast with the far more extensive work on social capital and health that draws on data from the United States and Western Europe. Indonesia is also an interesting context for the study because many regions of the country boast a long-standing indigenous tradition of community involvement, which the government has tried to harness as a means of promoting its development objectives. Relatively little research, however, has examined the implications of these dynamics for well-being.

Following one strand of the literature, we conceptualize social capital as a collective property that is embedded in networks, but one that individual members of the collectivity may access differentially depending on the extent to which they participate in community

organizations. Intuitively, a causal relationship between mothers' community participation and relatively better health for their children could arise through several mechanisms. By interacting with other parents, mothers may acquire information that helps them raise healthier children. Mothers may also develop connections with women who can help provide care for the child, help them navigate the process of obtaining formal medical care, or help them interpret a health care provider's advice, or even the instructions on medicine, when the child is ill.

We use data from the Indonesia Family Life Survey (IFLS), which has several features that support a more sophisticated methodological approach than has typically been feasible in the empirical literature. Because the survey is longitudinal, we are able to consider health outcomes as a function of maternal participation measured at an earlier point in time, thus establishing a logical temporal ordering to the relationship. Because the survey includes physical assessments of child health status, we are able to measure health status using children's height, an indicator of nutrition and illness that is widely accepted as meaningful. The data also allow us to control for potentially confounding factors such as children's health at birth. Finally, we are able to control for a number of features of the community that could be correlated both with maternal participation and with child health outcomes.

SOCIAL CAPITAL AND ITS LINK TO HEALTH OUTCOMES

The concept of social capital originates in the work of Durkheim, and in particular the idea that individuals are embedded in a normative structure that regulates social life. Coleman played a seminal role in developing the theory of social capital, arguing that norms of reciprocity help establish and maintain connections between individuals, which can be called on for support, but simultaneously create an obligation to respond to others (Coleman 1988; Furstenberg 2005).

Much of Coleman's work centers on whether parents use the social capital embedded in community structures for the benefit of their children, which is the question on which we focus.

To guide this analysis, we draw on a social capital framework developed by Lin (2001), which starts with the proposition that individuals invest in social relations and expect that these investments will generate returns. The idea that individuals can use their social connections to enhance status attainment has received widespread attention over the past two decades. Studies at both the micro and macro levels have attempted to develop links between social capital and a diverse array of outcomes encompassing civic participation, employment, education, migration, health, and mortality. The rapid expansion of empirical work has been accompanied by well-founded concerns that the concept has become so broad and all-encompassing as to lose any utility as a measurable construct (Portes 1998).

In the interest of laying out a more rigorous approach to research on social capital, Lin (2001) formalizes his definition of social capital as "investment in social relations by individuals through which they gain access to embedded resources to enhance expected returns of instrumental or expressive actions (17)." This definition facilitates developing a strategy for empirical analysis, because it clarifies the processes underlying the basic concept. Specifically, investments in social capital generate network resources that individuals can access in order to claim returns of some sort.

One of the criticisms of empirical work on social capital contends that in some analyses the specified cause and its effect are so similar that a strong relationship between the two of them is almost tautological (for example, see the discussion of Putnam's work in Portes 1998: p20-21). To be credible, a postulated causal link between the investment in social capital and the return on that investment must involve investments and returns that are separate and distinct entities rather

than narrowly different indicators of the same underlying phenomenon (Furstenberg 2005; Portes 1998; Portes 2000). From an empirical perspective, then, it is desirable to relate individual-level measures of *accessing* community-level social capital to conceptually distinct individual-level measures of outcomes that are plausibly linked to the possession of such capital (Portes 1998).

Why might access to social capital affect health? Several causal mechanisms are thought to link the two endowments. For example, many social scientists argue that health is a form of human capital produced at the individual or the household level (Bolin et al. 2003; Grossman 1972). The theoretical underpinning of such models is that health is produced in large part by lifestyle choices, such as those related to nutrition, physical activity, and the use of medical care. Social networks present the possibility of sanctioning health-related behaviors and so potentially influence life style choices. Additionally, information obtained from other network members likely influences health-related choices. In periods of difficulty, networks may provide the resources necessary to seek expensive medical treatments or implement practitioners' advice.

Beyond influencing one's own health, social capital may well influence the health of other family members, including children. Where health is concerned, the strength of a social tie does not need to be remarkably strong to result in the sharing of relevant information. Particularly with respect to *child* health, information sharing may potentially benefit the giver of the information as well as the receiver. Unlike information related to income generation, wherein competitive neighbors, friends, and acquaintances may risk personal loss by information sharing, no substantial incentive exists to protect information related to children's health. In fact, given the transmission mechanisms of viral infection and disease, parents may actually benefit from good health among the children with whom their own children interact.

The role that social capital is posited to play in producing good health for children is

qualitatively similar to the mechanisms hypothesized to link maternal education and child health in developing settings. Research suggests that maternal education influences child health via three pathways: knowledge about health acquired in school aids parents in raising healthy children; literacy helps parents to correctly diagnose and treat ailments; and exposure to "modern" society through school may cause parents to embrace biomedically oriented methods of medicine for their own families (Glewwe 1999). In a setting such as Indonesia, where the average adult female has only an elementary school education, social interaction likely provides mothers with information they have not obtained through schooling. With respect to child health, this may include information ranging from the benefits of oral rehydration therapy to information about the location of preventive care providers.

Indeed, a large body of network research underscores the importance of these types of social ties as a key mechanism of ideational change (Behrman et al. 2002). Other research finds evidence of this type of information exchange among participants in community programs. For example, Barber et al. (2002) use rich qualitative data from Nepal to document how participation in voluntary community associations provides families with social support, and with economic and education benefits, while also providing a vehicle for changes in fertility limiting behavior.

The theoretical link between social capital and health is supported by several decades of epidemiological research, which concludes that social connections are of key importance to health. This research documents the association between the presence of individual social networks and mortality, the ability to rebound after serious illness, and mental health status overall (Kunitz 2004; Lindau et al. 2003; Seeman 1996).

Other studies document a significant association between various neighborhood-level measures of social capital and health. Perhaps the most well-known are those using data from

the Project on Human Development in Chicago Neighborhoods. For example, Morenoff (2003) uses this data to create neighborhood measures of connectedness capturing the frequency of offering favors, asking advice, and visiting neighbors ("reciprocated exchange") and voluntary participation in local groups ("voluntarism"). Results suggest that these measures are significantly and positively associated with birthweight of children in the communities.

Several studies find evidence of links between individual/familial access to community social capital and child health. Runyan et al. (1998) use data from the Longitudinal Studies of Child Abuse and Neglect Consortium to assess the correlates of child well-being. Mothers who report having personal social support and who are involved in community affiliations are significantly less likely to have children with behavioral or developmental problems (as assessed by standardized tests), than are mothers who report having less social support. Carter and Maluccio (2003) use height-for-age data to measure family ability to manage economic shocks in South Africa. They suggest that one measure of familial coping success is the ability to provide adequate nutrition to their children, which can be measured by levels of stunting. The authors find that the presence of community ties significantly aids the ability to manage economic shocks to the extent that adequate nutrition can be provided to children. Kana'iaupuni et al. (2005) assess the relationship between maternal kin ties and mothers' reports of children's general health status in a region of northern Mexico. The authors find evidence that the frequency with which mothers interact with their kin is positively associated with the probability that mothers report their children are in good health.

Much of the previous research has produced interesting and informative results, but in only a few cases can one conclude that participation or community social capital *causes* better child health. A commonly cited concern with existing work is the inability to consider potential

alternative explanations because of data that is either limited to one point in time or does not include enough information to test competing hypotheses (e.g., Macinko and Starfield 2001). An inherent difficulty is that an individual's time or monetary investments that provide access to social capital represent a choice, just as the behaviors that contribute to health are choices. The characteristics that influence investments in activities that promote social capital are also likely to influence health (or the health of one's children), and failure to take them into account will lead to a biased estimate of the relationship between social capital and health outcomes.

By using rich longitudinal data that allow us to address concerns of temporal ordering, to test a number of competing hypotheses, and to hold constant all observed and unobserved time-invariant features of communities that may predict both mothers' social engagement and children's health, we are able to sidestep many of these potential threats to causal inference. Because this approach in part reflects aspects of the Indonesia setting, we turn to a discussion of context and then describe our data and methods in detail.

THE INDONESIAN CONTEXT

Over the last 40 years, Indonesia has experienced formidable economic and social change. From 1965 to 1997, per capita GDP increased at an average annual rate of over 5 percent a year. Levels of educational attainment rose as well; from 1965 to 1997, the proportion of women aged 15-19 with no formal education fell from one third to nearly zero, while the proportion of women in the same age group who had completed primary education, increased from less than a fifth to more than half (Central Bureau of Statistics 1998). Demographic change in the form of falling levels of both fertility and infant mortality has been equally substantial.

A hallmark of socioeconomic development in Indonesia has been the involvement of

local organizations that draw on the time and energy of local community volunteers. In many instances such programs began as grass roots initiatives and were subsequently adopted by higher levels of government as regional or national programs. Indonesia, in fact, is often cited as a success story by donor organizations for the development of such programs (Shiffman 2002; World Bank 2003). The goals of the various community programs differ, but include improving preventive health care, education, sanitation, security, and village upkeep (Wibisana et al. 1999).

The emphasis on community engagement is often traced to the Javanese concepts of *gotong royong*, or "mutual assistance," and *rukun*, "communal harmony." Anthropologists describe *gotong royong* and *rukun* as a genuinely indigenous concepts of moral obligation, generalized reciprocity, and community solidarity, but note that the state has harnessed the concepts as a means of mobilizing village labor (Bowen 1986; Geertz 1962).

Programs that rely on extensive participation by community members take many forms. However, most began at the grassroots level and were later replicated across the country. For example, one program with high levels of participation is the village women's association, *Pendidikan Kesejahtraan Keluarga,* known as the PKK. A small group of women founded the PKK in 1967, guided by the idea that improving family welfare provides the foundation for a better society. Volunteers in the PKK share the goal of providing village women with improved basic skills, such as education, household resource management, nutrition, health care, and environmental maintenance (Prawiro 1998). As participation in the PKK grew, the association took on larger projects. The PKK has been instrumental in providing increased access to family planning and children's health care through the development and proliferation of community health posts in the 1980's. The posts are still maintained by volunteers in the women's association (PKK) and are now found in nearly every Indonesian village (Prawiro 1998).

The functions of other community programs include waste management groups, adolescent youth groups, and burial societies. Grootaert and colleagues (1999) investigate the various Indonesian community programs in detail in the Local Level Institutions Study, which assessed community programs in three Indonesian provinces in the late 1990's. The results support the idea that participation in social organizations in Indonesia constitutes serious and meaningful involvement. For the types of groups we consider in this paper, Grootaert finds that meetings are relatively frequent, individuals have an active role in decision making, and most respondents consider participation "very important to the household" (1999).

Programs that involve active participation on the part of community members are found across the country; indeed, at least one type of volunteer program existed in every one of the 309 IFLS communities in 1997 (these data are described in detail in the subsequent section). In this study, we focus on mothers' participation in five such programs: community meetings, village cooperatives, voluntary labor associations, village improvement projects, and the village women's association. Table 1 draws on the IFLS data (described in more detail below) and presents descriptive statistics of mothers' volunteer participation in community programs. Thirty seven percent of mothers participated in at least one program in the year prior to interview. Among those who participate, about one third are involved in multiple programs. With respect to the type of activity in which one is involved, participation levels are highest for community meetings, the women's association (PKK), and voluntary labor.

(Table 1 about here)

It is important to note that none of these programs is specifically geared toward improving children's health; this feature is essential to the interpretation of our results. If the programs in which mothers participate target child health, a positive association between

participation and children's health would likely reveal the effect of the programs, and not necessarily the social capital generated by participating. While the women's association has historically played a key role in developing village health services, IFLS respondents report separately about participation in the children's health-related programs that the women's association first developed. Some of the above programs may indirectly improve conditions in the village (e.g., sanitation systems) but these improvements will likely affect all children in a village. As we describe in the next section, our methodological approach addresses such potentially confounding across-community heterogeneity.

DATA AND METHODS

The Indonesia Family Life Survey is an ongoing longitudinal survey that began in Indonesia in 1993. We use data from the 1997 and 2000 waves (waves 2 and 3). The IFLS sampling scheme stratifies on province and urban/rural location, selecting a total of 321 enumeration areas from 13 provinces, which represent about 83% of Indonesia's 1993 population. Households, defined as a group of people who reside together and "eat from the same cooking pot," were randomly selected from within the enumeration areas. The first wave of IFLS was fielded in 1993 and included interviews with over 7,200 households. Both the second and third waves, fielded in 1997 and 2000, successfully re-interviewed over 94 percent of households in the original sample (Frankenberg and Thomas 2000; Strauss et al. 2004).

For this analysis, we restrict the sample to the children who, as of the 2000 survey, were age 10 and younger and were living with their mothers. This study measures children's nutritional status in 2000 as a function of maternal community participation and other covariates in 1997. As such, the sample is restricted to the 5,144 children whose height was measured in 2000 and whose 3,281 mothers provided data in the 1997 wave of the IFLS.

Interpretation of the literature relating social capital to health is complicated by the difficulty of establishing a causal relationship between the two, which arises largely from concerns that participation is endogenous. With respect to maternal participation and child health, we envision three potential sources of bias that complicate establishing a causal relationship between maternal participation and child height-for-age.

One possibility is that mothers with children who are not thriving may be unable to participate in community programs because of the time required to care for the children. In this case, reverse causality is a potential issue: children's poor health status causes mothers' participation rates to be relatively low, rather than the reverse. We help address this concern by exploiting the advantages of longitudinal data for establishing temporal order. Specifically, we measure children's health outcomes at a later point in time (2000) than we measure maternal participation (1997). Furthermore, we include a control measure, birthweight, that is predictive of chronic illness in children (e.g., Barker 1998; Conley, Strully, and Bennett 2003).

A second source of bias arises if there are characteristics of women that affect both their participation and their children's health, and are unaccounted for in the analysis. For example, some evidence suggests that people who participate in voluntary community programs are advantaged with respect to socioeconomic status (e.g., Schady 1997; Thoits and Hewitt 2001). If we fail to control for these factors and they are also positively related to child health, as is almost certainly the case, regression results will misstate the contribution of social capital.

To address this issue, we identify factors related to mothers' participation and control for these in the regressions relating participation to child health. We begin the analysis by modeling the relationship between socioeconomic, demographic, and health characteristics and mother's participation. In these models, both covariate and outcome data (i.e. participation) are from

1997. To examine whether community-level factors predict mother's participation, these models also include community-level measures of expenditures and urbanicity.

Next, we estimate the relationship between maternal participation measures in 1997 and child health outcomes in 2000, while controlling for the characteristics in 1997 that are related to maternal participation. We hypothesize that, net of other controls for socioeconomic status, the relationship between maternal participation and child height-for-age will be positive.

The third source of coefficient bias arises if unmeasured community characteristics are correlated with both mothers' participation and child health. For example, perhaps some communities have particularly effective leaders who simultaneously succeed in establishing hygienic practices with respect to disposal of sewage and also succeed in promoting women's participation in community activities. From another angle, consider that a high level of women's participation at the community level may also *result* in improvements to community infrastructure. If this were the case, a positive association between mothers' participation and child health could simply reflect the effects of the programs as opposed to the social capital generated through participation. To address these issues, we estimate specifications that include community fixed-effects. These models, which can be interpreted as including a dummy variable for each community, provide an assessment of the relationship between maternal participation and child health outcomes *within* communities, or, net of time-invariant features of the community that may affect both characteristics.

Theorists posit that social capital is a potentially more important resource for those whose human and financial capital is limited (e.g., Kunitz 2004). Coleman, in fact, argues explicitly for an analytical strategy that includes "an interaction between human capital (parents' education) and social capital" (1988: S110). For this reason, we also test for interactions between maternal

participation and measures of human and financial capital: maternal education and levels of household expenditures.

MEASURES

Table 2 presents summary statistics for the key measures used in our analysis. We describe each of these measures in more detail in the following discussion.

Child Height-for-Age

The IFLS collects data on height measured directly by trained anthropometrists for all household members. For children under two years of age, height is measured while the child is recumbent. Because height varies systematically with age and gender, capturing variation in these measures within a population is facilitated by standardizing against the median values for children of the same age and sex from a well-nourished population. Thus we assess respondents' height relative to sex- and age-specific height medians of children in the United States, using data available from the National Center for Health Statistics (2000). For each child, a z-score is computed that expresses the child's height given age as the number of standard deviations that the child is above or below the median for a child of that sex and age in the United States. Because most Indonesian children are shorter than U.S. children, the median z-score for Indonesian children is negative. The median z-score is -1.57 for females and -1.73 for males.

(Table 2 about here)

Community Activities and Maternal Participation

Our fundamental question concerns the relationship between children's health and whether women choose to participate in community activities; theoretically it is the choice to participate that gives mothers access to the resources that reside in network ties. Accordingly,

we consider mothers' participation in key community programs: community meetings, cooperatives, voluntary labor, village improvement activities, and the village women's association. The IFLS asks women whether they participated in these programs in the 12 months prior to the interview. We measure participation with 1) a dichotomous variable indicating participation in any program and 2) a continuous variable that takes on a value between zero and five, measuring the number of programs in which mothers participate (see Table 1).

Individual and Household Characteristics

We control for individual and household characteristics, including levels of per capita monthly household expenditures, maternal education, age, and number of children, the child's gender and age, and household location (urban or rural). With the exception of children's gender and age, these characteristics are measured in 1997. To measure mothers' education we construct a dummy variable indicating completion of six or fewer years of education (relative to more than six). Six years of education is the modal education level for our sample of mothers and denotes a completed primary education in the Indonesian schooling systems. We examine three age groups for mothers: 15-24 years of age (the reference category), 25-34 years of age, and 35 years and older. Summary statistics are presented in Table 2.

In this analysis, a measure of monthly per capita household expenditures is used to capture household financial resources. We prefer expenditures on the grounds that spending levels are likely to more accurately capture levels of long-term economic resources than income, which fluctuates seasonally to a greater degree. The household expenditures variable is logged to correct for a skewed distribution. The mean level of monthly expenditures is Rp 141,572, which converts to about $50 per month in 1997 dollars.

We include measures of maternal kin support to address the concern that women who are

more active in their communities may have better kin ties, and these kin ties potentially influence the health of their children. We measure the number of adult siblings women have living in their villages and create a dichotomous indicator of whether women report having frequent person-to-person contact with their own mothers in 1997. Table 2 includes summary statistics.

This analysis also controls for whether the child's mother arrived in the community relatively recently, in which case she may not have neighborhood ties that provide information or care-giving that would aid in child rearing. We measure whether the child's mother moved in between waves one (1993) and two (1997) of the IFLS. Nine percent of women did so.

An important determinant of child health is the health endowment that he or she is born with as a function of inherited characteristics and development in utero. To this end, we include controls for maternal height, and for the child's birthweight. Maternal height captures many aspects of the mother's background that may be related to her children's health, including the health behaviors and inputs to which she was exposed as a child, and, to some extent, genetic predisposition. Birthweight captures the health condition of the child during the pregnancy, which has been shown to have a strong relationship with children's physical development in many settings (e.g., Conley, Strully, and Bennett 2003) including Indonesia (e.g., Schmidt et al. 2002). Maternal height is measured in centimeters; children's birthweight is measured in kilograms. For about one third of the sample, birthweight data is not available because the child was not weighed at birth. In Indonesia, many births occur at home with the assistance of a traditional midwife, in which case the newborns are typically not weighed (Frankenberg and Thomas 2001). Children without data on birthweight are assigned the mean birthweight and an additional variable indicating that the value was missing is included in the estimations.

Finally, we also consider a more contemporaneous measure of mother's health (than her

height) given previous research suggesting that women in poor health are less likely to participate in volunteer activities (e.g., Thoits and Hewitt 2001), and intuitively, the possibility that these women may be more likely to have children with poor health. All women in the sample report on self-rated health, which predicts chronic disease in many settings, including Indonesia (Frankenberg and Jones 2004). As such, we also include a control for whether mothers are in the lower end of the distribution of self rated health, which in this sample is reporting average or below average health. We group the two categories because so few mothers in our sample report being in below average health.

Assessing the Correlates of Community Participation

Before analyzing the relationship between community involvement and child health, we explore the extent to which socioeconomic, demographic, and health-related characteristics of mothers are associated with the choice to participate in community activities. Table 3 presents the results for a Tobit regression predicting the number of programs in which mothers participate and addressing lower level censoring at zero.[1]

(Table 3 about here)

In Table 3, maternal education, age, and height are significantly associated with increases in the number of programs in which a mother participates. Mothers with six or fewer years of education participate significantly less than do mothers with more than six years of schooling. Both age and height are also positively associated with program participation. Having more children is negatively associated with program participation, suggesting that women with more children may face time constraints.

Living in a household with below median per capita household expenditures decreases the expected extent of participation in community programs. Controlling for household

resources, community wealth is significantly associated with maternal participation. Women in relatively wealthier communities are more likely to participate. Having moved between 1993 and 1997 significantly decreases the expected program participation in 1997 for Indonesian mothers. Participation, however, does not appear to differ between urban and rural locations.

Overall, the results displayed in Table 3 suggest a strong positive correlation between socioeconomic status and participation in community activities. Accordingly, it is important to control for many dimensions of socioeconomic status in the regressions of children's health status on mothers' community participation in order to isolate the relationship between maternal access to community networks and child health. We do so in the results that follow.

RESULTS

We relate children's health outcomes to maternal participation in community activities by estimating fixed effects regressions of child height-for-age on a number of individual and household predictors including maternal community participation. Table 4 presents the results of four specifications estimated on a sample of children aged 10 and younger in 2000. All models include community-specific fixed effects and can thus be interpreted as comparisons among children living within the same communities, averaged over the 309 communities in our sample. Because many children have siblings who are also in the sample, our observations are not independent. To address this issue, the standard errors in these models are calculated using a bootstrap estimator clustered at the level of the child's mother, conservatively estimated with 1,000 repetitions (Efron and Tibshirani 1993).

The first specification includes a dichotomous variable measuring whether children's mothers participate in any community programs in 1997. The estimated coefficient is small

(0.017) and insignificant. The second estimation tests a different parameterization of participation by asking whether the *extent* of mother's participation measured by the number of programs in which she participates is related to her children's health. The coefficient remains small (0.015) and insignificant. Simply put, these results provide no evidence that, on average, the health of children benefits from the access to network resources that their mothers gain by participating in community programs. However, it may be that participation is more beneficial for particular subgroups of children. We now turn to that question.

(Table 4 about here)

We introduce interactions between maternal participation and measures of human and financial capital.[2] We are essentially asking whether, within communities, the association between maternal participation and child health varies by indicators of socioeconomic disadvantage. Model 3 includes an interaction between mothers' program participation and educational attainment, measured as having six or fewer years of education. The interaction term is positive and statistically significant, suggesting that relationship between community participation and children's health differs within communities by the level of mothers' education. The first-order term remains insignificant, suggesting that participation is unrelated to children's height-for-age in families advantaged with respect to human capital. Instead, each additional program in which a child's mother participates is positively associated with children's height-for-age *only* if that child's mother is poorly educated. For these children, each additional program is associated with having height values that are, on average, 0.052 standard deviations larger (0.079 + -0.027 = 0.052).

It is useful to compare the magnitude of the coefficient on the participation measure with the coefficients on well-established predictors of child height, such as maternal education.

Doing so reveals that the magnitude of the coefficient on participation is sizeable. In fact, although having a mother with six years of education or less is associated with one-fifth of a standard deviation lower height-for-age values compared to having a more educated mother, each program in which a woman with little education participates reduces the height deficit associated with low levels of maternal education by about 25%. In other words, the height-for-age difference between children with less and more educated mothers is 0.198 if neither mother participates in community programs. If less educated mothers participate in just one community program, the height deficit of their children is reduced by about 25%, to 0.146 (0.198 – 0.052 = 0.146) standard deviations below that of children of well educated mothers. This result suggests that social capital may mitigate some of the negative consequences for children's health associated with having a less-educated mother.

Model 4 tests for an interaction between maternal participation and a measure of whether the child is from a household in which monthly per capita expenditures are below the median. The estimates reveal a similar relationship with respect to the interaction between household resources and maternal participation. Although children from poor households are at a disadvantage with respect to height, the association between participation and children's height for age is positive (0.080 - 0.018 = 0.062) and significant for individuals from relatively poor households. Each program in which a mother from a poorer household participates reduces the initial height-for-age deficit associated with scarce resources by nearly 40%.

Additional Analyses

Our analysis incorporates a number of methodological choices designed to reduce the likelihood that an alternative explanation drives the results presented above. Nevertheless, as a further check that an unmeasured chronic component of children's health is not driving mothers'

decision to participate in communities, we restrict our sample to children born *after* the 1997 interview and re-estimate Models 2, 3, and 4 from Table 4. We present only the coefficients on maternal participation, maternal education, and household expenditures for these estimations in Table 5. The coefficients on maternal participation match the direction of those shown for the full sample and are actually larger in magnitude, though the considerably smaller sample size reduces the precision of these estimates. Nevertheless, the interaction between mother's education and participation in community programs is still significant at the 6 percent level (p = 0.057). Our conclusions from these models are substantively similar: mother's community participation is positively associated with children's height only for children whose mothers are less educated and for children who come from poorer households.

One additional concern that arises when specifying a measure like participation linearly is that the few women who participate in a large number of programs (e.g., 4 or 5 programs) are actually driving the results. Accordingly, we test the sensitivity of our results in Table 4 by recoding those women as having participated in 3 programs and re-estimating the results (not shown). Our findings are nearly identical, further supporting the robustness of these results.

DISCUSSION AND CONCLUSIONS

Our study investigates whether social capital produces benefits to the individuals who posses it, relative to those who do not. Following recent work on the subject, we characterize social capital as an endowment which exists within communities, but which individuals must access through active social participation. Accordingly, we measure access to social capital as the extent to which a woman participates in local volunteer organizations, and ask whether her participation level of influences her children's health. Considering the possibility that possession

of social capital may be more relevant in resource-constrained settings where women have less access to human capital, we use rich data from Indonesia to answer this question.

The results of this analysis suggest that the extent of mothers' participation in volunteer community programs is significantly and positively associated with child height-for-age, but only for children from households with relatively low levels of human and financial capital. This conclusion holds across two different measures: maternal education and economic resource levels. For children whose mothers have relatively less education, and for children from relatively poorer households, maternal social capital, as indicated by maternal community participation, is associated with better health as indicated by height. The similarities of the findings across these measures of disadvantage increase our confidence in the robustness of the relationship. Moreover, such a relationship is logical given the mechanisms of advice, information sharing, health system navigation, and access to resources that we believe accrue through participation. These benefits are likely to be of more value to disadvantaged women.

We have taken a number of steps to address potential methodological pitfalls in relating a measure of maternal social capital to child health. Our measure of health is a physical assessment conducted by a trained health worker, rather than a maternal report that could be subject to systematic error correlated in some way with women's choices to participate. Moreover, we measure the child's health status three years after the measure of participation, so the choice to participate is unlikely to be driven by short-term illness. To help assess whether these results are driven by variation in children's chronic illness that predates and determines the mother's decision to participate (and that is not captured by variation in birthweight), we re-estimate our models for the subset of children born after women's participation behavior is measured. We find no attenuation of the participation coefficients. We have also included

community fixed effects to control for all unobservable features of communities that might simultaneously generate relatively high levels of maternal participation and better child health. Finally, we include controls designed to test a number of potentially competing hypotheses by measuring characteristics that could drive both a woman's choice to participate in her community and her child's health. These include the number of children she has, the size of her kin network, her own reported health and health background, as well as several measures of her socioeconomic background.

The remaining stumbling block to concluding that the association we show between social capital and health is indeed a causal one is that unmeasured features of women may contribute both to the choice to participate and to children's health outcomes. For example, some research finds that people who participate in voluntary community programs in the United States are advantaged with respect to psychological well being, measured by happiness, self-esteem, and lower levels of depression (Thoits and Hewitt 2001). If these traits also characterize volunteer participants in Indonesia, they may translate into a woman's general level of motivation with respect to positively influencing well-being, whether it is the well-being of her children or her community.

The results of the interaction effects give us some leverage against this possibility. If our results are a function of unmeasured motivation of the mother rather than the benefits of information and resources that come from social capital, it must be the case either that 1) such motivation simultaneously drives mothers' participation and other behaviors that promote children's health *only* for those of low socioeconomic status across multiple dimensions or 2) motivation drives the decision to participate for all mothers, but the only children who benefit from their mothers' motivation are those from disadvantaged households. While not impossible,

these scenarios are more complicated than our interpretation, which posits that in households with little educational and economic capital on which to draw, the social capital created through participation serves as a substitute. Nevertheless, we cannot conclusively rule out the possibility that some unmeasured third variable simultaneously affects both participation and children's health outcomes, but only for those at low levels of education and economic resources.

The other key limitation of this study is lack of specific measures of trust, social support, and what community participation means to women in our sample. The IFLS data are rich in many ways, but are not geared toward specifically measuring the features of social networks that matter for well-being. Further, a limitation faced by this study, and most other quantitative studies on social capital, is little information about the characteristics of community members with whom individuals interact. Our analysis reveals that women who participate in community programs are more likely to be socioeconomically advantaged; we can then conclude that the disadvantaged mothers in our sample who participate in community activities have the *opportunity* to interact with mothers who are better educated and wealthier than themselves. Nevertheless, we are unable to distinguish between women who make close ties with others who are most like themselves, or others who have better health behaviors or more education. Future research would benefit from greater attention to the characteristics of women's networks that matter for children's health and development.

Despite these limitations, our findings have several important implications. First, the potential benefits of social capital do not appear to be limited to the developed world; we demonstrate that social capital is significantly associated with health benefits for the disadvantaged in a large, resource constrained country. Second, the types of participation programs we examine are not limited to Indonesia. Similar types of community programs exist

in many other resource-constrained contexts (e.g., see Grootaert and Bastelaer 2004), but very few studies have examined the health implications for families in these communities. Our findings suggest that these programs may not only improve village infrastructure (as is traditionally demonstrated), but may also influence the health of disadvantaged children by promoting social interaction between village members.

Third, our findings support Coleman's (1988) theory that social capital can differentially influence children's outcomes by the levels of human capital in a family. In fact, that social capital largely provides health benefits only for children in disadvantaged households suggests that it may serve as an important mechanism to reduce socioeconomic-based health disparities that exist even in poorer contexts like Indonesia. As we note, each program in which mothers participate is associated with a substantial decrease in the socioeconomic-based deficits in height-for-age.

Importantly, the implications of this interaction for inequality actually extend even further. Because height has been shown to causally influence a number of later-life welfare measures, including earnings (see Strauss and Thomas 1998), the social capital harnessed through mothers' community participation may potentially serve as an important mechanism to reduce the intergenerational transmission of socioeconomic inequality altogether. To our knowledge, very little work has assessed the role of social capital as a moderator of intergenerational processes in health and socioeconomic standing. Our findings point to the potential value of research in this area. Certainly as future waves of data from the Indonesia Family Life Survey become available, it will be worthwhile to assess the young adult outcomes for children in this sample and examine the potential role that social capital plays with respect to inequality in later life health and economic welfare.

NOTES

1. A logit regression predicting whether mothers participate in any programs (not shown) produces substantively equivalent results.

2. We also test interactions between a dichotomous indicator and measures of socioeconomic status. The models were worse-fitting according to *BIC* goodness-of-fit statistics, though the substantive conclusions from these models are the same. Similarly, interactions between the number of programs in which a mother participates and *linear* measures of mothers' education and household expenditures were tested; these models also produced substantively similar conclusions, but also fit the data less well than the specifications we present.

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Table 1
Community involvement in 1997 among mothers of children age 0-10 years in 2000 (N=3,281)

		Percentage Participating
Community Programs		
Participation in any program		37%
Number of programs (if > 0)	1	65%
	2	23%
	3 or more	12%
Participation, by program type[1]		
Community Meetings		15%
Cooperatives		3%
Women's Association		16%
Village Improvement		6%
Voluntary Labor		15%

[1] Not mutually exclusive categories
Source: Data from Indonesian Family Life Survey

Table 2
Summary Statistics for Key Variables

	Mean	S.D.
Children's indicators		
Median height-for-age z score (2000) (Females)	-1.57	1.1
Median height-for-age z score (2000) (Males)	-1.73	1.2
Age in Years (2000)	5.7	5.5
Birthweight in kilograms	3.2	0.58
Percentage of children male	51%	
Percentage of children not weighed at birth	33.8%	
Number of children	5,144	
Parental and household indicators (measured in 1997)		
Mother's age in years	30.2	7.3
Mother's educational attainment in years	6.5	4.1
Mother's height in centimeters	150.3	5.2
Mother reports being in average or poor health	28.2%	
Number of children under 15 per Mother	2.0	1.3
Mother's number of adult siblings in her village	1.3	1.7
Mother interacts with her mother at least once a week	61%	
Monthly per capita household expenditures	Rp 141,472	Rp 485,463
Household in urban location	36.2%	
Percentage of mothers who moved between 1993 and 1997	9.2%	
Number of mothers	3,281	
Community indicators (measured in 1997)		
Mean per capita HH expenditures	Rp 185,574	Rp 200,196
Number of community programs	6.4	2.3
Number of communities	309	

Source: Data from Indonesian Family Life Survey

Table 3
Correlates of Mothers' Participation in Community Programs:
Results from a Tobit Specification, Indonesian Mothers, 1997 (N=3,281).

Covariates (1997)	Number of Community Programs
Mother's education: elementary or less	-0.296
	(0.087)**
Mother's height (cms)	0.000
	(0.007)
Mother reports having poor or average health	-0.169
	(0.098)
Mother's number of children	0.020
	(0.036)
Mother's number of adult siblings in her village	-0.001
	(0.023)
Mother interacts with her own mother often	0.093
	(0.082)
Mother's age: 15 - 24 years	-
25 - 34 years	0.397
	(0.110)**
35 or older	0.525
	(0.128)**
Household below median per capita expenditures	-0.453
	(0.084)**
Household moved between 1993 – 1997	-0.508
	(0.137)**
Household in urban area	-0.089
	(0.088)
Mean community per capital expenditures	0.244
	(0.079)**
Constant	-2.020
	(1.171)
Sigma	1.764

*p < 0.05 ** p < 0.01 (two tailed tests)
Notes: Controls for province location not shown.
[a] Results from a Tobit regression, lower level censoring at zero.
Source: Data from Indonesian Family Life Survey

Table 4
Height-for-Age as a Function of
Maternal Participation, Demographic, and Socioeconomic Factors
Indonesian Children Age 0 to 10 in 2000 (N=5,144).

Covariates (1997)	(1)	(2)	(3)	(4)
Mother participates in at least one community	0.017	-	-	-
	(0.038)			
Number of programs in which mother participates	-	0.015	-0.027	-0.018
		(0.023)	(0.033)	(0.028)
Number of programs x Mother's education elementary or less	-	-	0.079*	-
			(0.039)	
Number of programs x Household below median expenditures	-	-	-	0.080*
				(0.038)
Child's age (years)	-0.022**	-0.022**	-0.022**	-0.022**
	(0.006)	(0.006)	(0.006)	(0.006)
Child is male	-0.119**	-0.119**	-0.119**	-0.118**
	(0.029)	(0.029)	(0.029)	(0.029)
Child's birthweight (kg)	0.222**	0.222**	0.221**	0.221**
	(0.031)	(0.031)	(0.031)	(0.031)
Child's birthweight is missing	-0.095*	-0.095*	-0.091*	-0.092*
	(0.039)	(0.039)	(0.039)	(0.039)
Mother’s education - elementary or less	-0.152**	-0.151**	-0.198**	-0.152**
	(0.041)	(0.041)	(0.047)	(0.041)
Mother’s height (cm)	0.052**	0.052**	0.052**	0.052**
	(0.003)	(0.003)	(0.003)	(0.003)
Mother reports poor or average health	-0.091	-0.090	-0.093	-0.091
	(0.063)	(0.063)	(0.062)	(0.062)

Table 4 continued on next page

Table 4 continued

Mother's number of children		-0.081**	-0.081**	-0.082**	-0.081**
		(0.016)	(0.016)	(0.016)	(0.016)
Mother's number of adult siblings living in her village		0.000	0.000	0.000	0.000
		(0.010)	(0.010)	(0.010)	(0.010)
Mother interacts with her own mother often		-0.041	-0.042	-0.038	-0.039
		(0.037)	(0.037)	(0.037)	(0.037)
Mother's age:	15 - 24 years	-	-	-	-
	25 - 34 years	0.054	0.053	0.056	0.055
		(0.050)	(0.050)	(0.050)	(0.050)
	35 or older	0.208**	0.206**	0.208**	0.207**
		(0.059)	(0.059)	(0.060)	(0.060)
Household below median per capita expenditures		-0.116**	-0.114**	-0.115**	-0.160**
		(0.039)	(0.039)	(0.039)	(0.046)
Household moved between 1993 and 1997		0.028	0.028	0.027	0.024
		(0.066)	(0.066)	(0.066)	(0.067)
Constant		-9.696**	-9.700**	-9.690**	-9.679**
		(0.519)	(0.520)	(0.519)	(0.519)
R-squared		0.17	0.17	0.18	0.18
Includes community-specific fixed effect		Yes	Yes	Yes	Yes
Number of communities		309	309	309	309

** p<=0.01 * p<=0.05 (two-tailed tests)
Notes: Standard errors (in parentheses) calculated using a bootstrap estimator with 1,000 repetitions.
Source: Data from Indonesian Family Life Survey

Table 5
Height-for-Age as a Function of Maternal Participation, Demographic, and Socioeconomic Factors, Indonesian Children Age 0 to 2 in 2000 (N=1,072)

Covariates (1997)	(1)	(2)	(3)
Number of programs in which mother participates	-0.024	-0.132	-0.059
	(0.063)	(0.079)	(0.071)
Number of programs x Mother's education elementary or less	-	0.235	-
		(0.123)	
Number of programs x Household below median expenditures	-	-	0.106
			(0.128)
Mother's education elementary or less	-0.183	-0.310*	-0.187
	(0.116)	(0.131)	(0.116)
Houshold below median per capita expenditures	-0.085	-0.089	-0.133
	(0.113)	(0.112)	(0.124)
Constant	-7.884**	-8.015**	-7.96**
	(1.367)	(1.372)	(1.374)
R-squared	0.15	0.15	0.15
Includes community-specific fixed effect	Yes	Yes	Yes
Number of communities	284	284	284

** p<=0.01 * p<=0.05 (two-tailed tests)
Notes: All models include the same controls shown in Table 4; not all estimates are reported here. Standard errors (in parentheses) calculated using a bootstrap estimator with 1,000 repetitions.
Source: Data from Indonesian Family Life Survey