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ERRATUM
In the December 2008 issue of JHSB, the publication date is erroneously listed on the spine as September 2008. The volume number, however, is correctly stated. If you would like a label with the correct publication date, please write to publications@asanet.org.
We use rich data from the Indonesia Family Life Survey to assess the relationship between mothers’ access to social capital via participation in community activities and their children’s health. 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 and positive only for children from relatively disadvantaged backgrounds, as measured by their mothers’ educational and household economic resources. The results suggest that in poorer settings community involvement may benefit disadvantaged families, possibly by providing resources and information that would otherwise be inaccessible.

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 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 reviews, see Macinko and Starfield 2001; Almedom 2005). Yet, given that social capital is theorized to substitute for other forms of capital, 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 of 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 positive, causal relationship between mothers’ community participation and children’s health could arise through several mechanisms. By interacting with other parents, mothers may acquire information that helps them raise children to be healthier. 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, 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. This survey has several features that support a more sophisticated methodological approach than has typically been feasible in 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 temporal ordering to the relationship. Because the survey includes physical health assessments, 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 (1988) played a central role in developing the theory of social capital, arguing that norms of reciprocity help establish and maintain connections between individuals who 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 that we focus upon.

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 link social capital and a diverse array of outcomes. 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 as “investment in social relations by individuals through which they gain access to embedded resources to enhance expected returns of instrumental or expressive actions” (p. 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 tautological (for example, see the discussion of Putnam’s work in Portes 1998: 20–21). To be credible, a postulated causal link between 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 (Portes 1998; Furstenberg 2005). From an empirical perspective then, it is desirable to relate individual-level measures of accessing community-level social capital to conceptually dis-
tinct 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 household level (Grossman 1972; Bolin et al. 2003). The theoretical underpinning of such models is that health is produced in part by choices, such as those related to nutrition, physical activity, and the use of medical care. Social networks present the possibility of access to health-related information and sanctioning health-related behavior, and so potentially influence lifestyle 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, and particularly child health, is concerned, the strength of a social tie does not need to be remarkably strong to result in the sharing of relevant information. Unlike information related to income generation, wherein competitors may risk personal loss by sharing, no substantial incentive exists to protect information related to children’s health. In fact, given the transmission mechanisms of communicable 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 better 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 helps parents in raising healthy children; literacy helps parents to correctly diagnose and treat ailments; and exposure to “modern” society through school encourages parents to embrace medical methods of treatment for their own families (Glewwe 1999). In a setting such as Indonesia, where the average adult female has only an elementary 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 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, Kohler, and Watkins 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 change in fertility limiting behavior.

The theoretical link between social capital and health is supported by several decades of epidemiological research concluding 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 (Seeman 1996; Lindau et al. 2003; Kunitz 2004). With a few notable exceptions (Yip et al. 2007), the vast majority of this work is set in developed, resource-rich settings.

Related 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 these data to create neighborhood measures of reciprocated exchange among community members and voluntary participation in local groups. Results suggest that these measures are significantly and positively associated with birth weight of children in the neighborhoods.

Several studies find evidence of links between individual/familial access to community social capital and child health. Carter and Maluccio (2003) use height-for-age data to measure family coping in South Africa. The authors find that the presence of community ties significantly boosts a household’s ability to manage economic shocks to the extent that adequate nutrition can be provided to children. Kana’iaupuni and colleagues (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 posi-
tively associated with the probability that mothers report their children are in good health. Surkan and colleagues (2007) examine the correlates of very young children’s growth in a city in Brazil. Children of mothers who report having more friends and family, who engage in leisure activities with others, and who report having more affectionate support have higher weight-for-height scores than do children of women who have fewer social ties and less support.

Much of the previous research on social capital 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 on social capital is the inability to consider potential alternative explanations because data are either limited to one point in time or do not include enough information to test competing hypotheses (discussed in 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 many of 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 those characteristics into account produces biased estimates 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 affect 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 growth and social change. From 1965 to 1997, the annual GDP increased at an average of over 5 percent a year, while the proportion of women aged 15 to 19 with no formal education fell from one-third to nearly zero (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 these organizations began as grassroots initiatives and were subsequently adopted by higher levels of government as regional or national programs. In fact, Indonesia 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 health care, education, sanitation, security, and village upkeep (Wibisana, Trihono, and Nurwati 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 genuinely indigenous concepts of moral obligation, generalized reciprocity, and community solidarity, but they note that the state has harnessed the concepts as a means of mobilizing village labor (Bowen 1986).

Grootaert (1999) examines community programs in detail in three Indonesian provinces. 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 study, 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.

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 communities in the 1997 Indonesia Family Life Survey (these data are described in detail in the subsequent section). In this study, we focus on mothers’ participation in five specific programs: community meetings, village cooperatives, voluntary labor associations, village improvement projects, and the women’s association. Table 1 draws on the data and presents descriptive statistics of mothers’ volunteer participation. Thirty-seven percent of mothers report participating in at least one program in the year prior to interview. Among those who participated, about one-third were involved in
multiple programs. With respect to the type of activity in which one is involved, participation is highest for community meetings, the women’s association, and voluntary labor.

It is important to note that none of these five 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. Some of the above programs may indirectly improve conditions in the village, such as sanitation or transportation. Indeed, Miller and colleagues (2006) find a significant and positive community-level association between the number of programs in a village and several measures of adult well-being. Similarly, we would expect that these improvements would affect all children in a village (as opposed to just those of participating parents), and, 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 survey sampling scheme stratifies on province and urban/rural location, selecting a total of 321 enumeration areas from 13 provinces, which represent about 83 percent 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 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.

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 lat-
er point in time (in 2000) than we measure maternal participation (1997). Furthermore, we include birth weight as a control measure that is predictive of chronic illness in children (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 (Schady 2001; 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 mothers’ participation. In these models, both covariate and outcome data (participation) are from the 1997 wave. These models also consider 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 more advantaged communities simply have more participation opportunities and better population health. For example, it is possible that 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 (Kunitz 2004). Coleman (1988), 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 household capital: maternal education and 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 Indonesia Family Life Survey 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-for-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.\(^3\) As 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 Summary Statistics for Key Variables

<table>
<thead>
<tr>
<th>Children’s indicators</th>
<th>Mean</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height-for-age z score (2000) (Females)</td>
<td>−1.60</td>
<td>1.1</td>
</tr>
<tr>
<td>Height-for-age z score (2000) (Males)</td>
<td>−1.70</td>
<td>1.2</td>
</tr>
<tr>
<td>Age in Years (2000)</td>
<td>5.7</td>
<td>3.1</td>
</tr>
<tr>
<td>Birth weight in kilograms</td>
<td>3.2</td>
<td>.58</td>
</tr>
<tr>
<td>Percentage of children male</td>
<td>51%</td>
<td></td>
</tr>
<tr>
<td>Percentage of children not weighed at birth</td>
<td>33.8%</td>
<td></td>
</tr>
<tr>
<td>Number of children</td>
<td>5,144</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parental and household indicators (measured in 1997)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother’s age in years</td>
<td>30.2</td>
<td>7.3</td>
</tr>
<tr>
<td>Mother’s educational attainment in years</td>
<td>6.5</td>
<td>4.1</td>
</tr>
<tr>
<td>Mother’s height in centimeters</td>
<td>150.3</td>
<td>5.2</td>
</tr>
<tr>
<td>Mother reports being in average or poor health</td>
<td>28.2%</td>
<td></td>
</tr>
<tr>
<td>Number of children under 15 per mother</td>
<td>2.0</td>
<td>1.3</td>
</tr>
<tr>
<td>Mother’s number of adult siblings in her village</td>
<td>1.3</td>
<td>1.7</td>
</tr>
<tr>
<td>Mother interacts with her mother at least once a week</td>
<td>61%</td>
<td></td>
</tr>
<tr>
<td>Monthly per capita household expenditures</td>
<td>Rp 141,618</td>
<td>Rp 485,463</td>
</tr>
<tr>
<td>Household in urban location</td>
<td>36.0%</td>
<td>9.2%</td>
</tr>
<tr>
<td>Percentage of mothers who moved between 1993 and 1997</td>
<td>9.2%</td>
<td></td>
</tr>
<tr>
<td>Number of mothers</td>
<td>3,281</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Community indicators (measured in 1997)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean per capita household expenditures</td>
<td>Rp 186,874</td>
<td>Rp 191,388</td>
</tr>
<tr>
<td>Number of community programs</td>
<td>6.4</td>
<td>2.3</td>
</tr>
<tr>
<td>Number of communities</td>
<td>309</td>
<td></td>
</tr>
</tbody>
</table>

Source: Indonesian Family Life Survey

**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 Indonesia Family Life Survey 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), denoting completed primary school 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.

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 Rupiah 141,618, which converts to about $50 per month in 1997.
We include measures of maternal kin support to address the issue that women who are more active in their communities may have better kin ties, and that 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.

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 1 (1993) and 2 (1997). 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 birth weight. 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. Birth weight 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 (Conley et al. 2003), including Indonesia. Maternal height is measured in centimeters; children's birth weight is measured in kilograms. For about one-third of the sample, birth weight data are 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 birth weight are assigned the mean birth weight, 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 (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 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.

RESULTS
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 while addressing lower-level censoring at zero.

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 positively associated with maternal participation. 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.
Maternal Participation and Children’s Health

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 ages 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, 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 (.017) and insignificant. The second estimation tests a different parameterization of participation by asking whether the extent of mothers’ participation measured by the number of programs in which she participates is related to her children’s health. The coefficient remains small (.015) and insignificant. Simply put, these results provide no evidence that, on average, the health of children benefits from 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.

We introduce interactions between maternal participation and measures of human and financial capital. We are essentially asking whether, within communities, the association

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

<table>
<thead>
<tr>
<th>Covariates (1997)</th>
<th>Number of Community Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother’s education: elementary or less</td>
<td>–.296 (.087)**</td>
</tr>
<tr>
<td>Mother’s height (cm)</td>
<td>.000 (.007)</td>
</tr>
<tr>
<td>Mother reports having poor or average health</td>
<td>–.169 (.098)</td>
</tr>
<tr>
<td>Mother’s number of children</td>
<td>.020 (.036)</td>
</tr>
<tr>
<td>Mother’s number of adult siblings in her village</td>
<td>–.001 (.023)</td>
</tr>
<tr>
<td>Mother interacts with her own mother often</td>
<td>.093 (.082)</td>
</tr>
<tr>
<td>Mother’s age: 15–24 years</td>
<td></td>
</tr>
<tr>
<td>25–34 years</td>
<td>.397 (.110)**</td>
</tr>
<tr>
<td>35 or older</td>
<td>.525 (.128)**</td>
</tr>
<tr>
<td>Household below median per capita expenditures</td>
<td>–.453 (.084)**</td>
</tr>
<tr>
<td>Household moved between 1993–1997</td>
<td>–.508 (.137)**</td>
</tr>
<tr>
<td>Household in urban area</td>
<td>–.089 (.088)</td>
</tr>
<tr>
<td>Mean community per capita expenditures</td>
<td>.244 (.079)**</td>
</tr>
<tr>
<td>Constant</td>
<td>–2.020 (1.171)</td>
</tr>
</tbody>
</table>

Sigma 1.765

*p < .05 **; p < .01 (two-tailed tests)

Notes: Controls for province location not shown.

*a Results from a Tobit regression, lower-level censoring at zero. Robust standard errors in brackets.

Source: Indonesian Family Life Survey
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 the 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 .052 standard deviations larger, on average (.079 + .027 = .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. Although having a mother who has at most an elementary education 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 percent. In other words, the height-for-age difference between children with less and more educated mothers is .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 to .146 (.198 – .052 = .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 low levels of human capital.

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 of Indonesian households. 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 (.080 – .018 = .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 percent.

**Additional Analyses**

Our analysis incorporates a number of methodological choices designed to reduce the likelihood that an alternative explanation drives the results presented above. As a further check that an unmeasured chronic component of children’s health is not driving mothers’ decision to participate, we restrict our sample to children born after the 1997 interview and re-estimate the models in Table 4 (not shown). 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 community participation is still significant at the .06 level ($p = .057$). Our conclusions from these models are substantively similar: Mothers’ 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 participation continuously 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 their robustness.

**DISCUSSION**

We investigate whether social capital produces benefits for those who possess it. Specifically, we follow recent work that characterizes 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
we ask whether her participation level influences her children’s health. Considering that possession of social capital may be particularly relevant in settings where women have less access to other forms of capital, such as formal education, 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 children’s health (as indicated by height-for-age), but only for children whose mothers have less education, and for children from relatively poorer households. The similarities of the findings across these two 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.

### 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)

<table>
<thead>
<tr>
<th>Covariates (1997)</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother participates in at least one community program</td>
<td>.017 (0.038)</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Number of programs in which mother participates</td>
<td>— .015 (0.023)</td>
<td>— .027 (0.033)</td>
<td>— .027 (0.028)</td>
<td>—</td>
</tr>
<tr>
<td>Number of programs × Mother’s education elementary or less</td>
<td>—</td>
<td>.079 (0.393)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Number of programs × Household below median expenditures</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>.080 (0.038)</td>
</tr>
<tr>
<td>Child’s age (years)</td>
<td>— .022** (0.006)</td>
<td>— .022** (0.006)</td>
<td>— .022** (0.006)</td>
<td>— .022** (0.006)</td>
</tr>
<tr>
<td>Child is male</td>
<td>— .119** (0.029)</td>
<td>— .119** (0.029)</td>
<td>— .119** (0.029)</td>
<td>— .119** (0.029)</td>
</tr>
<tr>
<td>Child’s birth weight (kg)</td>
<td>.222** (0.031)</td>
<td>.222** (0.031)</td>
<td>.222** (0.031)</td>
<td>.222** (0.031)</td>
</tr>
<tr>
<td>Child’s birth weight is missing</td>
<td>— .095* (0.041)</td>
<td>— .095* (0.041)</td>
<td>— .095* (0.041)</td>
<td>— .095* (0.041)</td>
</tr>
<tr>
<td>Mother’s education (elementary or less)</td>
<td>— .152** (0.041)</td>
<td>— .152** (0.041)</td>
<td>— .152** (0.041)</td>
<td>— .152** (0.041)</td>
</tr>
<tr>
<td>Mother’s height (cm)</td>
<td>.052** (0.003)</td>
<td>.052** (0.003)</td>
<td>.052** (0.003)</td>
<td>.052** (0.003)</td>
</tr>
<tr>
<td>Mother reports poor or average health</td>
<td>— .091 (0.063)</td>
<td>— .091 (0.063)</td>
<td>— .091 (0.063)</td>
<td>— .091 (0.063)</td>
</tr>
<tr>
<td>Mother’s number of children</td>
<td>— .081** (0.016)</td>
<td>— .081** (0.016)</td>
<td>— .081** (0.016)</td>
<td>— .081** (0.016)</td>
</tr>
<tr>
<td>Mother’s number of adult siblings living in her village</td>
<td>.000 (0.010)</td>
<td>.000 (0.010)</td>
<td>.000 (0.010)</td>
<td>.000 (0.010)</td>
</tr>
<tr>
<td>Mother interacts with her own mother often</td>
<td>— .041 (0.037)</td>
<td>— .041 (0.037)</td>
<td>— .041 (0.037)</td>
<td>— .041 (0.037)</td>
</tr>
<tr>
<td>Mother’s age: 15–24 years</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>25–34 years</td>
<td>.054 (0.050)</td>
<td>.053 (0.050)</td>
<td>.056 (0.050)</td>
<td>.055 (0.050)</td>
</tr>
<tr>
<td>35 or older</td>
<td>.208** (0.059)</td>
<td>.206** (0.059)</td>
<td>.208** (0.059)</td>
<td>.207** (0.059)</td>
</tr>
<tr>
<td>Household below median per capita expenditures</td>
<td>— .116** (0.039)</td>
<td>— .114** (0.039)</td>
<td>— .115** (0.039)</td>
<td>— .116** (0.039)</td>
</tr>
<tr>
<td>Household moved between 1993 and 1997</td>
<td>.028 (0.066)</td>
<td>.028 (0.066)</td>
<td>.027 (0.066)</td>
<td>.024 (0.067)</td>
</tr>
<tr>
<td>Constant</td>
<td>—9.696** (0.519)</td>
<td>—9.700** (0.520)</td>
<td>—9.690** (0.519)</td>
<td>—9.679** (0.519)</td>
</tr>
</tbody>
</table>

**p ≤ .01 * p ≤ .05 (two-tailed tests)

Notes: Standard errors (in parentheses) calculated using a bootstrap estimator with 1,000 repetitions.

Source: Indonesian Family Life Survey
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 birth weight), 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 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 that 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 the 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 to draw upon, 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.

Another 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 Indonesia Family Life Survey data are rich in many ways, but they are not geared toward specifically measuring the features of social networks that matter for well-being. Further, our data are limited with respect to the characteristics of community members with whom individuals interact. Our analysis reveals that women who participate in community programs are more likely to be advantaged; we can conclude, then, 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 the types of social ties made by the mothers in our sample. Future research would benefit from greater attention to the characteristics of women’s networks that matter for children’s health and development.

Our study is also limited in focus to the reduced-form relationship between social participation and children’s health. We do not study the mechanisms that link these two phenomena, and such research may reveal additional implications for the household. For example, it is possible that one of the ways social capital improves children’s well-being is by increasing a woman’s knowledge and resources to such a degree that her relative position in the household also shifts. Examining the gendered na-
ture of parenting, economic autonomy, and resource allocation to children is beyond the scope of this specific study; nevertheless, understanding how social capital influences these processes warrants future attention.

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 developing contexts (Grootaert and Bastelaer 2004), but very few studies have examined the health implications for families. 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 benefits only for children in disadvantaged homes suggests that it may serve as an important mechanism to reduce socioeconomic-based health disparities that exist even in poorer contexts such as 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 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’ participation may be an important mechanism to reduce 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 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 these children as young adults and examine the role that social capital plays with respect to inequality in later-life health and economic welfare.

NOTES

1. For example, the village women’s association Pendidikan Kesejahteraan Keluarga (PKK) was founded in 1967 by a group of women, guided by the idea that improving family welfare by providing village women with improved basic skills builds the foundation for a better society. As participation in the PKK grew, the association took on larger projects and is now found in nearly every Indonesian village (Prawiro 1998).

2. It is possible that a mother might more actively take advantage of a new community feature that she learned about through participating in the village improvement program or the women’s association. If this issue is driving our findings, we would expect to see larger coefficients on indicators of participation in these specific programs. In estimations of program-specific models (with the same interactions and control measures used in Table 4), we observe that the coefficient magnitude is relatively similar in size across programs. We find no evidence that our results are being driven by participation in any single program, including those that could be construed as more likely to have indirect benefits for children’s health.

3. For more detail on the LMS method of z-score calculation, see Kuczmarski and colleagues (2002), and, in particular, page 7.

4. We also test interactions between a dichotomous indicator of participation and measures of socioeconomic status. These estimations were worse-fitting according to BIC goodness-of-fit statistics (Raftery 1995) though the substantive conclusions from these models are the same.

REFERENCES


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