

Does Maternal Social Capital Affect Children's Physical Health in The Future?

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Abstract

Social capital is one of the capitals needed by mothers in caring for children. This study aimed to analyze the impact of maternal social capital on children's physical health in the future. Using pooled data in Indonesia Family Life Survey (IFLS) in 1997 and 2014, this study could capture the long-term effect of maternal social capital in children's early life via the mother's participation in community-based associations. The methodology of this study is an instrumental variable to overcome the endogeneity of a mother's social capital. The ethnic similarity is applied as an instrumental variable that correlates with maternal social capital but is uncorrelated with children's physical health in the future. The result showed that maternal social capital could decrease their children's physical health disorder as young adults. The more intense the mother participates in her association; the fewer children's physical health disorders occur. Based on the results, this paper recommends to consider improving the number of programs and activities in the village as a channel to advance information and access to maternal health knowledge, specifically in remote areas.

Keywords: Maternal Social Capital, Children's Health Status, Physical Health Disorder, Instrumental Variable

JEL classification: I15, J13, Z13

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Introduction

Social capital is a multidimensional concept that does not only concerned with economic aspects but also cultural and social norms. Social capital, according to Putnam (2000) is a collection of norms, networks, and trusts that will increase the efficiency of society. Communities will coordinate and work together to get benefits (De Silva & Harpham, 2007). This study conceives social capital as a community-level resource accessed by the individual, specifically mothers.

Social capital is one of the capitals needed by mothers in caring for children. The mechanism linking maternal social capital and children's health are channeled via improvements in mothers'

knowledge that in turn affects their parenting behavior (Anderson et al., 2004; De Silva & Harpham, 2007; Sujarwoto & Tampubolon, 2013). Research conducted by Nobles and Frankenberg (2007) was able to explain that with mother's education and limited financial capital, maternal social capital will have a significant positive effect on children's health status. Anderson et al. (2004) explained that mothers who have social capital will have information from their participation in the community. With this information, mothers will understand and apply it to their daily behavior, including healthy living behaviors, breastfeeding, and controlling the baby's weight. On the other hand, Kawachi & Berkman (2000)

explain that social capital will provide the rules and information needed by mothers in raising their children, especially in the early period.

Mother as individual who give birth to children have a crucial role as primary health care providers to prevent children from experiencing health problems. The accumulation of a mother's human and social capital is an essential determinant of child growth and development. Social capital can be measured from a mother's participation in community activities which will stimulate children's health through increasing health knowledge and opening up access to various social and financial services.

The importance of health in the early period of a child's life has previously been supported by the Thrifty Phenotype theory by Hales & Barker (2001). This theory explains that permanently malnourished babies will have difficulty adapting to a nutrient-rich environment after birth to adulthood. The baby's difficulty in absorbing these nutrients will reduce the ability of insulin and result in obesity, aging, and physical inactivity, resulting in type 2 diabetes (Hales & Barker, 1992). The health status of children only plays a role of 30 percent, while 70 percent is the contribution of sensitive nutrition interventions, for instance, nutrition interventions that involve various sectors such as the mother's role (Ministry of Health, 2017).

Similar to human capital, social capital is predicted to be an investment and will affect children's quality of life in the long term in describing children's productivity as adults. Previous research has not explained children's long-term impact or productivity as adults. Meanwhile, in looking at the health status of children as quoted from the Victora et al. (2008), the long-term impact of malnutrition in children is a reduction in the body's immunity so that it is easy to get sick. A high risk for the emergence of diabetes, obesity, heart, and blood vessel disease, cancer, stroke, and disability in old age, as well as uncompetitive work quality, which results in low economic productivity, so this study will consider the long-term impact by looking at the health status of children as adults. A study in Vietnam showed that cognitive, social capital as measured

by personal perceptions of trust, belonging, social harmony, and justice had a significant impact on children's health in the one year age group, while the mental health of children had an impact on the eight-year age group (De Silva & Harpham, 2007).

In Indonesia, local communities development has been grown as indigenous tradition (Beard, 2007; Bowen, 1986; Geertz, 1962; Grootaert, 1999). Gotong Royong recognized as the background of sociocultural ethic for reciprocity as general in Indonesia society including in urban and rural areas (Bowen, 1986; Koentjaraningrat, 1961). Involvement in community is a tradition that leads to the construction of grassroots organizations and adopted in regional and national programs by the government. The goals are vary but in general engage the role of participation in improving the health of household members, education, economy, sanitation, security, and village upkeep (Wibisana, Trihono, & Nurwati, 1999). Local communities that involve mothers are found in most of them. At least one type of volunteer program existed in each of communities in Indonesia Family Life Survey samples.

The impact of social capital on children's health in Indonesia has been widely carried out. Mothers' participation in various community activity programs such as women's association (PKK), cooperatives, regular meetings, community service, as well as village maintenance and village development programs have a positive and significant impact on children's health. Even children from families with low socioeconomic status have better health status when mothers actively participate in community organizations (Nobles and Frankenberg, 2007; Sujarwoto & Tampubolon, 2013). However, community social capital has no impact on individual health (Miller et al., 2006).

This study contributes from previous studies (Anderson et al., 2004; De Silva & Harpham, 2007; Nobles and Frankenberg, 2007; Sujarwoto & Tampubolon, 2013) to see the impact of mother's social the long-term impact on children health status. As mentioned before that health status is also affected by various factors, including long term factors.

2. Research Method

2.1. Method

This study is conducted with quantitative approach through regression analysis, specifically instrumental variable regression analysis. The research method in this study is arranged in two stages. First, the analysis begins with the selection of variables and the formation of a general model of the influence of maternal social capital on the health status of children. Second, analysis the role of maternal social capital on the physical health of children with the instrumental variable (IV) regression analysis employs 2 Stage Least Square (2SLS). This analysis is used to overcome the issue of endogeneity in maternal social capital or our variable of interest.

2.2. Data

This study uses IFLS data (Indonesia Family Life Survey) in 1997 and 2014. The use of IFLS wave-2 data in 1997 was chosen because data on maternal characteristics, especially maternal social capital data were available starting in 1997 which provides child health data when the child is an adult and IFLS wave-5 is the last IFLS data.

2.3. Operational Variable

2.3.1. Maternal Social Capital

The use of maternal participation as a proxy for social capital has previously been used by Anderson et al. (2004), De Silva & Harpham (2007), Nobles and Frankenberg (2007), and Sujarwoto & Tampubolon (2013). In the context of poverty, including those who are vulnerable to being in poverty, almost in poverty, in poverty, and extreme poverty, the creation of bridging social capital is essential to reducing family poverty (Kharisma et al., 2021). According to Helliwell & Putnam (1999) educational levels in the United States have risen sharply, yet levels of political and social participation have not. Norman Nie, Jane Junn, and Kenneth Stehlik-Barry (NJS-B individual participation in activities in their environment is one of the essences of social capital. Mother's participation in community activities illustrates that she has a value of trust in her group and believes that she will benefit from her participation. Based on the concept of Grossman (1972) mother's participation is capital for children

in the production of their health.

In IFLS social capital was asked to sample by using the question "*How much time did you spend participating in the [women's associations (Women's association (PKK), Village cooperatives, Integrated Health Service Post, contraceptive recipient group, children development, and rotating saving and credit association] program during the last 12 months?*" Rotating saving and credit association is a social association that has the function of a rotational savings scheme. Although it seems traditional, it is perceived to be a more practical solution to unbankable group especially with financial problem (Astuti & Hardi, 2022). Meanwhile, Integrated Health Service Post is a community-based primary health service for mother and children less than 5 years old and available for all villages in Indonesia (Nirwana et al., 2015). To define maternal social capital we use similar concept with Sujarwoto & Tampubolon (2013) that social capital meaning adopt from the participation or the intense of a person to join community activities. In this study, we use number of days in a year to participate in community activities. Table 1 shows that rotating saving and credit association is the most participated local association by mothers, around 30 percent in a community mothers' participation. The second more extensive community participation is integrated health service which help mothers to monitor their children development. This study chooses six community associations as mothers' social activity or maternal social capital based on this data.

Table 1. Percentage of Mother's Participation by Type of Association

Community Association	Percentage of Participation
Village cooperatives	19.48
Women's Association (PKK)	23.98
Integrated Health Service Post	27.69
Contraceptive Recipient Group	17.05
Children Development Program	14.45
Rotating saving and credit association	30.32

Source: author's calculation based on IFLS (1997)

2.3.2. Children's Physical Health

Physical health variable is a variable in the form of an index. The physical health index value ranges from 0 to 100. The physical health index value has units of percent. A value of 0 is for someone who has good physical health, a value of 100 is for someone who has poor physical health. The index calculation follows Budidharma & Wahyuni (2017), Fayers & Machin (2000), and Hays & Sherbourne (1995).

$$\text{Physical index} = (\text{score} - \text{minimum score}) / (\text{maximum score} - \text{minimum score}) \times 100$$

In the IFLS questionnaire, the questions asked to respondents are "If you had to [11 statements in Appendix A], can it be done with" (1. easy 2. difficult 5. Cannot). Physical index reflects the existence of children's physical disorder as adults in 17 years ahead. The more physical index score, the more children have physical disorder symptom.

2.4. Model

The general model that will be used in this study refers to the research of Sujarwoto & Tampubolon (2013), which is as follows:

$$Y_i = \alpha_0 + \alpha_1 SC_i + \alpha_2 I_i + \alpha_3 C_i + v_i \quad (1)$$

By using IV, equation (1) can be modified to be our standard model:

$$PH_i = \alpha_0 + \alpha_1 SC_i + \alpha_2 MC_i + \alpha_3 HC_i + \alpha_4 Com_i + v_i \quad (2)$$

Where is children's physical health as dependent variables. represents maternal social capital define by days of participating in community activities, represents mother's characteristics consist of mother's age, mother's education level. represents household characteristics such as per capita expenditure in household level where mother and children live, number of household member, total asset in the household. defines vector of community variables.

This study uses data on maternal social capital which is thought to contain endogeneity. This is due to the simultaneity problem between

maternal social capital and other mother characteristic variables, such as mother's education, per capita expenditure, and number of household members. This is supported the theory of health production functions by Grossman (1972), where human capital (education) and social capital are determinants of health.

Mother's participation in activities in her community is influenced by the level of per capita expenditure in her household. Nobles and Frankenberg (2007) explain that the effect of mother's participation on child health will be greater when the mother has a low education and per capita expenditure. Mothers who have low socio-economic conditions will take advantage of the value they get from the community compared to mothers who have better socio-economic conditions.

Simultaneous problems can occur in maternal social capital. Maternal social capital can be influenced by other factors not considered in the model. Other factors such as the mother's obligation to participate in the village cooperatives in her village or the mother's employment status can affect the maternal social capital (Nobles and Frankenberg, 2007).

The correlation between mother's social capital and child's health is simultaneous. Increasing maternal social capital can improve child health. On the other hand, health issue in children will limit mothers from participating in various community activities. Moreover, the healthy condition of the child can support the mother's participation in various activities.

3. Results and Discussion

3.1 Results

The descriptive statistics of this study are described in Table 2 observational data used to explain that the average child as an adult has good health. The physical health index has an average value of 5.16 percent, which means that the average child had a healthy physique as an adult in 2014. This index explains children's physical disorder context; the smaller the index, the better children's physical health.

Observational data used in this study showed that the average age of the mothers included in the

sample was 35 years. The social capital variable (frequency of mothers participating in activities) shows that, on average, mothers participate in activities in their community 12 hours a year. Data on mothers' education shows that two percent of

mothers are primary school graduates. 1.5 percent are high school graduates, and 0.18 percent of mothers are college graduates, while 96.5 percent of mothers are not in school or have not graduated from elementary school in the year 1997.

Table 2. Descriptive Statistics

Variables	Average	Standard Deviation	Min	Max	Observation
Dependent Variable					
Children physical health	5.16	6.64	0	100	6017
Mother's Characteristics					
Maternal social capital	11.58	63.09	0	1320	5693
Mother's age	35	6.47	15	54	4908
Mother's age ²	1250	497.76	225	2916	4908
Mother with elementary school background	2	0.11	0	1	5653
Mother with middle school background	1.5	0.07	0	1	5653
Mother with university background	0.18	0.025	0	1	5653
Household Characteristics					
The number of household member	6	1.80	2	17	5765
base group: 25% lowest group	16.57	0.16	0	1	5662
Income per capita in second quartile group 25%	27	0.49	0	1	5662
Income per capita in third quartile group 25%	30	0.34	0	1	5662
Income per capita in fourth quartile group 25%	26	0.25	0	1	5662
House ownership	83.5	0.34	0	1	5765
Electricity availability	83	0.44	0	1	5704
Stove types	49.23	0.50	0	1	5765
Television ownership	58	0.48	0	1	5704
Toilet type	36	0.48	0	1	5765
Urban/Rural	40	0.49	0	1	5706
Community Characteristics					
Number of <i>Integrated Health Service Post (Posyan-du)</i>	6	4.91	1	38	5681
Number of Hospital	2	4.93	0	96	5456
Number of Clinic	5	3.38	0	25	5350
Number of Primary health facilities	4	4.94	1	41	5673
Number of Traditional health facilities	4	8.67	0	98	4695
Instrumental Variable					
Ethnicity Similarity	85	19.35	25	100	4241

Source: Author's calculation based on IFLS (1997) and (2014)

3.2. Instrument Variable Validity

Because other factors also influence maternal social capital, the social capital variable is a non-independent variable, either due to the issue of the committed variable or the problem of simultaneity. The mother's education will influence maternal social capital. Mothers who have an education will be more aware of interacting with the surrounding community (Nobles and Frankenberg, 2007). On the other hand, according to Sujarwoto & Tampubolon (2013), the maternal social capital will also be influenced by the mother's place of residence.

Maternal social capital can also experience simultaneity problems. Maternal social capital can be influenced by other variables that are not included in the model, such as the mother's obligation to participate in one of the activities and the type of mother's work (Nobles and Frankenberg, 2007). The problem of simultaneity and committed variables is supported by the results of the Wu-Hausman endogeneity test with a value of 3.979 (p-value = 0.046) and a Durbin chi² value of 4.002 (p-value = 0.045). With both significant values, it proves that the maternal social capital variable is an endogenous variable.

To overcome the problem of endogeneity on maternal social capital used instrument variables. One variable that was supposed to be used as an instrument variable was selected in this study, namely ethnic similarity. Validity testing was carried out to determine the instrument variable to be used.

In Indonesia, the same culture and language have an essential role in shaping community or social group activities. Individuals with the same ethnicity will interact more because of the same culture and language. Intensive interaction will make gatherings or activities easier. Furthermore, the interaction is motivated by a sense of community-owned by the community and the same goals among the people (Bowen, 1986; Geertz, 1962; Koentjaraningrat, 1961). The percentage level of ethnic/ethnic similarity in a community will not affect children's health in the future. So that in this study, ethnic similarity instrument variables will be used in physical health models. Table 3. show that ethnic/ ethnic similarity is correlated with mother's social capital. This uncorrelation explains that mothers participate in activities partially not based on the same ethnicity.

Table 3. Ethnic Similarity Instrument Variable Validity

Dependent Variable	Coefficient	t	p >(t)
Maternal social capital	0.104**	2.92	0.004
Children's physical health disorder	0.006	1.20	0.232

Note: *p<0.1 **p < 0.05: ***p<0.001

Source: Author's calculations based on IFLS (1997) and IFLS (2014)

3.3. Instrumental Variable Estimation

Maternal social capital uses a proxy for the frequency or intensity of mothers participating in activities in their community in one year. Maternal social capital has a marginal negative effect on children's physical health disorders as adults. The mother's presence in her association will reduce the chance of physical disorders by 0.10 percent of physical disorders in children as adults. Maternal social capital has been shown to affect children's physical disorders as adults,

seen from a significant value. These results are consistent with previous studies (De Silva & Harpham, 2007; Nobles and Frankenberg, 2007; Sujarwoto & Tampubolon, 2013) which explained that maternal social capital will improve the physical health status of children.

Maternal social capital is an investment for everyone (Lin, 2001). In this context, social capital is an investment for mothers in developing themselves to increase their ability to care for and raise children. Mothers have a role in providing

nutrition interventions for children, especially the education of the mother and the economic condition of the family (Abuya *et al.*, 2012). According to Pangaribowo *et al.* (2019) women who participate in their communities will have a better bargaining position so that in this context, the position of mothers in the family is increasingly important, and the family increasingly needs their role. Firmansyah & Sihaloho (2021) find that large investments in women's education and health are instead intended to lower the birth rate and improve the well-being of the children.

The results show that mothers with elementary education had a significant influence on physical health. This result means that mothers who have elementary education will reduce the chance of physical health problems by 1.51 percent compared to mothers who do not have elementary education. The per capita expenditure variable is divided into four categories. The 25 percent of households with the lowest per capita expenditure were used as a reference in the study. This study found that

the 25 percent of households with the highest per capita expenditures will reduce the chance of children's physical disorders as adults by 84 percent compared to the 25 percent of households with the lowest per capita expenditures.

Another characteristic that can be seen is the mother's age, which significantly affects the probability of a child's physical disorder as an adult—one year younger, the greater the 43.3 percent chance of having children's physical disorders as adults. Household size has a positive effect on increasing children's physical health disorders as an adult. It implies that the more household members in a house, the more children have physical health disorders.

This study also regards the community-level characteristics. The presence of *Puskesmas* and *Posyandu* or health facilities near children's houses will reduce children's physical health disorders in 2014. These health facilities will help the mother easily access health services for her children's and household members' needs.

Table 4. Instrumental Variable Estimation Result

Variables	Children's Physical Health Disorder	
	Coefficients	S.E.
Maternal social capital	-0.010**	0.001
Mother with elementary school background	-1.510**	0.730
Mother with middle school background	1.116	1.371
Mother with university background	4.328	4.441
Mother's age	-0.433**	0.136
Mother's age ²	0.005**	0.001
Income per capita in second quartile group 25 percent (base group: 25 percent lowest group)	-0.577	0.389
Income per capita in third quartile group 25 percent	-1.066**	0.376
Income per capita in fourth quartile group 25 percent	-0.836**	0.410
Household size	0.112*	0.066
House ownership	0.523	0.336
Electricity availability in the household	0.582*	0.342
Stove's type	0.209	0.224
Television ownership	-0.274	0.206
Toilet's type	0.059	0.201
Urban/Rural	-0.050	0.240

Variables	Children's Physical Health Disorder	
	Coefficients	S.E.
Number of <i>Integrated Health Service Post</i> nearby	-0.055**	0.023
Number of Hospital nearby	0.014	0.011
Number of Clinic nearby	-0.011	0.033
Number of <i>primary health facilities</i> nearby	-0.080***	0.023
Number of traditional health facilities	-0.010	0.011
Ethnic Similarity	0.006	0.005

Note *p<0,1 **p < 0,05; ***p<0,001

Source: Author's calculation based on IFLS (1997) dan IFLS (2014)

Table 5. Instrumental Variable Estimation of Maternal Social Capital Based on Community Activities

Variables	Children's Physical Health Disorder	
	Coefficients	S.E.
Village cooperatives Community	-0.000	(0.013)
Women's Association (PKK)	0.001	(0.001)
Integrated Health Service Post	-0.002*	(0.002)
Contraceptive Recipient Programs	0.019	(0.013)
Child Development Programs	-0.110	(0.101)
Rotating saving and credit association	-0.041*	(0.035)

Note: *p<0,1; **p < 0,05; ***p<0,001

Source: Author's calculation based on IFLS (1997) and IFLS (2014)

In addition to looking at maternal social capital as a whole, this study will also partially examine maternal social capital by dividing the physical health function model into six parts based on the type of association where mothers participate. It is helpful to see the partial impact of the goals of each association that the mother participates in on the physical health of children as adults. The results show that Integrated Health Service Post and Rotating saving and credit association have significant effects on decreasing children's physical health disorders in the future.

Table 5 describes the impact of the number of mothers' days participating in activities in their community on their children's physical health disorder. The more active mothers participating in the Integrated Health Service Post and Rotating saving and credit association will reduce the probability of children's physical health disorders as adults. Integrated Health

Service Post can provide for the needs of mothers and children, especially in health information and nutritional program. Rotating saving and credit association is the association that has higher participation of mothers. This association could provide community information and provide saving management among participants. Rotating saving and credit association is a social association that has the function of a rotational savings scheme, but the specific purpose of the Rotating saving and credit association is to increase social and business networks among members and increase information networks among its members (McCulloch & Grover, 2010).

3.2 Discussion

This study aims to examine the effect of maternal social capital on children's physical health in the future. It fills the gap that physical health status is not only affected by short-term factors but also affected by long-term factors. This

study also improves the previous findings of a mother's social capital effect on children's health status.

The main result shows that maternal social capital reduces children's physical health disorders. This finding is similar to the study result of Sujarwoto & Tampubolon (2013) that in the short-term, mother's social capital has association with children health outcomes. Maternal social capital is one of the factors in determining healthy behavior and preventing health risks that can involve children's health status and their quality of life as adults. Through social capital, mothers will have more information, since they get knowledge transfer, social support, social leverage, and informal social controls, that will play important role in providing the best nutrition for their children.

This finding relates to prior research which mentioned that social capital is vital for women, especially mothers with children (Caughy *et al.*, 2003). The spillover of maternal social capital to children's health is using information diffusion that will affect the healthy behavior of individuals. Mother will implement her information from community activities to household member health behavior, for instance, sanitation behavior, keeping the house clean, providing healthy foods, and sending their children to health facilities (De Silva & Harpham, 2007; Mengesha *et al.*, 2021) Social capital has been shown to be positively associated with a range of health outcomes, yet no studies have explored the association between maternal social capital and child nutritional status. Using data from the Young Lives study comprising 7242 1-year-old children from Peru, Ethiopia, Vietnam and the state of Andhra Pradesh in India, we find significant differences in the levels of, in particular, structural social capital (group membership and citizenship. In the Indonesian context, information diffusion and maternal social capital signal are vital because access to information in 1997 is very limited due to geographic remoteness.

The finding also shows that Integrated Health Service Post and rotating saving and credit association (locally known as arisan) have significant effects of decreasing the probability of

children's physical health disorders. Integrated Health Service Post can provide for the needs of mothers and children, especially in health information and nutritional program. At the same time, rotating saving and credit association can provide social and business networks among members, even though it indirectly increases household's food and non-food expenditures (Astuti, R. D., & Hardi, A. S. (2022).

The implication of this study is the importance of women's participation, especially mothers, in activities and programs held in the village because the more active the mother's participation, the more children will have a good health status. The government needs to consider increasing the number of programs and activities in the village as a channel to increase information and access to maternal health knowledge, especially in remote areas.

However, this study also has some limitations, such as this study cannot estimate the amount of information provided by the local community to mothers' participation. Moreover, it does not consider the biological factors, including the initial health of children and other external factors that could influence children's health.

4. Conclusions

This paper finds that maternal social capital by mother's participation in the local community has a substantial and long-term effect of decreasing children's physical health disorders. We examine ethnic similarity as an instrumental variable to overcome endogeneity issues in mothers' participation. Ethnic similarity expands the probability of mothers participating in local community associations but does not directly influence children's physical health in the future. The frequency of mothers' participation in visiting the local community provides them with information and access to maternal health knowledge. Hence, this benefit will spill over to the mother's daily behavior, including healthy living behaviors, breastfeeding, and controlling the baby's weight.

These results have important policy implications. The government needs to consider improving the number of programs and activities

in the village as a channel to advance information and access to maternal health knowledge, specifically in remote areas. Integrated Health Service Post and rotating saving and credit association have a significant effect on increasing maternal social capital. Hence social capital provides a positive impact on children's health status. It implies that programs in these local associations have long-term and effective results on children's physical health regardless of biological factors and the initial condition of each child.

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7. Appendix A.

“If you have [11 statements below], can it be done with” (1. easy 2. difficult 5. cannot)

Carrying a heavy load of 20 meters

Pulling a bucket of water from the well

Walk for 1-kilometre

Walk along 5 kilometres

Sweep the yard

Bending, squatting, kneeling

Walking across the room

Stand up from a sitting position on the floor

without assistance

Standing from a sitting position in a chair

without assistance

Reaching the hand furthest from above the
shoulder

Picking up a small coin from the table