Impact of social capital on child nutrition status: The case of three villages in Oudomxay province of the Lao People's Democratic Republic

Alay Phonvisay 1, Terukazu Suruga 2, Don Eliseo Lucero-Prisno 3

1Faculty of Economic and Business Administration, National University of Laos, Vientiane, Laos
2Graduate School of International Cooperation Studies, Kobe University Rokkodai 2nd Campus, Kobe, Japan
3London School of Hygiene and Tropical Medicine, London, UK

ABSTRACT

Background: The role of social capital on development, with trust, norm and networks as its attributes, has been all the more recognized to generate benefit for development. Social capital also has a positive role in improving child health. With its poor ranking on health indicators among Southeast Asian countries, the health sector in Lao PDR is set as a priority sector that urgently requires improvement. In this sector, child health is of particular significance. This paper examines social capital, in the form of kinship network, and its impact on child health outcomes such as nutrition status.

Methods: Following the general definition of social capital, specifically of bonding social capital, kinship network is used in this paper as a proxy of social capital. From field survey data conducted in early 2010 in 3 villages in the Northern Province of the Lao People’s Democratic Republic, a Probit regression analysis is applied to 214 samples of children under 10 years old for stunting and underweight cases.

Results: It is found that kinship network as social capital plays an important role in reducing stunted and underweight levels of children in these 3 villages. The estimated coefficient for social capital shows that children, who aside from their family nucleus are surrounded by more families of relatives in the village, are less likely to be stunted and underweight by 1.8% and 1.5% at significant levels of 10% and 5%, respectively.

Conclusion: Social capital is one of the mechanisms that people in rural areas of Lao PDR use as a buffer from economic and health shocks. Based on analysis, kinship network shows an impact on improving child health status, especially for long-term child health. Also, as society moves toward urbanization, a family network tends to be smaller and more independent. Thus, a challenge for policymakers is to create an appropriate support mechanism to substitute or complement this traditional social capital.

Keywords: Child health; Nutrition status; Social capital

INTRODUCTION

In the 1990s, the term ‘social capital’ became a buzzword, gaining importance alongside the long-recognized economic development concepts of importance of physical and human capital.1 Past literature suggests that social capital generally refers to trust, norms
and networks which can generate benefits and extend help for communities in developing countries where markets do not function well. Social capital acts as a substitute or a complement for formal institutions or markets, like insurance and credit, the help improve and alleviate the life of people in the community.²

It was not until the 1990s when the important contribution of social capital to development became widely recognized. It was first used by Hanifan³ for explaining the role of community participation in school performance. Initially however, social capital was poorly defined and was interpreted subjectively according to the field of interest of various authors.⁴ In the mainstream concepts of social capital, as defined by Putnam⁵ and Fukuyama,⁶ it refers to the trust, norms and networks which enable the collective action of people. Coleman⁷ views social capital as a resource or asset of individuals made from social relationships. According to Coleman, social capital consists of obligation and expectation, information sharing and norms produced by the trustworthiness of a social structure. For Bourdieu,⁸ social capital is the sum of actual or potential resources earned by being members of a group or network. From these concepts above, social capital can be generally referred to as trust, norms and networks that provide resources and enhance collective action in order to generate benefits for a member of the group.

From the growing literature on social capital, several studies have documented the positive function of social capital on economic development. Using cross-country data of the World Value Survey from a sample of 29 countries, Kanack and Keefer⁹ find that social capital (measured by the percentage of individuals who say most people can be trusted), has a positive impact on a country’s Gross Domestic Product per capita output growth. In addition, from a sample of 41 countries, Zak and Knack¹⁰ assert that social capital measured by trust increases investment rates. Social capital also makes contributions to community development. Studying 52 community forests in Nepal, Sakurai et al.¹¹ discover that social capital improves the management of community forests. Moreover, Sakurai¹² also confirms that social capital, measured by the number of organizations or associations in a village, has a positive correlation with the number of villages receiving aid from outside after a crisis affecting 208 villages in Burkina Faso.

In the case of health, social capital could affect health through many mechanisms such as provision of support, community influence, and having access to resources.¹³ Using an aggregate state level of trust among citizens of the USA as a proxy of social capital, Kawachi et al.¹⁴ find that people with low social capital have a high risk of poor health. At the state level in the USA, Putnam¹⁵ shows that the states with high social capitals positively correlate with better public health and negatively correlate with mortality rates. But according to Lynch et al.¹⁶ and Kennelly et al.,¹⁷ social capital measured by trust has a weak impact on health outcomes across the country level. However, in East Asia, Yamaoka¹⁸ argues that social capital measured by belonging to an organization has a positive relation with a higher number of self-reported somatic symptoms while a lack of trust in an organization correlates with poor health satisfaction. In the Indonesia Family Life Survey (IFLS) in 1993 and 1997, people who live in a community with strong social capital have higher self-rated health, a greater number of activities in their daily life and a lower number of bodily pains.¹⁹ Moreover, social capital as internalized norms, group solidarity as consequences of social support, and social participation could affect health through access to support and belongingness.²⁰

Regarding child health, one way that social capital may affect child health is through self-insurance as a way of handling the health and economic shocks in developing countries...
where an insurance market is usually absent. Moreover, social capital also influences child health by providing health information and supporting both the physical and mental health of mothers. In Mexico, social capital, through proximate kinship networks and members in a household, provides support and resources for mothers with young children, and maintains child health. Carter and Maluccio show that social capital, measured at the village level, positively correlates with the nutritional statuses (height-for-age z-score) of children under 5 in the Kwazulu-Natal province in South Africa. Based on IFLS 1997 and 2000, the panel study of Nobles and Frankenberg finds that especially among women of low education and income, their participation in key community programs has a positive impact on the height-for-age of children ages 0 to 10 years.

The degree of the impact of social capital varies among countries due to differences in culture and social value. Investigating the impact of maternal social capital on the child nutritional status of 1-year-old children in Peru, Vietnam, Ethiopia, and India, social capital measured by the level of trust and social harmony has a positive association with a child’s weight-for-age in all these countries except Peru. On the other hand, effects from other forms of social capital, like membership in a community group, involvement in citizenship activities and support from individuals, vary among the countries. In addition to these aspects of social capital, the role of kin is argued to be crucial for child nutrition status, especially for child height. In another study, Gryboski concludes that a significant proportion of child care is given by relatives.

In the Lao People’s Democratic Republic (PDR), there are many areas which still need to be improved in order to be closer to achieving sustainable development. This is especially applicable in rural areas where a market system does not function well or exists only in some places. Aside from relying on their capital endowments, people also resort to their community in order to overcome shocks such as crop failure and random health emergencies.

In addition to studying the orthodox factors, it is worth giving more attention to social capital as another alternative factor that may affect people’s well-being. Lao PDR’s human development index ranks 133 out of 177 countries with under-5 child mortality rate. Lao places 50 in the world and child malnutrition ranking, the second highest among East-Asian countries. Given these poor rankings, the health sector, especially child health, is set as a priority sector that urgently needs to be improved. According to literature and media, social capital also has a positive role in improving child health, where social network in the village can provide health information or protection by buffering the impact of health shocks.

To the best of our knowledge, literature relating social capital to child health is still relatively small in developing countries and it is considered rare in the case of Lao PDR. This paper therefore aims to investigate the effect of social capital on child nutritional status by using field survey data conducted in 3 villages in Lao PDR’s Oudomxay province. This study provides useful information on how social capital relates to child health which policy makers can utilize as a factor for promoting the health sector.

**METHODS**

**Measure of social capital**

According to the general definition of social capital, especially of bonding social capital, this paper defines the concept as resources enhanced by networks which can be potentially
or actually used by individuals. Kinship network is used as a proxy of social capital in this paper because it covers almost all aspects of social capital. Members of this network generally share the same norms and values. Moreover, kinship network also generates trust and provides resources for members and is acknowledged as the most fundamental and effective form of social capital. Family and kinship ties also make significant contributions to development, especially in developing countries. This kind of network establishes social norms, provides members with insurance and credit to overcome shocks. In Southeast Asia, the kinship tie is very strong especially in rural areas and it is considered a fundamental aspect of social capital, as in Thailand where the culture is quite similar to Lao PDR’s.

Theoretical framework
The theoretical framework in this paper follows the framework of human capital investment and the household production function model. The child health demand function is derived from the health demand function developed by Rosenzweig and Schultz.

Parents obtain utility from child health (H), goods affecting child health (Y) and consuming other goods (X), subject to budget constraints (where I is household total resource, px is price of others goods, py is price of consumption goods affecting child health and pm is price of medical care) and child health production function (H). H consists of consumption goods affecting child health (Y), medical care (M) augment utility only through H function, biological endowment (B), household and parents’ characteristics (Z), and health environment (G).

Regarding social capital, according to Becker and Murphy, social capital (S) is exogenous and does not directly enter the parents’ utility function. In this paper, it is an input in the household model that produces commodities such as providing good health for their children.

The utility maximization is expressed as follows:

\[
\max U(X, Y, H) \\
\text{S.t} \\
H = h(Y, M, B, Z, G, S) \\
I = pxX + pyY + pmM
\]

By solving this maximize utility function of the parents, we obtain the optimum level of the choice variables as a function of all the exogenous variables. The reduced form demands are:

\[
X = x(p, I, B, Z, G, S) \\
Y = y(p, I, B, Z, G, S) \\
M = m(p, I, B, Z, G, S)
\]

Substitute these with the child health production function. The reduced form of optimal child health demand function can be written as:

\[
H^* = h(y(p, I, B, Z, G), m(p, I, B, Z, G), B, Z, G, S) \\
H^* = h(p, I, B, Z, G, S)
\]

With respect to the data used in this paper (cross-sectional data), the prices of all goods can be considered a constant except for the price of health care, such as the ability of mothers.
to provide health care in each region. In this paper, the number of the medical workers in the district is used as a proxy of price for health care. The cost of medical care in Lao PDR is almost free, thus the greater the number of medical workers available in their region, the lesser the opportunity cost of the patients.

Therefore, the optimal child health production function is influenced by the price of medical care \( (p_m^*) \), total household resource \( (I) \), biological endowment \( (B) \), household’s and parents’ characteristics \( (Z) \), health environment \( (G) \) and social capital \( (S) \). The reduced form of health equation can be denoted as follow:

\[
H^* = h(p_m^*, I, B, Z, G, S)
\]

**Empirical model and analytical method**

From the theoretical framework above, child health is the function of the price of health input, biological endowment, total household resource, parents’ characteristics, health and social capital. The empirical model used in this paper is shown as follows:

\[
\text{Stunt or Underweight} = \beta_0 + \beta_0\text{female} + \beta_0\text{age} + \beta_0\text{Mheight} + \beta_0\text{Mage} + \beta_0\text{Fedui} + \beta_0\text{Medui} + \beta_0\text{SC} + \beta_0\log y + \beta_0\text{info} + \beta_0\text{HHsiz} + \beta_0\text{village dummy} + \varepsilon
\]

Where *stunt* and *underweight* are used to indicate children’s health status which are a proxy of children’s health \( (H) \), *female* and *age* are child’s gender and age; *Mheight* and *Mage* is mother’s height and age; *Feduc* and *Meduc* are years of father’s and mother’s education; *SC* is social capital; \( \log y \) is household income level; *info* is accessibility to health information; *HHsiz* is household size; *village dummy* is dummy for 3 sample villages.

Child nutrition status is measured by the Anthropometry method based on the World Health Organization standard. Anthropometric value is in the form of z-score which is calculated using the formula below:

\[
Z_{ij} = \frac{X_{ij} - \mu_j}{\sigma_j}
\]

Where \( X_i \) is the observed value of \( i^{th} \) child; \( \mu_j \) is the mean value of the reference population; and \( \sigma_j \) is standard deviation of the reference population.

A child who has weight-for-age or height-for-age z-score below \( -2 \) is considered underweight or stunted, respectively. Stunted height normally results from a long period of inadequate food consumption. Therefore, it is considered as a proxy of long-term child health. Underweight is generally considered as a child malnutrition status -- this can be observed as a short-term health status.  

For the method above, equation (1) is then applied to the probit model to estimate the impact of explanatory variables on the probability of child nutritional status.

**Data and variables**

**Data**

As previously mentioned, the mother’s biological endowment is said to have a significant impact on child nutrition status. In particular, the mother’s height is widely used in literature...
as a proxy for mother’s health and biological endowment to control child nutrition status in the estimation. However, to our knowledge, such information has not been used for analysis in the case of Lao PDR. Moreover, social capital is considered important for child health, particularly in rural and remote areas, owing to the lack of appropriate market mechanisms and external assistance (external to the community) in case of health shocks, for example.

In order to fill this data gap and to enhance the quality of the analysis in our research, a field survey was conducted to collect primary data. According to the Lao Social Indicator Survey 2011/2012, the prevalence of child stunting in Laos is 44%. Therefore, with a confidence level of 95%, a margin of error of 0.1, and design effect of 2, the minimum sample size should be at least 190 samples. Specifically, the field survey was conducted in Odomxay province, the northern part of Lao PDR in August 2009 and early 2010. It covered 3 villages (Homxay village, Mainatao village, and Nasavang village). Since the exact number of children in those 3 villages were not exactly known, the survey was aimed to cover about 50% of the Homxay and Nasavang village population in order to meet the minimum sample size. It yielded a sample of 88 households in Homxay village and 104 households in Nasavang village. However, there were 37 out of 41 households in Mainatao village that were interviewed because of the small village size. Thus, the total interviewed household in this survey was 229 households.

Upon removing incomplete samples and cleaning the data, there were 214 children from 229 households below the age of 10 years who were available for econometric analysis. Another advantage of the dataset is that it contains annual income data which is invariant to random health shocks over the year, and can overcome the problem of endogeneity in our analysis.

Variables and definition
Dependent variables: stunt and underweight are children who have z-score of height-for-age and weight-for-age under −2 respectively.

Independent variables:
• Female dummy: this is a dummy variable and is defined as 1 if the gender of children is female and 0 if otherwise.
• Age: is the age of sample groups. Here, the children’s age is divided into 3 age groups (0–11 months, 1–5 years, and 6–10 years) to capture the feeding effect in each age period. Children between 0–11 months old are exclusively in the breastfeeding period; child has some breastfeeding with other food for supplement during 1–5 years; 6–10 years is school age and no longer breastfeeding.
• Mother’s height: this is the height of the mother in centimeters. This variable is used as a proxy of child biological endowment to control genetic factors on child health. On the other hand, despite its availability, the mother’s weight is not applied for analysis, because it fluctuates over time and would not reflect her long-term health status.
• Mage is the age of the mother in years.
• Feduc and Meduc are the father’s and mother’s educational level. It is divided into 5 groups: no education = 1; with some primary school level (1–4 years of school) = 2; finished primary school level (5–7 years of school) = 3; finished lower secondary school (8–10 years of school) = 4, and finished high school and higher education (11+ years of school) = 5.
• SC is the number of a child’s families of relatives living in his/her village. This variable is used as proxy of social capital for measuring the network of kin. In terms of proxy for social capital, the kin network is more appropriate because in the context of the sample
villages, other forms of social capital, such as voluntary participation, are controlled by the village regulation that every household must send 1 representative to join community activities.

- $\log(y)$ is a natural logarithm of household annual income per capita from wage earning and agricultural output. This proxy is used as household income resources.
- Info is the dummy variable for having access to health information and is defined as 1 if the household has a television and 0 if otherwise.
- HHsize is household size. It represents the number of household members who are living together.
- Village dummy: this refers to the dummy variables of the 3 villages. These variables are used for controlling the effect of each village on child health status. They are also used to control the impact of health and sanitation environments because most households in each village share the same health environment.

**Major characteristics of the samples**

On the average, the prevalence of underweight and stunted levels is 18% and 41%, respectively (20.9% and 44.7% for Homxay village, 21.1% and 50.9% for Mainatao village, and 10.1% and 28.7% for Nasavang village). Compared to the national and northern regions, underweight levels from the 3 villages are lower, with children from Nasavang village having the lowest levels. On the other hand, except for Nasavang village, the stunted levels in the villages are higher than that of the national and northern-regions. (**Fig. 1**).

In **Table 1**, the average age of the children is 5 years old while the average age of the father and mother are 34 and 29 years, respectively. On the average, the schooling years of the father is 5.75 years, with 7% of the sample having no education. The average number of years of the mother’s education are 3.8 and uneducated mothers comprise 28% of the samples. The number of relatives living in the same village are 7 families and the yearly income per capita is 1,166,148 kip (United States Dollar [USD] 141.7). Among the 3 villages, households in Mainatao village have the lowest average annual income per capita (USD 102.1), while the highest is in Nasavang village (USD 205.3). In terms of the average number of kin networks,

![Graph](https://e-jghs.org)

**Fig. 1.** Under weight and stunt at national, northern region and village level.
Source: UNICEF, 2010b and author’s calculations
a household in Nasavang village has the largest network (9 families of relatives), while the smallest network is in Homxay village (5 families of relatives).

**RESULTS**

**Oudomxay province and the 3 villages**

Oudomxay province which has Xay district as its capital district, is the second poorest in the northern regions. It is surrounded by Phongsali, Lungnumtha, Bokeo Xayabouri, and Lungprabang province, and is considered as a junction of the Northern provinces in Lao PDR (Appendix 1). Oudomxay province has 7 districts, and 473 villages where 121 have no access to roads, and only 96 have access to electricity. There are 196 complete primary schools in the province. It has a total population of 276,960 with 46,244 households in 244 villages. Some 31.2% of households and 90 of the villages are considered poor. Agriculture in the province is mostly upland farming, with a strong subsistence orientation and where shifting cultivation is still widespread.

Homxay village which belongs to Xay District is considered an urban area. The village was established in 1976 by expanding the small community to the main road. The village is now located along the main road which is 7 kilometers from the capital village of the province. There are 165 households and 886 people who are mostly ethnic Kumeu. The main crop in this
village is corn which is part of the locals' farming contracts with Chinese merchants. After the cultivation season, some villagers recently took temporary jobs at a rubber plantation. People in this village are also highly dependent on non-timber forest products as additional sources of food and income. To earn extra for daily consumption, they sell banana leaves, mushrooms, and bamboo shoots in the market which is 7 kilometers away from the village.

Mainatao village, established in 1977, is located about 20 kilometers away from the paved road under Namor District, about 60 kilometers from Xay District. The village has only 41 households and 223 people, a majority of whom are Kumeu. All of the villagers moved here at almost the same period. Recently there are still some household migrants arriving from more remote villages, with most of them having relatives residing in the area. Of the geographical area of Mainatao village, 95% is upland and the main crops are rice and corn. Rice is largely for their own consumption while corn is mostly sold to a Chinese merchant who conducts contract farming with them. Beside corn, they also grow vegetables such as chili, watermelon, and pumpkin after the rainy season depending on the demand of the Chinese merchant.

Nasavang village has a long history of settlement that even the elders in the village do not know exactly when the village was established. It belongs to Namor District and is located 24 kilometers away from a paved road. There are 204 households and 749 people who are mostly ethnic Yang. Among the 3 villages, Nasavang village is the only village that can produce enough rice for their people's own consumption and sell the remaining supply because they have better land quantity and quality. Nasavang village is also set as a base for Chinese merchants who come to offer contract farming in the region.

Regarding its health care facility, Oudomxay province has 1 provincial hospital, 6 district hospitals, 41 health centers and 345 drug kits. In 2009, the total number of health workers was 521 where 286 persons were medical workers. There were 108 medical workers in provincial hospital, 86 persons working in the district hospitals and 92 persons assigned in health centers. As Homxay village is only 10 kilometers away from the provincial hospital, people in the village use the provincial hospital in case of serious injury. Otherwise, they treat themselves by buying medicines from drug kits and the nearest pharmacy due to a lack of transportation to shuttle them off to the hospital. Generally, children in the village are born at home with the assistance of the only birth attendant in the village, a former soldier and medical doctor. However, according to the survey, the main reason why mothers give birth at the hospital is for a hysterectomy after they have enough children.

The nearest district hospital is located in Namor District which is 20 kilometers from Mainatao and Nasavang village. Thus, for people in these villages, they mainly use the service of a health care center, which is about 5 kilometers from Mainatao village and 3 kilometers from Nasavang village. This health care center has 3 medical workers, and all of them are low-level medical staff in charge of the surrounding 7 villages (984 households). Besides curative care, this health center is also functioning as a center to promote primary health care, vaccination, mother and child health, and nutrition. Based on the interview, the health center is still facing a shortage of medicines including vaccines, limited beds for patients, and a lack of transportation for patient referrals and medical workers. Moreover, there is an urgent need for higher-level medical workers to improve the efficiency of curative services. In addition, people in the Mainatao and Nasavang village also utilize drug kits in case of minor health problems such as flu or minor injuries. There are 2 volunteers for each drug kit who had...
undergone short-term training in Luang Prabang and have the capacity to provide villagers with consultations and medicines.

Most people in Mainatao and Nasavang village were born at home with the assistance of their relatives. Recently, however, the younger generation of women in Nasavang village choose to give birth at health centers or hospitals because of improved access compared to the past. Interestingly, women in Mainatao village still prefer to give birth at home. This is because of the tradition of the Keumu.

Self-awareness of sickness, and awareness of their children’s health in both the villages of Mainatao and Nasavang are low, according to the answers they provided the interviewer. Most cases of child mortality occur because parents are not able to identify unusual and fatal symptoms that their children may have suffered.

In terms of community activities, there is a common rule in the village where every household must send a representative to join and participate. These activities include meetings, participation in health promotion campaigns and improving the road. An absent household is charged a fine. Moreover, Nasavang village has a distinct culture that could have a positive effect on the health nutrition status of people in the village. According to the Yang ethnic culture, there are 2 days every month called “Wan Sin” (full moon ritual) based on Buddhism, in which 1 household in each unit of the village must hold a ritual ceremony and invite all the villagers to join in (on the average, 1 household has to hold the ceremony once a year). The households normally share money for buying meat from outside the village to provide food for the ritual. These 2 days of ritual are the only time that people in the village eat meat. On a daily basis, the staple fare of the villagers is rice and vegetables. In the aspect of kinship networks, Nasavang village has stronger and larger kin networks because the village has a longer settlement period and its residents rarely migrate to other villages. Kin networks tend to play an important role for Nasavang and Mainatao villages in comparison to Homxay village due to the lack of access to a market and to outside help.

**Estimation Results**

On the national level, there is a lack of data and information on child genetic determinant factors, especially social capital which is considered an important factor for the well-being of people, particularly in developing countries. Therefore, to fill the gap, the field survey was conducted mainly to study the impact of social capital on child health in villages in order to provide evidence. The marginal effects and z-statistics of probability of children who are stunted and underweight are shown in Table 2.

At the village level, the estimation result shows evidence that social capital plays an important function in reducing child malnutrition, especially on long-term child health. The estimated coefficient for social capital shows that children who have more than 1 family of relatives in the village are less likely to be stunted and underweight by 1.8% and 1.5% at 10% and 5% significant levels, respectively. This finding supports previous studies about the impact of social capital on child nutritional status, such as those of Nobles and Frankenberg and Silvia and Harpham. This result can be explained by the fact that relatives might help provide food or credit for the child’s family when they are facing a crisis, particularly in terms of child health in Mainatao and Nasavang villages. These two villages have limited contact with the outside. In Nasavang village, there is evidence of food sharing, especially of rice during a crop failure or food crisis. From the interviewed sample, the affected people who...
had financial problems had a tendency to borrow money from their relatives, and almost 80% of the samples borrow without making any formal document, procedure, or agreement on paying interest. According to previous literature, there is evidence that social capital makes a significant contribution to accessing credit.\textsuperscript{38} Moreover, it is also believed that there is sharing of health information among the group.

Comparing the 3 villages, the estimated coefficients show that children who live in Homxay and Mainatao villages have a probability of being stunted and underweight at 22.8% and 34.4%, respectively, compared with children in Nasavang village. This finding tends to show that the relative strength of the kinship network in Nasavang village has some beneficial effect on child health. Nasavang village has a much longer history and so the longer the village has been established, the better and stronger the village organization has become, which in turn has strengthened its kinship networks. There is no difference between boys and girls in cases of stunting and being underweight. The age of children is confirmed as a crucial determinant for both stunting and malnutrition which are similar to the findings above. Comparing children below 1 year old with children ages between 1–5 and 6–10, the probability of being stunted increases by 22% and 33%, respectively, while children aged between 6–10 have a higher risk of being underweight by 21%. This finding presents the evidence of insufficient food intake among children in the villages. The results indicate a significant increase in the probability of being malnourished as children become older. From our observation, the foods in each meal are mainly rice and vegetables while sources of protein like fish or meat are rare and vary depending on the ability and luck at hunting these in the river and forest.

Tother’s height, which is used to control the genetic factor of children, shows significant impact on reducing child malnutrition, particularly on child long-term health status. The

| Table 2. Marginal effect estimation result (probit regression) |
|---------------------------------------------------------------|
| Independent variables                                       | Stunt          | Underweight    |
|                                                              | dy/dx z        | dy/dx z        |
| Female                                                       | -0.0353 -0.47  | -0.0606 -1.41  |
| Age 0–6 mon as ref.                                          |               |                |
| Age 1–5                                                      | 0.2277 1.94    | 0.1053 1.24    |
| Age 6–10                                                     | 0.3382 2.95    | 0.2186 2.71    |
| Mother’s height                                              | -0.0113 -1.95  | -0.0104 -2.58  |
| Mother’s age                                                 | -0.0295 -3.87  | -0.0237 -4.28  |
| Father education (no education as ref.)                      |               |                |
| Some primary                                                | -0.4265 -5.55  | -0.1246 -2.94  |
| Primary                                                     | -0.3984 -2.69  | -0.2578 -2.69  |
| Higher                                                      | -0.4216 -3.14  | -0.1943 -2.77  |
| Mother education (no education as ref.)                      |               |                |
| Some primary                                                | -0.0141 -0.11  | -0.052 -0.85   |
| Primary                                                     | -0.017 -0.14   | -0.1099 -1.59  |
| Higher                                                      | 0.049 0.3      | -0.0869 -1.52  |
| No. of relative                                              | -0.0186 -2.1   | -0.0154 -2.46  |
| Log total income capita                                      | 0.1464 1.21    | 0.0094 0.14    |
| Television                                                  | 0.0253 0.29    | -0.0827 -1.31  |
| Household size                                              | 0.0243 1.6     | 0.0091 1.03    |
| Homxay                                                      | 0.2287 2.31    | -0.0109 -0.17  |
| Mainatao                                                    | 0.3441 2.74    | 0.0411 0.46    |
| No. of observation                                           | 214 214        |                |
| Pseudo R2                                                    | 0.1671 0.2745  |                |
| Log likelihood                                              | -119.4 -72.61  |                |

Source: author’s calculations.\footnote{Significant at 10\% level; \textsuperscript{a}Significant at 5\% level; \textsuperscript{b}Significant at 1\% level.}
coefficient estimate for the mother’s height reveals that mothers who are taller in height are less likely to have stunting and underweight children by 1.2% and 1%, with statistical significance at the 10% and 5% levels, respectively. This finding is supported by previous studies, such as those done by Silvia,39 Nobles and Frankenberg,23 and Kabubo-Mariara et al.40 Furthermore, themother’s age is also a crucial determinant factor of child health. The coefficient has a negative impact on a child being stunted and underweight by 2.9% and 2.3%, respectively at 1% statistical significance. This can be explained by the fact that an older mother knows how to take care of her child better. Moreover, it is interesting to note that an older mother who decides to have her last pregnancy prefers to give birth at the hospital because she tends to ask the doctor for a hysterectomy thereafter. In terms of parental education, maternal education does not show any impact on children being stunted and underweight, unlike the finding in cases at the national and northern region. However, parental education tends to have an influence on child health in both the long-run and short-run. The positive impact of parental education on improving child health supports previous literature such as those of Thomas et al.41, and Strauss and Thomas.42 Compared to those with uneducated fathers, children whose fathers have reached some primary and higher educational level are seen to have a decreased probability of stunting. This probability of stunting decreases by 42%, 39%, and 42%, respectively, while the probability of being underweight lowers by 12%, 25%, and 19%, respectively. This finding confirms the evidence that a father’s level of educational attainment has an effect on child nutrition status in the North as reported in previous studies. An explanation for this is that a Kumeu husband mostly stays at home and takes care of their children, while the wife works in the field. Hence, in this case, the father’s education plays a more direct role in utilizing health information in the home and distributing food among the family members.

Family income, in this case, shows no impact on child nutrition status. The underlying reason is that people in the sample depend on their own production for consumption while the income from their annual sales production is spent on assets. From estimation, the household size is not statistically significant in correlation with child nutrition status, even though larger households show positive signs of malnutrition.

**DISCUSSION**

Our study provides an analysis of social capital as a determinant of child nutrition status. The research has found evidence that kinship network, which is acknowledged as the foundation of social capital, is one of the mechanisms that people in rural areas resort to as a buffer from economic and health shocks. From the analysis, kinship network shows an impact on improving child health status, especially for long-term child health. However, this study still faces some limitations which might overstate the impact of social capital. The proxy used to determine child’s health status such as stunting / underweight might be related to diet and exercise in addition to socio-economic status. For further study, these data could be included in the estimated equation to arrive at clearer resultst.

Consequently, the government must be aware of the importance of this social capital. These traditional kinship networks or social relations among household units or communities may be altered gradually under a transition economy as the government has strongly and continuously pursued economic development. An unsound and misguided economic development, particularly marked by macro-development projects without proper social
and environmental assessments, would severely impact on people especially in rural areas where most rely on community and natural resources for survival. As their ability to survive is affected on a larger scale (e.g. at the community level), social capital like kinship network would not function well, in acting as a buffer from social and economic shocks. As a result, widespread child malnutrition could possibly be unavoidable. Moreover, as a society moves towards urbanization, a family network tends to be smaller and more independent. Thus, a challenge for policymakers is to create an appropriate support mechanism to substitute or complement this traditional social capital. Recently, formal institutions such as microfinance or community funds seem to be viable options for boosting social capital at the community level and are used as a tool for handling shocks in villages. However, as in literature, the effects of these kinds of tools on rural development still vary among countries. Therefore, further study of other types of social capital would be useful for development. Specifically, it is recommended that there be further study on 1) how social capital like the traditional kinship network has been affected or deviated by transition economies and the increasing presence of free market forces, and 2) the social and economic implications and effects of a declining social capital on child health. These could pave the way for appropriate government intervention programs that can be introduced to mitigate rural households and communities with deteriorating social capital.

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Appendix 1. Map of Oudomxay province