

## ORIGINAL RESEARCH

# Social capital and its relationship with malnutrition and anemia in children from rural coastal Ecuador

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## ABSTRACT:

**Introduction:** Social capital is considered an important determinant of health and overall wellbeing; however, to the best of the authors' knowledge, literature relating social capital to malnutrition in developing countries is still relatively small. This article examines the relationships between social capital and chronic malnutrition and anemia in a population of rural coastal children in Ecuador.

**Methods:** A cross-sectional study in two groups of 246 and 282 children under 5 years and their families was performed. Anemia and chronic malnutrition were analyzed as outcome variables. Variables about social capital were identified on the basis of the Social Capital Assessment Tool of the World Bank. Bivariate and multivariate logistic regression analyses were conducted.

**Results:** The prevalences of anemia and chronic malnutrition in the children were 15.0% and 12.8%, respectively. At the multivariate analysis, the variable 'mother has borrowed money'

had an inverse association with chronic malnutrition (prevalence ratio (PR) 0.43, 95% confidence interval (CI) 0.20–0.90). Receiving and providing help after the earthquake of 2016 was significantly associated with a lower prevalence of chronic malnutrition (PR 0.52, 95%CI 0.28–0.97), but not with anemia. However, a mother being part of a community organization was associated with a 1.90 times higher prevalence of anemia (95%CI 1.04–3.48) in children than mothers who were not part of a community organization.

**Conclusion:** The relationship between maternal social capital and the nutritional status of their children in rural communities seems to be positively related. However, a mother's participation in community organizations increases the prevalence of anemia in the children. These mixed results highlight the need for further studies focused on the different types of social capital and how they impact on health in deprived areas.

## Keywords:

anemia, children, Ecuador, malnutrition, social capital.

## FULL ARTICLE:

### Introduction

The relationship between child nutrition and maternal social capital has not been widely explored in developing countries; only a few studies have been made in Peru, Vietnam, Ethiopia and India<sup>1,2</sup>. There are several ways in which maternal social capital can determine the nutritional status of a child; for example, by increasing the possibility of access to different services such as health care, information and education; by allowing access to assets such as money, provisions and food; and by helping mothers to maintain physical and mental health<sup>3</sup>.

Another possible mechanism by which maternal social capital can improve a child's health and nutrition is through social networks<sup>1</sup>. These networks allow mothers to 'know more' because of information transfer (eg where to obtain cheaper resources), to 'think differently' because of behavioral influences (eg hygiene and cooking practices), to 'do things differently' (eg maintain breastfeeding for longer duration), and to 'feel differently' because of emotional support (eg improved mental health).

Two definitions of social capital were used for this study; the first

and wider definition describes social capital as a set of intangible attributes present in a society that favor entrepreneurship: trust, reciprocity and social action according to shared norms<sup>4</sup>.

According to Putnam et al, social capital has two key elements: structural social capital and cognitive social capital<sup>4</sup>. The first reflects the links and connections that people have in a community by being active and participating in internal activities. The second reflects the sense of being part of the community by addressing the confidence in the community, social cohesion, common local guidelines, and recognition of reciprocity<sup>2</sup>.

The second and more recent definition visualizes social capital as informal relationships of trust and cooperation (family, neighbors, colleagues), formal associativity in organizations of different types, and the institutional framework (rules and values) of a society that fosters or inhibits relationships of trust and civic commitment<sup>5</sup>.

The hypothesis used for this study was that maternal social capital can be effective in improving a child's nutrition, especially when physical and human capital are uncommon. Thus, this study aimed to determine the social capital of mothers with young children and to determine the association between maternal social capital and

their children's nutritional status. This study was conducted in San Isidro, a parish on the Ecuadorian coast that suffered the impact of an earthquake in 2016. Therefore, questions about social capital include receiving help after the earthquake.

## Methods

### Study area and sample size

A cross-sectional study was conducted in San Isidro, a rural parish located in the province of Manabí, on the coast of Ecuador, in September 2017. San Isidro parish has 10,987 inhabitants (35.7% urban and 64.3% rural) and its area is 296 km<sup>2</sup>. The climate is tropical, dry and humid, and the average temperature fluctuates between 24°C and 26°C. The economy of the parish is based on agricultural and livestock activities<sup>6</sup>.

The sample size was calculated by using an estimated prevalence rate of chronic malnutrition of 24.7% in rural coastal children of Ecuador, a 95% confidence interval (CI), and a precision of 5.0% and 10% for missing data. The minimum sample size required was calculated to be 314 children aged 0–59 months<sup>6</sup>.

The study was conducted at public daycare centers and schools. For all procedures performed on children, the presence of the mother was required. Children with diseases or conditions that have an influence on nutritional status were excluded from the study.

### Questionnaires

The questionnaire for this survey consisted of three sections. The first section was adapted from the Multiple Indicator Cluster Survey (UNICEF)<sup>7</sup> and the National Health and Nutrition Survey (ENSANUT-2012), developed by the Ministry of Health of Ecuador and the National Institute for Statistics and Census<sup>8</sup>. It included questions about demographics and socioeconomic status, maternal and paternal information, health, and nutrition of children, including anthropometric measurements.

The second section was based on the Latin American and Caribbean Scale for Food Security (*Escala Latinoamericana y Caribeña de Seguridad Alimentaria* – ELCSA)<sup>9</sup>. It included questions about food security.

The third section, based on the Social Capital Assessment Tool of the World Bank<sup>10</sup>, addressed information concerning the family's social capital.

The questionnaire was adapted and validated to San Isidro's culture to ensure its appropriateness. Trained nutrition students collected data via personal interviews directed to the children's primary caregivers, usually the mothers.

### Anthropometrics and blood samples

Researchers observed the recommended technical standards and criteria throughout all steps of the anthropometric evaluation. Children's and mothers' weights and heights were measured as described elsewhere<sup>6</sup>. In summary, weight was measured with portable electronic microscales (ADE, model M320600, Hamburg,

Germany), height was measured with a portable stadiometer (SECA model SECA 213, Hamburg, Germany), and length was measured by using a length board (ADE model MZ10027-1, Hamburg, Germany). The precision of the instruments was 100 g for weight and 0.1 cm for length/height). Z-scores for length-for-age, weight-for-age and weight-for-length were calculated by using the WHO 2006 Child Growth Standards for children under 5 years<sup>11</sup>.

A sample of venous blood (3 mL) was collected from each child and hemoglobin values were determined with a spectrophotometer.

### Variable description

The dependent variable 'chronic malnutrition' or stunting was determined by the height-for-age Z-score  $\leq 2$  standard deviations<sup>11</sup>. Anemia was defined as a blood hemoglobin level of  $< 110$  g/L for children 6–59 months of age at sea level<sup>12</sup>.

The questions for cognitive and structural social capital considered the relationships that the family, particularly the mother, had with other members in the community (eg 'After the earthquake emergency, were you helped by community members or did you help them? – Yes/No', 'In an emergency, were you helped by friends and family? – Yes/No', 'Money borrowed? – Yes/No'), their participation in community groups (eg 'Mother being part of a community organization – Yes/No', 'Mother takes part in community activities – Yes/No'), and their feeling of belonging (eg 'Will you live several more years in your community? – Yes/No', 'Do you like your community? – Yes/No').

Covariates for this study were children's ages, mother's age, number of children, maternal education level, family income and food security. These covariates are directly and critically related to children's nutritional and health status. Maternal education is expected to improve a child's nutritional status by changing preferences and resource allocations, and by improving childcare practices<sup>13-15</sup>. A higher family income is related to an improved children's nutritional status, probably because of access to higher quantities of nutritious and tasty foods<sup>12-14</sup>. It also relates to the access to better health services<sup>16-18</sup>. The number of children in a household was considered to be a proxy of family size, the reason being that number of children is related to their nutritional status because of the 'competition' with other children for attention, care, food, and sometimes scarce resources<sup>19-21</sup>.

### Statistical procedure

Bivariate analysis and multivariate logistic regression models were used to measure the association between social capital and dependent variables (anemia and chronic malnutrition), using Poisson regression models (prevalence ratio (PR) and 95%CI). The multivariate models were adjusted by covariates: mother's age at childbirth, child's age, family income, number of children in the household, and food insecurity. Variables that were significant ( $p < 0.20$ ) in the bivariate analysis were maintained for the multivariate model. Only significant variables ( $p < 0.05$ ) were maintained in the final model. The OpenClinica software v.3.7 (<https://www.openclinica.com>) was used in data entry and STATA

v15.0 (StataCorp LLC, Texas, USA) was used for statistical analysis.

### **Ethics approval**

This research involved human participants. Mothers or guardians of the children signed a written informed consent to participate in this study. Illiterate mothers consented by their thumbprint after verbal consent. The Institutional Review Board from the Pontifical Catholic University of Ecuador (protocol number CEISH-297-2017) and from the Ministry of Public Health of Ecuador (protocol number MSPCURI000216-3-etapa 1) approved the protocol.

### **Results**

A total of 246 children for anemia and 282 for chronic malnutrition were included in the multivariate analysis. The prevalence of anemia and chronic malnutrition was 15.0% and 12.8%, respectively.

Table 1 shows characteristics of the sample. Children's ages ranged from 1 to 59 months and the most frequent age group was 49–59 months (35.4% for the anemia sample and 35.1% for the chronic malnutrition sample). The most frequent group for mother's age at child's birth was 20–25 years (32.9% for anemia and 34.7% for chronic malnutrition). Forty percent of mothers were illiterate or had only finished primary education.

Most families had one or two children (61.8% for anemia and 63.1% for chronic malnutrition). Considering the family income per month, 57.3% in the anemia sample and 54.6% in the chronic malnutrition sample earned from US\$80.10 to US\$300 (less than the 2017 minimum wage of US\$375).

In relation to structural social capital, after the 7.9-magnitude earthquake in April 2016, 64.5% of the anemia sample and 63.8% of the chronic malnutrition sample received and provided help. A low percentage of mothers were part of a community organization (18.7% for anemia and 18.1% for chronic malnutrition). Approximately 40% of mothers participated in community activities and 30% of mothers had borrowed money in both samples.

In cognitive social capital analysis, a higher proportion of mothers (96.7% for anemia sample and 95.7% for chronic malnutrition) liked their community, and were willing to live more years in that community (92.3% for anemia and 90.4% for chronic malnutrition).

Finally, descriptive analysis of food security variables showed that more than half of households were worried about the scarcity of food in the previous 3 months (62.6% for anemia and 62.1% for chronic malnutrition). In addition, approximately 20% of households reported that they were out of food because of a lack of money in the previous 3 months and were forced to reduce the quantity of food for someone aged less than 18 years in the previous 3 months (Table 1).

### **Social capital and anemia**

The prevalence of anemia was higher in children whose mothers were part of a community organization than in children whose mothers were not (26.1% vs 12.5%,  $p=0.021$ ) (Fig1). In bivariate (PR 2.02, 95%CI 1.13–3.60) and multivariate analysis (PR 1.90, 95%CI 1.04–3.48), a mother being part of a community organization was positively associated with anemia (Tables 2,3). The other variables were not significantly associated with anemia in bivariate or multivariate analysis (Tables 2,3).

### **Social capital and chronic malnutrition**

The prevalence of chronic malnutrition was lower in children whose mothers had borrowed money than in children whose mothers had not (8.1% vs 14.8%,  $p=0.049$ ) (Fig2). In addition, a lower prevalence of chronic malnutrition was observed in children from households who were helped after the 7.9-magnitude earthquake than in children whose families did not receive help (8.3% vs 20.6%,  $p=0.003$ ).

In multivariate analyses, receiving help after the earthquake was associated with a lower prevalence of chronic malnutrition (PR 0.52, 95%CI 0.28–0.97). In addition, children whose mothers had borrowed money were less likely to have chronic malnutrition (PR 0.43, 95%CI 0.20–0.90) than children whose mothers did not (Table 3).

**Table 1: Characteristics of the sample, San Isidro, Manabí, Ecuador, 2017**

Variable	Anemia sample (N=246) n (%)	Chronic malnutrition sample (N=282) n (%)
<i>Outcomes</i>		
Anemia		
No	209 (85.0)	–
Yes	37 (15.0)	–
Chronic malnutrition		
No	–	246 (87.2)
Yes	–	36 (12.8)
<i>Child attributes</i>		
Child's age (months)		
1–12	20 (8.1)	25 (8.9)
13–24	32 (13.0)	33 (11.7)
25–36	45 (18.3)	54 (19.1)
37–48	62 (25.2)	71 (25.2)
49–59	87 (35.4)	99 (35.1)
<i>Maternal and family attributes</i>		
Mother's age at birth of the child (years)		
13–19	71 (28.9)	78 (27.7)
20–25	81 (32.9)	98 (34.7)
26–30	42 (17.0)	48 (17.0)
31–40	43 (17.5)	48 (17.0)
41–50	9 (3.7)	10 (3.6)
Number of children		
1–2	152 (61.8)	178 (63.1)
3–4	79 (32.1)	84 (29.8)
>4	15 (6.1)	20 (7.1)
Maternal education level		
Illiterate	6 (2.4)	8 (2.8)
Primary	94 (38.2)	106 (37.6)
Secondary	123 (50.0)	137 (48.6)
Higher education	23 (9.4)	31 (11.0)
Family monthly income (US\$)		
<80	39 (15.9)	55 (19.5)
80.10–300	141 (57.3)	154 (54.6)
>300	66 (26.8)	73 (25.9)
<i>Social capital</i>		
Receiving and providing help after the earthquake		
No	87 (35.5)	102 (36.2)
Yes	158 (64.5)	180 (63.8)
Mother is part of a community organization		
No	200 (81.3)	199 (81.9)
Yes	46 (18.7)	44 (18.1)
Mother takes part in community activities		
No	150 (61.2)	167 (60.1)
Yes	95 (38.8)	111 (39.9)
In an emergency, were you helped by friends and family?		
No	171 (69.8)	198 (70.5)
Yes	74 (30.2)	83 (29.5)
Mother has borrowed money from family and friends		
No	172 (70.2)	196 (69.5)
Yes	73 (29.8)	86 (30.5)
Do you like your community?		
No	8 (3.3)	12 (4.3)
Yes	238 (96.7)	270 (95.7)
Will you live several more years in your community?		
No	19 (7.7)	27 (9.6)
Yes	227 (92.3)	254 (90.4)
<i>Food security</i>		
In the last 3 months, were you worried about the scarcity of food?		
No	92 (37.4)	107 (37.9)
Yes	154 (62.6)	175 (62.1)
In the last 3 months, due to lack of money, were you out of food?		
No	191 (77.6)	216 (76.6)
Yes	55 (22.4)	66 (23.4)
In the last 3 months, due to lack of money, were you forced to reduce the quantity of food of someone under 18?		
No	201 (81.7)	157 (80.5)
Yes	45 (18.3)	55 (19.5)

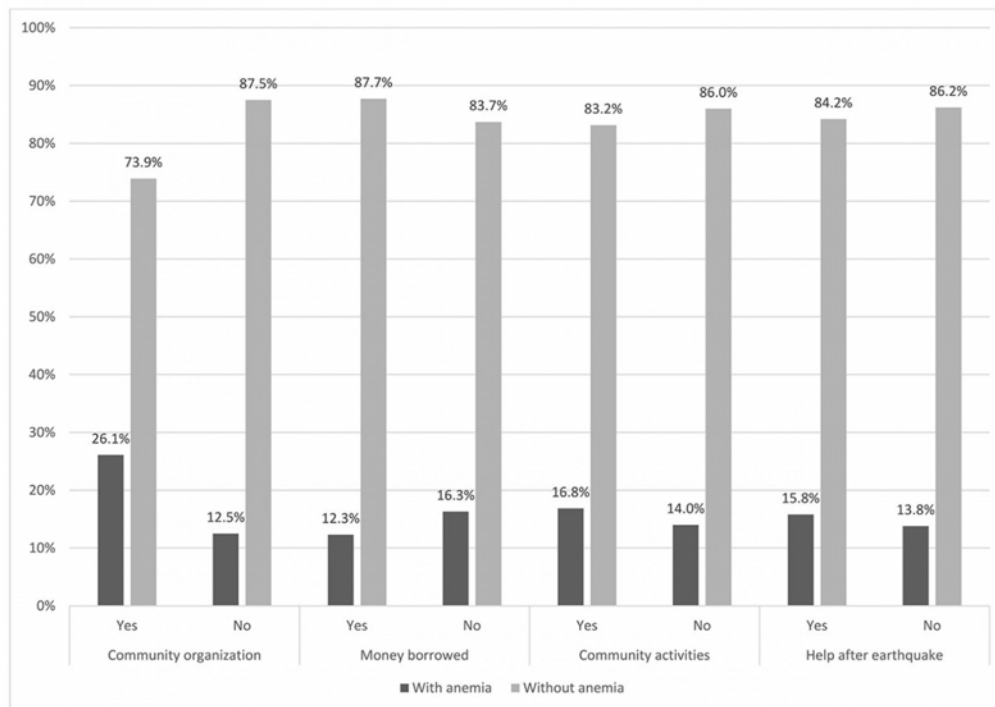
**Table 2: Bivariate analysis between social capital, anemia and chronic malnutrition adjusted by confounding variables, San Isidro, Manabí, Ecuador, 2017**

Social capital variable	Anemia			Chronic malnutrition		
	Prevalence ratio	95% confidence interval	p-value	Prevalence ratio	95% confidence interval	p-value
Receiving and providing help after the earthquake						
No	(Reference)					
Yes	1	0.59–1.69	1.000	0.41	0.22–0.75	0.004
Mother being part of a community organization						
No	(Reference)			(Reference)		
Yes	2.02	1.13–3.60	0.018	0.57	0.21–1.53	0.262
Mother takes part in community activities						
No	(Reference)			(Reference)		
Yes	1.59	0.96–2.64	0.070	0.82	0.44–1.55	0.544
In an emergency, did friends and family help you?						
No	(Reference)			(Reference)		
Yes	1.37	0.82–2.28	0.233	1.39	0.75–2.57	0.299
Mother has borrowed money from family and friends						
No	(Reference)			(Reference)		
Yes	0.81	0.45–1.45	0.482	0.55	0.25–1.20	0.134
Do you like your community?						
No	(Reference)			(Reference)		
Yes	0.91	0.25–3.26	0.882	1.47	0.22–9.84	0.692
Will you live several more years in your community?						
No	(Reference)			(Reference)		
Yes	1.06	0.42–2.72	0.897	1.70	0.43–6.68	0.448

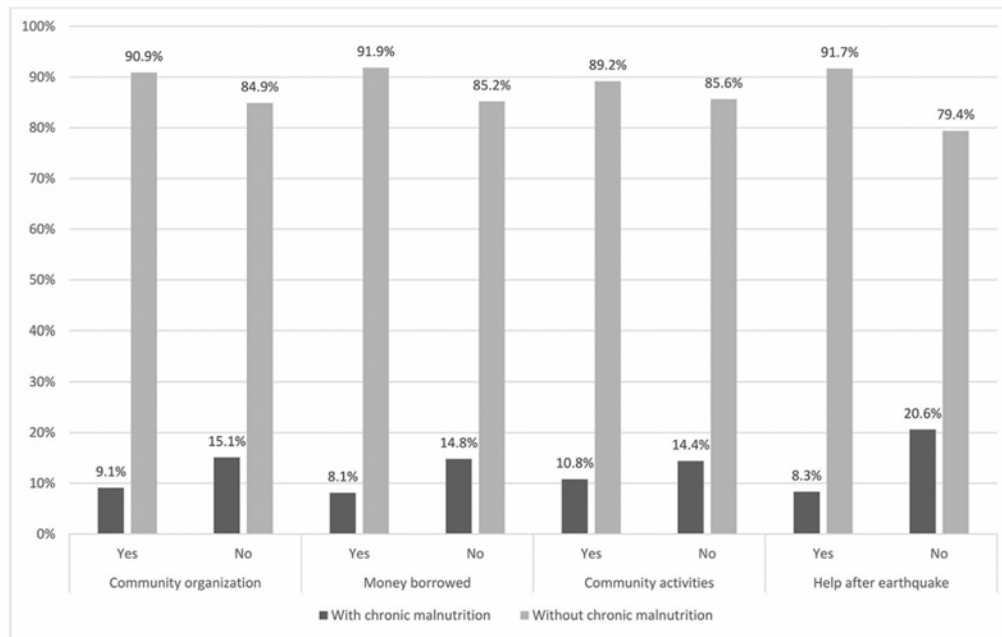
**Table 3: Multivariate analysis (final models) for the association between social capital, anemia and chronic malnutrition adjusted by confounding variables, San Isidro, Manabí, Ecuador, 2017<sup>†</sup>**

Social capital variable	Anemia			Chronic malnutrition		
	Prevalence ratio	95% confidence interval	p-value	Prevalence ratio	95% confidence interval	p-value
Mother being part of a community organization						
No	Reference					
Yes	1.90	1.04–3.48	0.038			
Receiving and providing help after the earthquake						
No				Reference		
Yes				0.52	0.28–0.97	0.043
Mother has borrowed money from family and friends						
No				Reference		
Yes				0.43	0.20–0.90	0.026

<sup>†</sup> Analysis adjusted for children's age, mother's age, number of children, maternal education level, family income and food security.



**Figure 1: Social capital variables in children with and without anemia, San Isidro, Manabí, Ecuador, 2017 (n=246).**



**Figure 2: Social capital variables in children with and without chronic malnutrition, San Isidro, Manabí, Ecuador, 2017 (n=282).**

## Discussion

This study provides data on the relationship between a mother's social capital and their child's nutritional status (anemia and chronic malnutrition). The reciprocity relationships observed in the support received by the community after the 2016 earthquake and having borrowed money from family, friends or community members were protective factors for chronic malnutrition. However, being part of a community organization increased the prevalence of anemia.

After the multivariable analysis, the results show that receiving help from community members or helping them after the earthquake (used as a proxy for structural social capital and bonding social capital) showed a protective effect on chronic malnutrition. By helping people who were affected by the earthquake, some resources may have been directed to address the needs of children of the households before other matters. The fact that a mother borrowed money (also used as a proxy for structural social capital) may have been a demonstration of the community solidarity and was shown to have a protective effect on the nutritional status of a child. This money may have helped mothers to access more resources for food, health services, and hygiene supplies.

Similarly, some studies have shown a protective effect of social capital on the nutritional status of children. One study in Peru analyzed the relationship between maternal social capital and the nutritional status of children. It found a positive relationship between maternal structural social capital and a child's nutritional status. A child whose mother was part of a community group was 1.1 cm taller than children whose mothers were not part of a community group<sup>2</sup>.

Likewise, in rural areas in Laguna, Philippines, children whose mothers had higher maternal social capital scores (being active

members of organizations, attended social events, having high network density) had a lower probability of a poor nutritional status, regardless of the community they belonged to. Additionally, weight-for-age and height-for-age were found to have a significant association with maternal social capital in rural areas<sup>22</sup>. A study in rural Ethiopia has shown that support from two or more individuals was associated with meeting a minimum level of dietary diversity (OR 5.2, 95%CI 1.32–20.40)<sup>23</sup>.

In the present study, some contradictions were found with the hypothesis that maternal social capital can be related to a child's nutrition improvements. The results suggest that children whose mothers participate in community organizations are more likely to have anemia. Studies in India, Peru, Vietnam and Ethiopia have shown that maternal group membership was not related with either height or weight of children even after adjusting the model for confounding variables<sup>1</sup>. Additionally, children whose mothers were involved in citizenship activities showed lower height-for-age Z-scores in the India study, and lower weight-for-age Z-scores in the Ethiopian study<sup>1</sup>. No association between maternal cognitive social capital and child nutritional status was evident in the study in Peru<sup>1</sup>. De Silva and Harpham suggested that these results should be cautiously interpreted from cross-sectional data<sup>1</sup>. Further longitudinal research will need to be undertaken because it is not known if mothers were participating in community groups because their children were not growing properly, or if children were suffering because of the activities of mothers<sup>1</sup>. Stress caused by community participation, added to that caused by a mother's productive and reproductive roles, could have had a negative impact on the mother's mental health<sup>1</sup> and affected the nutritional status of children.

Regarding the relationship between frequency of meals of children and maternal social capital in Ethiopia, being a member of a community group (OR 0.35, 95%CI 0.20–0.59) or having one type

of citizenship activity (OR 0.39, 95%CI 0.20–0.76) showed decreased odds of meeting the minimum meal frequency for children<sup>19</sup>. The authors of that study hypothesized that this inverse relationship could have been due to the lack of trust in community members, and mainly associated with cognitive social capital. Additionally, Coleman stated that social capital could negatively influence innovation when an individual adheres to group norms<sup>24</sup>. Therefore, mothers with high social capital would be convinced and influenced by the social norms of that community, some of which may have not been adequate for children's nutrition<sup>24</sup>. It is likely that these studies underestimated the influence of social capital because they did not distinguish between the different types of social capital (bonding and bridging), which could be acting in opposite directions<sup>25</sup>.

The results of the present study suggest that social capital appears to work in a non-intuitive way. Bonding social capital, which generally refers to ties between family members and friends, had a positive impact on child nutrition. There is evidence to show that bonding social capital is positively related to overall improved healthcare access and use across countries<sup>26</sup>. However, this role may depend on the norms or beliefs of members within the network<sup>26</sup>. At the same time, bridging social capital, especially when it entails participation in organizations, did not prevent children from having nutritional problems. Bridging social capital can potentially improve child health outcomes by making more information available about health, local services, and ways to access them<sup>27</sup>. However, if a community lacks or has limited access to safe water, transportation, and health services, then bridging organizations are able to do little by themselves to affect nutritional outcomes of children.

Most research has focused on the association between a mother's social capital and child nutrition, whereas research on the relationship between a father's social capital and child undernutrition in developing countries is sparse. In recent years, the importance of a father's role in child nutrition has been recognized<sup>28</sup>. For instance, a study found that a father's financial contributions to child nutrition and health care enhanced their children's nutritional status<sup>29</sup>. Similarly, the nutritional condition of Mexican American children was favorably connected with the father's engagement in feeding practices<sup>30</sup>.

This study is a first approximation of the relationship between social capital in mothers and nutrition of their children in a rural area of Ecuador. Moreover, it can be the beginning in the

development of similar studies that could address the effect of social capital on health outcomes. However, results from this study may lack external validity because of the limited study area (a single rural parish in coastal Ecuador affected by an earthquake). Other weaknesses are the sample size for some categories, which may influence the results of the associations, and the cross-sectional study design, which is not the best for causation analysis between social capital and anemia or chronic malnutrition. It is highly recommended that information be gathered in several points in time for further causation analysis. Finally, this study did not analyze the relationship between social capital and parenting practices (ie breastfeeding and care practices), variables that could influence the results of the association between social capital and anemia or chronic malnutrition on children.

## Conclusion

Maternal social capital and the nutritional status of their children in a coastal rural community of Ecuador seems to be positively related. Structural social capital or bonding social capital (mother had borrowed money from family or friends, and the reciprocity relationships observed in the support received by the community after the 2016 earthquake) had a protective effect on chronic malnutrition. This study emphasizes the importance of improving bonding social capital in community intervention programs. The study also found that bridging social capital (mother's participation in community organizations) was associated with a higher prevalence of anemia and had no impact on chronic malnutrition. These mixed results highlight the need for further studies focused on the different types of social capital and how they affect health in deprived areas.

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## REFERENCES:

- 1 De Silva MJ, Harpham T. Maternal social capital and child nutritional status in four developing countries. *Health and Place* 2007; **13**: 341-355. DOI link, PMID:16621665
- 2 Favara M. 'United we Stand Divided we Fall': maternal social participation and children's nutritional status in Peru. Policy Research Working Paper No. 6264. Washington, DC: World Bank, 2012. DOI link
- 3 Harpham T, De Silva MJ, Tuan T. Maternal social capital and child health in Vietnam. *Journal of Epidemiology and Community Health* 2006; **60(10)**: 865-871. DOI link, PMID:16973533
- 4 Putnam R, Leonardi R, Nanetti R. *Making democracy work: civic traditions in modern Italy*. Princeton, New Jersey, USA: Princeton University Press, 1994. DOI link
- 5 Lechner N. Challenges of a human development: individualization and social capital. [In Spanish]. *Instituciones y*



Desarrollo 2000; **7**: 7-34.

**6** Rivadeneira MF, Moncayo AL, Tello B, Torres AL, Buitron GJ, Astudillo F, et al. A multi-causal model for chronic malnutrition and anemia in a population of rural coastal children in Ecuador. *Maternal and Child Health Journal* 2020; **24(4)**: 472-482. DOI link, PMID:31838668

**7** United Nations Children's Fund. *Multiple Indicator Cluster Survey*. 2018. Available: [web link](#) (Accessed 17 July 2018).

**8** Freire W, Ramirez MJ, Belmont P, Mendieta MJ, Silva K, Romero N. Tomo I. *National Survey of Health and Nutrition. ENSANUT-ECU 2011-2013*. [In Spanish] Quito: The Ministry of Public Health and the National Institute of Statistics and Censuses, 2014.

**9** Latin American and Caribbean Food Security Scale (ELCSA). *Latin American and Caribbean Food Security Scale: operation and applications*. [In Spanish] Rome: Food and Agriculture Organization, 2012.

**10** Grootaert G, Narayan D, Nyhan V, Woolcock M. *Measuring social capital: an integrated questionnaire*. World Bank Working Paper No. 18. Washington, DC: World Bank, 2004. DOI link

**11** de Onis M, Onyango AW, Borghi E, Siyam A, Nishida C, Siekmann J. Development of a WHO growth reference for school-aged children and adolescents. *Bulletin of the World Health Organization* 2007; **85(9)**: 660-667. DOI link, PMID:18026621

**12** World Health Organization. *Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity*. Geneva: WHO, 2011.

**13** Thomas D, Strauss J, Henriques MH. How does mother's education affect child height? *Journal of Human Resources* 1991; **26(2)**: 183-211. DOI link

**14** Desai S, Alva S. Maternal education and child health: is there a strong causal relationship? *Demography* 1998; **35(1)**: 71-81. DOI link, PMID:9512911

**15** Bicego G, Boerma T. Maternal education and child survival: a comparative study of survey data from 17 countries. *Social Science and Medicine* 1993; **36(9)**: 1207-1227. DOI link

**16** Kim K, Shin SC, Shim JE. Nutritional status of toddlers and preschoolers according to household income level: overweight tendency and micronutrient deficiencies. *Nutrition Research and Practice* 2015; **9(5)**: 547-553. DOI link, PMID:26425286

**17** Miller JE, Korenman S. Poverty and children's nutritional status in the United States. *American Journal of Epidemiology* 1994; **140(3)**: 233-243. DOI link, PMID:8030626

**18** Engle P. Influences of mothers' and fathers' income on children's nutritional status in Guatemala. *Social Science and*

*Medicine* 1993; **37(11)**: 1303-1312. DOI link

**19** Gurmu E, Etana D. Household structure and children's nutritional status in Ethiopia. *Genus* 2013; **69(2)**: 113-130.

**20** Kumari K. Differentials of nutritional status in school-age children and the associated factors. *Health and Population: Perspectives and Issues* 2007; **30(4)**: 268-277.

**21** Ajao KO, Ojofeitimi EO, Adebayo AA, Fatusi AO, Afolabi OT. Influence of family size, household food security status, and child care practices on the nutritional status of under-five children in Ife-Ife, Nigeria. *African Journal of Reproductive Health* 2010; **14(4 Spec no.)**: 117-126.

**22** Domingo DG, Barba C, Talavera MT, Tolentino L, Naupal-Forcadilla R. Association of maternal social capital with nutritional status of 6 to 24-month-old children living in urban and rural areas in Laguna, Philippines. *Malaysian Journal of Nutrition* 2017; **23(1)**: 53-63.

**23** Kang Y, Kim J, Seo E. Association between maternal social capital and infant complementary feeding practices in rural Ethiopia. *Maternal and Child Nutrition* 2018; **14(1)**: e12484. DOI link, PMID:28714283

**24** Coleman J. Social capital in the creation of human capital. *American Journal of Sociology* 1988; **94**: S95-S120. DOI link

**25** Vikram K. Social capital and child nutrition in India: the moderating role of development. *Health and Place* 2018; **50**: 42-51. DOI link, PMID:29339291

**26** Derose KP, Varda DM. Social capital and health care access: a systematic review. *Medical Care Research and Review* 2009; **66(3)**: 272-306. DOI link, PMID:19174538

**27** Manandhar DS, Osrin D, Shrestha BP, de L Costello AM. Effect of a participatory intervention with women's groups on birth outcomes in Nepal: cluster-randomised controlled trial. *Lancet* 2004; **364(9438)**: 970-979. DOI link

**28** Win T, Sein TT, Ikeda W, Morita A, Sokejima S. Does father's social capital matter to child undernutrition in Myanmar? *Asia Pacific Journal of Public Health* 2020; **32**: 418-425. DOI link, PMID:32857618

**29** Kansime N, Atwine D, Nuwamanya S, Bagenda F. Effect of male involvement on the nutritional status of children less than 5 years: a cross sectional study in a rural southwestern district of Uganda. *Journal of Nutrition and Metabolism* 2017; **2017**: 3427087. DOI link, PMID:29348935

**30** Penilla C, Tschann JM, Deardorff J, Flores E, Pasch LA, Butte NF, et al. Fathers' feeding practices and children's weight status in Mexican American families. *Appetite* 2017; **117**: 109-116. DOI link, PMID:28629931