Does Maternal Social Capital Have a Health Payoff? Evidence from Jimma Zone, Ethiopia

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Abstract

The relationship between social capital and health has been the subject of research in developed countries. However, empirical evidence from developing countries is scarce. This study examines the association between different dimensions of social capital and maternal health in Jimma Zone of Ethiopia. We utilized a cross sectional data gathered from a random sample of 422 mothers in four districts of the zone. We utilized two-stage regression procedure. We have also controlled for other confounding factors and heterogeneity of the study areas. We find that an increase in an overall score of a mother's social capital would increase her probability of enjoying better health condition by about 0.61. However, we found mixed effects of different sub-dimensions of social capital. Increases in scores of sub-dimensions of structural social capital like social cohesion and networks are associated with 0.39 and 0.19 decreases in probability of enjoying better health status. Nevertheless, increases in scores of dimensions of cognitive social capital like general trust, institutional trust and sense of security would increase probability of enjoying better health status by 81%, 64% and 65% respectively. Therefore, people with higher levels of social capital – especially in terms of social interaction and all forms of cognitive social capital– engage in healthier behaviors and feel healthier. Since the other forms of capital such as physical and human capital are scarce in countries like Ethiopia, health policies that aim to promote maternal health should promote favorable social capital, which is abundantly available in these countries.

Keywords: self-rated maternal health; social capital; endogeneity; Jimma Zone; Ethiopia
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1. Introduction

Health is one of the basic objectives of economic development, a key to the wellbeing of citizens. Despite notable strides made by governments and international organizations in improving public health, large disparities in health still persist within and among countries. In particular, health inequalities are pervasive within countries particularly in the developing world. Consequently, health related issues have still received due consideration in Sustainable Development Goals (SDGs) which will be due in 2030.

Inequalities in health have traditionally been attributed to differences in income or economic status within the health literature. In fact, factors such as income and poverty have long been considered as key determinants of health (Lomas, 1998; Macinko and Starfield, 2001). However, renewed interest in the social determinants of health grew following findings of strong links between health and income inequality within society than differences in absolute income (Macinko and Starfield, 2001; Erikson, 2010). Subsequent researches reveal that the erosion of social cohesion is an important pathway between income inequality and poor health, highlighting the critical role of social capital in health development (Erikson, 2010).

Previous studies on Ethiopia have explored the relationship between social capital and health behavior (Erulkar and Ferede, 2009), and on child health outcomes (De Silva and Harpham, 2007; and Fantahun et al., 2007). However, none of these were specifically concerned with maternal health. Moreover, there were a few other limitations. Firstly, the analyses in most of these studies relied on single-item measures of social capital as well as health and thus failed to provide a comprehensive picture of the relationship (Story, 2014). Moreover, none of them have explicitly attempted to address the problem of endogeniety. In this paper, we attempt to address these gaps.

Therefore, this paper aims to provide comprehensive empirical evidence on the relationship between maternal social capital and its association with self-rated maternal health among women in Jimma zone of Ethiopia. The rest of the paper is organized as follows: Section 2 deals with review of literature. Section 3 deals with methodology and the data, and Section 4 is concerned with result and discussion. The final section is conclusion.

2. Literature Review

Although there is a large body of empirical research on the link between social capital and health, the picture remains less clear (Erikson, 2010; OECD, 2010; De Silva and Harpham, 2007; Islam et al., 2006). The literature is inconclusive with findings reported ranging from a significant positive association (Eriksson, 2010; Islam, et al., 2006; Kawachi et al., 1999; Poortinga, 2006a; Sundquist and Yang, 2007), to little or no association (Poortinga, 2006b; Veenstra et al., 2005; Engstrom et al., 2008). Results also vary greatly depending on how social capital is conceptualized

and measured (Krishna, 2004; Snelgrove et al., 2009). Also, depending on what measure of health is used[1], making comparison between studies virtually impossible.

The evidence on developing countries is even less clear (Agampodi et al., 2016; Semali et al., 2015; Riumallo-Herl et al., 2014), and only few studies have so far explored the effect of various dimensions of social capital and health in the context of Sub-Saharan African countries including Ethiopia. Knowledge about the effect of social capital on health is of particular interest and relevance to developing countries. This is because social capital is relatively more prevalent in developing countries, while other forms of capital such as human and physical capital are relatively scarce in these countries, pointing to the importance of social capital as a substitute for other capitals (Story, 2013). Thus, more empirical evidence is needed to gain a better understanding of the link between social capital accumulation and health in developing countries.

Ethiopia offers an interesting case to examine the link between social capital and maternal health. First, it has been one of the fastest growing countries in recent a decade which was also accompanied by significant health improvements during the same period. In particular, remarkable improvements have been registered in areas such as child health where Ethiopia managed to meet MDG 4[2] target in 2012 three years before the deadline. However, progresses in other fronts have not been as impressive. Rates of morbidity and mortality from preventable causes are still high and considerable regional disparity in health outcomes persists (Health Sector Transformation Plan, 2015). On the other hand, the economic growth has also led to significant inequalities in income and health. Such a generally widening income inequality could possibly lead to erosion of some forms of social capital. However, the aggregate effect and how this gets transmitted into health outcomes is not clear and deserves empirical analysis. In particular, it is quite interesting to examine the link between various forms of social capital and health in the face of accelerated economic growth. Therefore, this study tries to elucidate the relationship between social capital and maternal health by considering the broad dimensions of social capital in rural Ethiopia.

3. Methodology and Data

This study was conducted in Jimma zone, Ethiopia. Based on figures from Central Statistical Authority (CSA, 2007[3]), the zone has an estimated total population of 2,495,795 of whom female accounts 49.7%. About 94.3 % of the population of the zone is rural dwellers. Jimma town is the capital town of the zone and located at 356 km to the South West of the capital city, Addis Ababa. The study was implemented in four districts of the zone, which was randomly selected. The data collection was undertaken in 2016 in the Month of June.

Study design: Multi-center community based cross sectional study was undertaken to examine the relationship between social capital and health status. All women in the reproductive age group

[1]See OECD (2010) for details.
[2] For more information, please refer https://www.who.int/topics/millennium_development_goals/child_mortality/en/
[3] The latest survey was conducted in 2007

(15-49 years) who live in the rural kebeles[4] of Jimma zone were the source population. The study population constitutes women in the reproductive age group who fulfilled the inclusion criteria participated in the study. For this study, we prefer to include only women due to the fact that mothers' health has significant implication to the health status of the household and its high return to the economy as a whole.

Only mothers who fulfill the following criteria were included in the study. First, mothers who has lived in the selected kebele at least for six months. Second, healthy mothers who were able to communicate at the time of interview were also encompassed by the survey. We calculated the sample size is by single population proportion formula:

$$n = \frac{\left(Z_{1-\alpha/2} \right)^2 p(1-p)}{d^2}$$

Where n is sample size; $Z_{1-\alpha/2}$ is 95% confidence interval; p is expected proportion; and d is marginal error. Here we made the following assumptions: expected proportion of mothers with acceptable level of social capital (50%), marginal of error 5% and confidence interval 95%. A proportion of 50% was preferred due to lack of similar studies. When computed, this gives 384[5] individuals. Considering 10% non-response rate, the final sample size was 422.

Multi-stage sampling technique was employed for selection of study subjects. In the first stage, four of the seventeen districts in Jimma zone were randomly selected. Then, a list of all kebeles in each district was prepared, from which one was selected randomly per district. After identification of the kebeles, the total numbers of women in the reproductive age group in the each selected kebeles were identified in consultation with health extension workers for proportional allocation of the sample size to each kebele. Finally, systematic sampling technique was employed to identify the study subjects. Sampling interval was determined after the number of households in each kebele known. In case two women are available within one household, one lady was selected by lottery method.

The data was collected by face-to-face interview methods. The interview was conducted at a convenient place for the interviewee and where her privacy was respected. Training was given to data collectors on the purpose of the study, instruments and data collection procedures. The data collectors were closely supervised. Data collectors made three attempts in cases where the selected mothers were not available at home to make effort to access them.

To control the quality of the data, data collectors and supervisors were trained for two days about the study. The instrument was pre-tested on 5% of similar population. Based on the result of pre-

[4]Kebel is the smallest administrative unit in Ethiopia and it is equivalent to peasant association.
[5] Calculated as: ((1.96)*(0.5*0.5))/(0.05*0.05)

testing a necessary revision was made. Those who participated in pre-testing were contacted to give their general feeling, comments and what problem they faced during the interview. Explanations were given to respondents pertaining to purpose of the study and the confidentiality of the information was ensured. Data collectors submitted the collected data to the supervisors on daily basis and the supervisors checked the completeness of the data. Code cleaning was also done to check data entry errors. Confounding factors was controlled through application of multivariate analysis. In addition, we selected data collectors who are familiar with language and culture of the target population.

The ethical clearance of the study was approved by the Ethical Review Committee of Jimma University. Official permission to conduct the study was requested via official letter from the university and granted by local administrators of the selected districts and Kebeles. All respondents were given detail information about the objective and purpose of the study and verbal consent was obtained from each respondent before the interview. All the information acquired through this study was kept confidential in lockable cabinets and access to the study records was restricted to the members of the study team. To attain confidentiality, information was identified using codes and analysis was done on data without revealing the identity of the individual and no names of participants were recorded during the survey.

3.1 Measurement of Variables

The Dependent variable: Self-rated maternal health

In the current research design, we used self-rated maternal health status as a proxy for the dependent variable. Self-rated health (SRH) status is a powerful and independent predictor of disability and mortality (Idler and Benyamini, 1997), and is also one of the most frequently used health indicators in studies on the relationship between social capital and health (Kawachi et al., 2004). Our self-rated maternal health variable was constructed based on responses to the question: "In general, would you say that your health is healthy or unhealthy"? Respondents' assessment of their health status was recorded on a five-point Likert scale (1 = very good, 2 = good, 3 = fair, 4 = poor, 5 = very poor). We dichotomized the responses into "good" (responses 1, 2 or 3) and "poor" (responses 4 or 5) consistent with previous studies (Meng, and Chen, 2014; Engström, et al., 2008).

Focus Variable: Social capital

For the measurement of social capital, an Integrated Questionnaire for Social Capital (SC-IQ) – a standard questionnaire developed by the World Bank – was used by adapting to the local context (Grootaert et al., 2004). The instrument includes questions related to various dimensions of social capital: groups and networks (participation in and contributions to, membership diversity and roles); trust and solidarity (perceived trust in neighbors and various institutions); collective action and cooperation; social cohesion and inclusion (including forms of social interaction); and empowerment and political participation (Christian, 2003; World Bank: 2002).

Accordingly, we generated eight different indicators of social capital (4 structural and 4 cognitive). Structural social capital indicators included civic participation, bonding ties among others. *Civic participation* was represented by three indices: (1) collective action and cooperation measured by 4 survey items (2) social cohesion and inclusion measured by two survey questions and (3) social ties and interaction measured by 7 survey items as outlined in Table 1. *Bonding ties* on the other hand was measured by 6 survey items regarding presence of close friends, assistance to a neighbor in need, etc. Finally, an aggregate index of structural social capital was constructed using all the four measures with values ranging from 6 to a maximum score of 25 larger scores representing stronger social capital.

On the other hand, cognitive social capital was measured through four different indicators of trust and solidarity. *Personalized trust* was measured by four survey items on perceived trust in people within ones' close circles/neighborhood: (1) "Most people who live in this village/ or neighborhood can't be trusted", (2) "In this village/or neighborhood, one has to be alert or someone is likely to take advantage of you"; (3) "Most people in this village/or neighborhood are willing to help if you need it" and; (4) "In this village/ or neighborhood, people generally trust each other in matters of lending and borrowing money". Responses were recorded as "yes (= 1)" for respondents who agree and "no (= 0)" otherwise. The sums of these four responses were then summed to generate the index (see table 1).

Generalized trust was measured by four survey items which ask respondents' assessment of trust in: (1) People from their ethnic or linguistic group/race/tribe; (2) People from other ethnic or linguistic groups/race/tribe; (3) Shopkeepers; and (4) Strangers. Each item was measured on a 3-point scale: 1 = never trust, 2 = trust to some extent, 3 = trust to great or very great extent. The responses were each dichotomized into "yes/trust (=1)" for responses 2 and 3, and "no trust (=0) for response 1; and summed with the resulting score/index value ranging between 0 and 4 (higher score indicating better trust).

Institutional trust was measured by respondents' assessment of trust in seven different institutions or their representatives: (1) village/ or kebele administration; (2) central government; (3) police; (4) school teachers; (5) health center/professional; (6) agriculture office/development agents (DAs); and (7) health extension workers. Each item was measured on a 3-point scale: 1 = never trust, 2 = trust to some extent, 3 = trust to great or very great extent. The responses were each dichotomized into "yes/trust (=1)" for responses 2 and 3, and "no trust (=0) for response 1; and summed with the resulting score/index value ranging between 0 and 4 (higher score indicating better trust). Sense of security was measured based on three survey items as outlined in Table 1. Finally, we also constructed an aggregate cognitive index by summing all the four measures of cognitive social capital mentioned above with scores ranging from 18 to 35. We also created an *aggregate social capital index* by combining both categories of social capital indices.

Table 1: Measures of Various Dimensions of Social Capital and Survey Items

Measure/indicator		Survey item/question
Structural social capital	**Civic participation:** Collective action & cooperation (scores: 0 – 4)	**4 questions (all dichotomized as 1 = yes, 0 = no):** (1).During last12 months, have you worked with others in your village/neighborhood? (2) Would a good proportion of people in this village/neighborhood contribute time or money toward common development goals? (3) If there was a water supply problem in this community, people will likely cooperate to try to solve the problem? (4) In case something unfortunate happened to someone in the village/ neighborhood, would some people in the community would get together to help?
	Social cohesion & inclusion (scores: 2-7)	(1) How strong is the feeling of togetherness or closeness in your village/neighborhood? (1 = very distant, …, 4 = very close) (2) Extent of differences among residents of your village/neighborhood observed? (1=large, …, 3 = none)
	Social ties & interactions (scores: 0-8)	(1). Last month, have…. (1.1) you met with people in a public place either to talk or to have food or drinks? (1.2) have people visited you in your home? (1.3) you visited people in their home? [1=yes, 0=no] (2) Were the people you met mostly of different…(1.1) Ethnic/linguistic group? (2.2) Economic status, (1.3) Social status? (2.4) Religious group?
	Bonding Social networks & support (scores: 0 – 6)	**6 questions (dichotomized as 1 = yes, 0 = no):** (1). Have at least 5 close friends? (2) Assistance to a neighbor or close friend with a personal problem (3) Neighbors take care of one's children in case of trip away from home (4) Presence of at least one person outside one's family willing to assist in case of long-term emergency/death of breadwinner (5).Have been asked to assist with personal problem during last one year. (6). Assistance requests by people of a lower economic status?
	Aggregate structural index	Total score on the four dimensions of structural social capital measures (scores: 6 – 25)
Cognitive social capital	**Personalized trust** Trust in neighborhood (scores: 0 - 4)	**4 questions (dichotomized as 1 = agree 0 = disagree):** (1) "Most people in this village/neighborhood can't be trusted" (2) "In this village/neighborhood, one has to be alert or someone is likely to take advantage of you" (3) "Most people in this village/neighborhood are willing to help if you need it" and (4) "In this village/neighborhood, people generally trust each other in matters of lending and borrowing money"
	Generalized trust:[6] (4 - 12)	**3 questions on the extent of trust (1 = not at all, 2 = to some extent, 3 = to a large extent):** (1) People from their ethnic or linguistic group/race/tribe; (2) People from other ethnic or linguistic groups/race/tribe; (3) Shopkeepers; and (4) Strangers.
	Institutional trust: Trust in institutions (scores: 0 – 7)	In general, do you agree or disagree with the following statements? (Dichotomized as 1 = Yes, 2 = 0): (1) village/kebele administration; (2) central government; (3) Police; (4) school teachers; (5) health center/professional; (6) agriculture office/DAs; and (7) health extension workers.
	Sense of security: Feeling of security (scores: 7 – 12)	(1) In your opinion, is this village/neighborhood generally peaceful (1= very peaceful, …,4=very violent) (3) Compared to five years ago, has the level of violence in this village/neighborhood increased, stayed same, decreased? (1 = increased a lot, …., 5=decreased a lot) (3) How safe from crime & violence do you feel when you are alone at home? (1 = very safe, …, 3=very unsafe)
	Aggregate cognitive index	Total score on the four dimensions of cognitive social capital measures (scores: 18 – 35)
Overall social capital index		Overall score on (scores: 34 – 58)

Source: Own compilation based on SC-IC Developed by World Bank

[6]Trust in people in general, even if not personally known

***Covariates*:** We controlled for various covariates such as household income, the ages of the wife and the husband, education status of the wife and the husband, heterogeneity of the kebeles, and consumption behavior of the household among others. Incorporating these factors, helps us estimate the relationship between the various forms of social capital and self-rated maternal health keeping other factors constant.

3.2 Estimation Strategy

Our estimation strategy was guided by the conceptual framework presented in Figure 1. As a key independent variable, we focus on various dimensions of social interactions, including the frequency of meetings with friends and relatives, subjective satisfaction with relationship with friends, membership in voluntary associations, religious participation and perception of community problems. We created an index of social capital, which incorporates all these dimensions. Therefore, we have constructed eleven[7] indices of social capital. The indices have maximum and minimum values and are, therefore, censored both form below and above. In addition, we include a number of socio-demographic and economic household level characteristics as control variables.

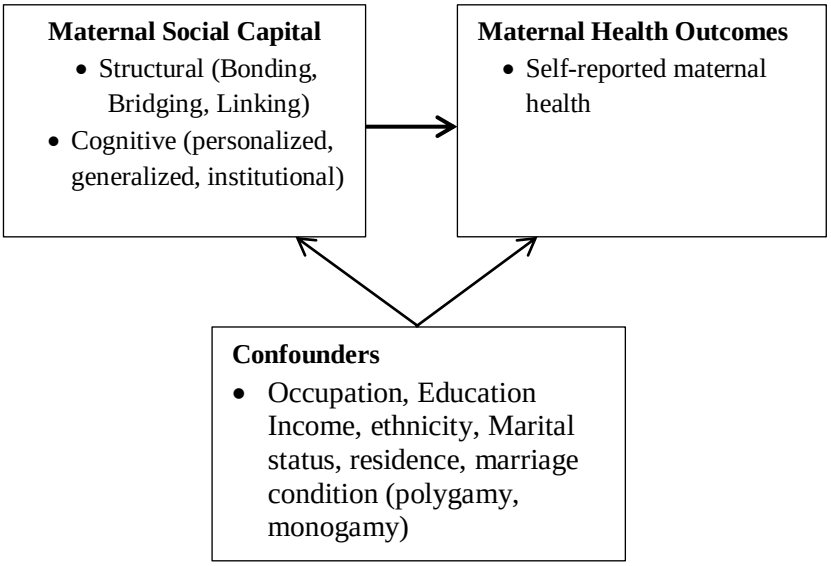

Figure 1: Conceptual framework of the study
Source: Own construction based on ligature

[7]Eight specific social capital measures (4 structural and 4 cognitive) plus three aggregate indices (structural, cognitive and combined/overall)

Following the above discussions and the conceptual framework presented in Figure 1, the model to be estimated will take the following form:

$$SRH_{ij} = \beta_0 + \beta_1 SCH_{ij} + \beta_2 Y_{ij} + \beta_3 X_{ij} + \beta_4 Z_{ij} + \mu_j + \varepsilon i \quad (1)$$

Where SRH_{ij} stands for self-rated health status of mother i in kebele j which takes score 1 if mother reports her health status as healthy; 0 otherwise; SCH_{ij} is the measure of social capital of the mother i in kebele j; Y_{ij} is annual income of the household i in kebele j; X_{ij} is vector of characteristics of mother i in kebele j; μ_j is village dummy[8] introduced to capture heterogeneous nature of each village that cannot be directly measured and quantified; Z_{ij} is vector of other covariates that are presumed to affect mother's health condition. εi is the error term of the model such that $\varepsilon i \sim N(0, \sigma^2)$ and the $\beta' s$ are the parameters to be estimated.

A major methodological challenge associated with models such as equation (1) relates to estimation bias arising from the possible endogeniety of the social capital variables considered. That is, it could be the case that social capital and health are jointly determined resulting in endogeneity bias. There could also be unobserved heterogeneity at local/or kebele level making it difficult to isolate the effect of social capital from other local effects possibly influencing health. We attempt to account for such potential influences of omitted variables through the inclusion of kebele fixed effects (μ_j), which could capture the heterogeneity of the kebeles. On account of the inherent nature of endogeneity problem in such analysis, we do not estimate model (1) directly. Instead, we employ a two-stage estimation strategy, where in the first-stage we estimate the following model:

$$SCH_{ij} = \beta_5 + \beta_6 Y_{ij} + \beta_7 X_{ij} + \beta_8 Z_{ij} + \mu_j + \varepsilon i \quad (2)$$

The nature of the dependent variable, SCH_{ij}, in equation (2) is different from that in equation (1), mothers' self-rated health. All measures of social capital included here assume certain minimum and maximum values i.e., they are censored both from above and below. Thus, an appropriate estimator to be used in such a case is tobit[9].

Accordingly, we run the two-limit tobit model for each measure of social capita, in the first-stage, with the lower and upper limits defined respectively by the minimum and maximum scores corresponding to each social capital measure. Next, we generate the predicted scores of each social capital measure from the first stage for use in the second stage model specified as:

$$SRH_{ij} = \beta_9 + \beta_{10} Y_{ij} + \beta_{11} PSCH_{ij} + \beta_{12} X_{ij} + \beta_{13} Z_{ij} + \mu_j + \varepsilon i \quad (3)$$

[8] This is defined as 1 for individuals residing in Kebele j and 0 otherwise.
[9] The two-limit tobit model to be specific.

Where $PSCH_{ij}$ denotes predicted score of social capital corresponding to mother i in kebele j; other variables as defined before. Since the dependent variable is dichotomous, the logistic regression is an appropriate model for estimating equation (3). That is, the predicted scores from equation (2) are to be used in the logistic regressions to be employed in the second-stage for estimating the effect of social capital on health.

4. Empirical Results and Discussions

Table 2: Descriptive Statistics

Variable	N	Mean	Std. Dev.	Min	Max
Dependent variable					
Self-reported maternal health (1 = good)	401	0.78	0.42	0	1
Overall social capital score	387	48.66	4.72	34	58
Low	387	0.37	0.48	0	1
Moderate	387	0.42	0.49	0	1
High	387	0.21	0.41	0	1
Structural social capital					
Collective action & cooperation	401	3.65	0.49	2	4
Social cohesion & inclusion	399	5.71	1.28	2	7
Social interaction	390	4.59	1.65	0	8
Social networks & support	401	4.67	1.19	0	6
Aggregate structural social capital	388	18.62	3.14	6	25
Low	388	0.37	0.48	0	1
Moderate	388	0.37	0.48	0	1
High	388	0.26	0.44	0	1
Cognitive social capital					
Personalized trust	401	2.82	0.76	0	4
Generalized trust	401	9.08	1.82	4	12
Institutional trust	401	6.73	0.77	0	7
Sense of feeling secure	400	11.36	1.15	7	12
Aggregate cognitive social capital	400	29.98	3.26	18	35
Low	400	0.46	0.50	0	1
Moderate	400	0.31	0.46	0	1
High	400	0.24	0.42	0	1

Table 3: Summary statistics of the socioeconomic and other control variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Family size	396	5.02	2.15	1	11
Household income (birr)	395	7724.06	7968.49	50	87000
Age of the mother (years)	401	38.98	14.29	18	100
Age of the husband (years)	315	45.91	26.74	2	453
Distance to nearest health facility (km)	397	0.89	0.49	0.01	5
Marital status (1 = married)	400	0.78	0.41	0	1
Mother's education (1 = literate)	399	0.81	0.39	0	1
Husband's education (1 = literate)	317	0.62	0.49	0	1
Mother's occupation (1 = farmer)	400	0.25	0.43	0	1
Mother's khat use (1 = yes)	401	0.67	0.47	0	1

Tables 2 and 3 present the descriptive statistics for the study variables. Majority (78%) of the respondents reported good health status. Over two thirds (63%) of the respondents scored moderate to high on the overall aggregate social capital index showing a relatively stronger social ties in the study area. Looking into the components, roughly the same composition was observed in terms of structural social capital (63% of respondents reporting moderate to high level social participation), while the corresponding figure for cognitive social capital was only 55%. That is, structural social capital makes relatively better contribution than the cognitive social capital within the overall index (Table 1). Majority of the respondents were married (80%) and literate (81%), and depend on non-farm activities for their livelihood (75%). The mean age among the sample respondents was about 39 years and lives in a family of 5 members on average. There is also a high prevalence of khat[10] use among the sample respondent mothers, which could have its own negative influence on health status of the study subjects.

[10] Khat and hashish are addictive substances that could have negative health impacts when consumed. People usually consume these substances being in group

Table 4: Logit regression estimates of the associations between maternal social capital and mother's self-reported health status

Dependent variable: Self-reported maternal health	**Overall social capital index**	**Structural Social Capital**				**Cognitive Social Capital**			
		Collective action & cooperation	Social cohesion & inclusion	Social interaction	Networks & support	Personalized trust	Generalized trust	Institutional trust	Sense of security
	(1)	(2)	(3)	(4)	(5)	(7)	(8)	(9)	(10)
Measure of social capital^^	0.463***	-5.05***	-0.418*	8.93***	-1.44***	2.19***	1.42***	0.57***	0.61***
	(0.126)	(1.371)	(0.198)	(2.426)	(0.390)	(0.594)	(0.386)	(0.155)	(0.165)
Household size^	0.1188	2.27**	0.8698	0.151	0.4072	0.3995	0.0175	0.3577	0.3974
	(0.435)	(0.692)	(0.473)	(0.434)	(0.434)	(0.434)	(0.438)	(0.433)	0.434)
Family income^	0.1651	-0.2896	0.1087	0.841**	0.652**	0.0157	0.418*	0.2936	0.0128
	(0.202)	(0.247)	(0.210)	(0.259)	(0.230)	(0.210)	(0.207)	(0.202)	(0.210)
Mother's age^	-2.33**	-0.1739	-2.78**	-3.97***	-2.11*	-2.24**	-1.478	-2.66**	-1.92*
	(0.823)	(1.048)	(0.846)	(0.903)	(0.829)	(0.825)	(0.872)	(0.820)	(0.839)
Husband's age^	-1.55*	-4.41***	-0.6316	-7.35***	-0.8715	-0.9717	-1.86*	-0.7948	-1.75*
	(0.713)	(1.308)	(0.643)	(2.051)	(0.633)	(0.642)	(0.762)	(0.626)	(0.743)
Distance to nearest health center^	-0.3849	-0.3849	-0.50*	-0.3849	-0.3849	-0.3849	-0.3849	-0.3849	-0.3849
	(0.218)	(0.218)	(0.219)	(0.218)	(0.218)	(0.218)	(0.218)	(0.218)	(0.218)
Mother's education (1 = literate)	1.20*	-0.9861	1.06*	4.99***	0.7207	0.1251	1.36*	1.40**	0.7987
	(0.526)	(0.704)	(0.517)	(1.252)	(0.514)	(0.544)	(0.537)	(0.540)	(0.514)
Husband's education (1 = literate)	0.1907	-0.5433	-0.4439	3.16***	-0.5207	-0.34	-0.0817	-0.1688	-0.2199
	(0.552)	(0.537)	(0.561)	(1.086)	(0.537)	(0.534)	(0.538)	(0.536)	(0.535)
Mother's occupation (1 = farmer)	-0.0783	-3.92**	-0.5598	9.72***	-1.2975	-0.9628	-1.1416	-0.5047	-0.6578
	(0.699)	(1.192)	(0.686)	(2.823)	(0.740)	(0.714)	(0.727)	(0.696)	(0.699)
Mother's khat use (1 = yes)	-0.2806	-1.23*	-0.1908	-0.0318	-0.6188	0.1567	-0.5564	-0.1723	-0.6564
	(0.437)	(0.545)	(0.434)	(0.431)	(0.462)	(0.433)	(0.456)	(0.433)	(0.466)
Constant	-9.1265	42.80***	15.02***	-14.05*	14.78***	6.504	-2.938	4.975	6.784
	(5.951)	(10.031)	(4.226)	(7.062)	(4.001)	(3.632)	(4.723)	(3.712)	(3.623)
Kebele fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: 1. marital status was dropped due to perfect collinearity with other variables;
2. ^ denotes that the variable is in natural logarithm form
3. ^^ denotes that the predicted value of the variable is used in the estimation to account for endogeneity4. *, **, *** denote p<0.05, p<0.01 and p<0.001 respectively

The results of the multivariate analysis are given in Table 4. Following our discussion as outlined under estimation strategy section, we run a number of regressions. First, we estimate model (2) and then model (3) for each measure of social capital. That is, we run eleven separate regressions corresponding to each dimension of social capital including the aggregate indices. The results presented in Table 4 are the estimates pertaining to model (3).

Model 1 corresponds to an aggregate index measure of social capital with scores ranging from 34 to 58 as our focus variable. It incorporates all the individual indices of social capital such as: collective action and cooperation (0 to 4); social cohesion and inclusion (2 to 7); mother's level of sociability (0 to 8); mother's social networks (0 to 6); personalized trust (0 to 4); mother's level of generalized trust (4 to 12); mother's trust in institutions (0 to 7) and the mother's degree of feeling secure (7 to 12).

As can be seen from Model (1), the aggregate index of maternal social capital enters the model with positive and statistically significant coefficient. This shows that mothers with higher level of aggregate social capital have better self-rated health status compared to those with lower level of aggregate social capital. Specifically, an increase in an overall score of a mother's social capital would increase her probability of enjoying better health condition by about 46.3%. The finding supports the intuition that if there is a higher level of social ties, trust, cooperation and reciprocity among individuals within a community, there will be diffusion of information with regards to causes, consequences and remedies for various kinds of diseases. Using such information, individuals could take actions that may improve their health. In addition, favorable social capital increases the likelihood that healthy norms of behavior are adopted and usage of preventive services exerts social control over deviant health related behaviors such as drinking and smoking. This result is consistent with findings by Eriksson (2010); Islam, et al. (2006); Kawachi et al. (1999); Poortinga (2006a); Sundquist and Yang (2007) who found positive and significant associations between social capital and health. Furthermore, our finding reinforces a study conducted in Sweden which concludes that low social capital and low social trust were associated with higher rates of psychosomatic symptoms, musculoskeletal pain, and depression (Diener & Seligman, 2004).

Pertaining to this model, we find that mother's age turned up with negative sign and statistically significant coefficient. This is intuitively appealing since old age is often associated with quite a number of illnesses (Sarvimaki and Stenbock-Halt, 2000). Furthermore, our finding shows that educated mothers have a better self-rated health condition than those who are illiterate. This also intuitively sounds well since educated individuals take care of their health, adjust to existing circumstance and look for and make use of available information to improve their health than less educated ones (Ross and Wu, 1995; Ross and Mirowsky, 1999).

As pointed out in the introduction section, there have been mixed findings pertaining to the association between social capital and health. To address these controversies, we disaggregate social capital into different dimensions. For this purpose, we run a number of regressions focusing on each form/or dimension of social capital as discussed in the previous sections. In a similar manner to Model 1, we control for the confounding factors that could also affect maternal health in the rest of the models. In the following paragraphs, we present results obtained corresponding to each form of social capital.

In Model 2 (Table 4), we use mother's collective action and cooperative participation as a proxy variable for social capital. Unlike in Model 1, most of the sub-components of structural social capital are found to be negatively associated with self-rated maternal health. This is likely to happen as mothers may find themselves in a group which participates in unhealthy practices such as chewing khat[11] and using hashish among others. This could happen because of peer pressure. As can been from Table 4 under Model 2, khat use enters the model with negative coefficient indicating that a mother who chews khat has worse self-rated health in comparison with mother who does not chew khat. Here, other variables carried their expected signs.

We obtained the same results when social capital is measured using social cohesion as well as social networks (Models 3 and 5). In both models, social capital was found to be negatively associated with mother's self-rated health condition. This is quite similar to the result obtained under Model 2. This strengthens our explanation that peer pressure may put mothers in a wrong group, which is involved in unhealthy practices. In other words, unfavorable social capital could increase the likelihood that unhealthy norms of behavior are adopted and usage of preventive services fail to exert social control over deviant health related behaviors, which may negatively affect mother's self-rated health.

Models 4 and 6 were in agreement with that of Model 1. In Model 4, mother's sociability is used to proxy social capita. The positive association reported is intuitively appealing because mothers who are sociable could easily receive support, social trust, and information that assist her to achieve health specific goals. A person who is already sick with HIV/AIDS may, for example, receive information, money, or moral support he/or she needs to tolerate treatment and recovery in high social capital society but not in a low social capital society. Once again this result reinforces the findings by Eriksson (2010); Islam, et al., (2006); Kawachi et al., (1999); Poortinga (2006a); Sundquist and Yang (2007). Here, income of the household and mother's education enter the model with positive and statistically significant coefficients supporting our earlier results. Likewise, mother and husband's ages enter the model with negative sign and statistically significant coefficients implying that the older the couple, the more the likelihood that the

[11]Khat and hashish are addictive substances that could have negative health impacts when consumed. People usually consume these substances being in group.

mother's health deteriorates. The same argument could be made with regard to Model 6. Coming to cognitive conceptualization of social capital (Models 7 through 11), we find that social capital had a strong positive association with health. In Model 7, 8, and 9, social capital was measured in terms of trust (maternal perceived trust on neighbors, individuals, and institutions). Interestingly, these dimensions of social capital, which is a typical measure of individual social capital, were positively associated with mother's self-rated health status. In Model 10 we proxied social capital by perceived sense of security. The aggregate measure of cognitive social capital (Model 11) also confirmed the same positive and significant association with self-rated maternal health.

5. Conclusion

Inspired by the current development discourse and controversy over the relationship between social capital and health, we are motivated to analyze the role of social capital in promoting maternal health. For this purpose, we conducted cross sectional study using data collected from 422 mothers in Jimma zone of Oromia National Regional State, Ethiopia. By applying logistic regression, we find that level of mothers' social capital was found to have a generally strong association with their self-rated health status, albeit in quite mixed ways. While the results revealed an overwhelming evidence of positive and significant associations, some components of social capital had a negative association pointing to the possible consequence of unfavorable social ties. That is, unfavorable social capital could increase the likelihood that unhealthy norms of behavior are adopted and usage of preventive services fails to exert social control over deviant health related behaviors.

We also find that household income is positively associated with mother's self-rated health status. We further document that mother's health condition deteriorates as her age increases. Therefore, any government policy that aims to improve maternal health would be more effective if it considers health promoting dimensions of mother's social capital paying attention to building their trust and cooperation in their communities. Furthermore, an increase in household's income would play a paramount importance to promote maternal health. Health related policies would also be more effective if they tackle some age related health risks, which challenge improving maternal health in the study area.

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