

Improved Livestock Breeds and Household Social Capital: The Case of Sahiwal Cattle Adoption among Isiria Maasai of Narok County, Kenya

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Abstract: The utilization of pastoral resources such as grasses, shrubs, water and salt-licks is an aspect social capital. However, with climatic and socio-economic changes traditional cattle production and livelihood outcomes including social capital may be impacted. As a result pastoralists devise mechanism to ameliorate any negative effects of the changes. Governments and other agencies have also intervened in the pastoral production systems to align them to current realities. In 1991, the Government of Kenya and the Federal Republic of Germany introduced the Sahiwal cattle to the Isiria Maasai of Narok County to improve cattle production. Studies on the effect of such interventions on social capital are few and the existing ones are narrowed to at most three aspects of social capital. Thus, this study was formulated to investigate the association between adoption of Sahiwal cattle and household social capital among Isiria Maasai pastoralists. The study considered ten aspects of social capital which adopted a cross-sectional social survey and it utilised both quantitative and qualitative methods of data collection and analysis. A multi-stage proportional sampling procedure was used to select a sample of 400 households to participate in the study. Results of the study indicated that over three-quarters (86.6%) of the respondents had adopted Sahiwal cattle and a majority (95.4%) had a moderate/medium level of social capital. Age and level of formal education had an effect on the level of social capital. Respondents scored highly on two aspects of social capital – friendship (84.4%) and information and communication (83.5%). Data revealed that the association between adoption of Sahiwal cattle and household social capital was negative, weak and not significant at the 0.05 level of significance. Nevertheless, the association was significant for the four aspects of social capital – solidarity, information and communication, safety as well as empowerment and political action. Thus, the study concluded that whereas there may not be any association between adoptions of improved cattle and overall household social capital, it may be possible that an association exists with some of its aspects.

Index Terms- Adoption, Livelihood, Outcomes, Sahiwal

I. INTRODUCTION

Up to 500 million people in the world rely on pastoralism to sustain their livelihood, mainly in arid and semi-arid

regions [1]. Utilization of natural resources such as grasses, shrubs, watering and salt-licks for pastoral production is mediated by social capital, especially socio-cultural norms and relationships [2]. A pastoralist system of rights governs mechanisms of access to, alienation of, control over, exclusion from, management and withdrawal of resources. The systems of rights are guided by principles of mutual trust and reciprocity implemented through social institutions [3].

Nevertheless, in the recent past, pastoralists worldwide have experienced climatic and socioeconomic changes which have affected their traditional livestock production practices and outcomes including aspects of social capital which mediated the utilization of pastoral production resources. Changes in land tenure from common property systems to individual and state land have resulted in reduced grazing land which forced a reduction in the livestock numbers [4].

Other changes include attacks from neighbouring herding communities, encroachment of crop cultivators and major investment projects such as road construction, establishment of resort cities and airports [5]. Similarly, the areas occupied by pastoralists have also experience growth in human population which has exacerbated scarcity of pastoral production resources [6].

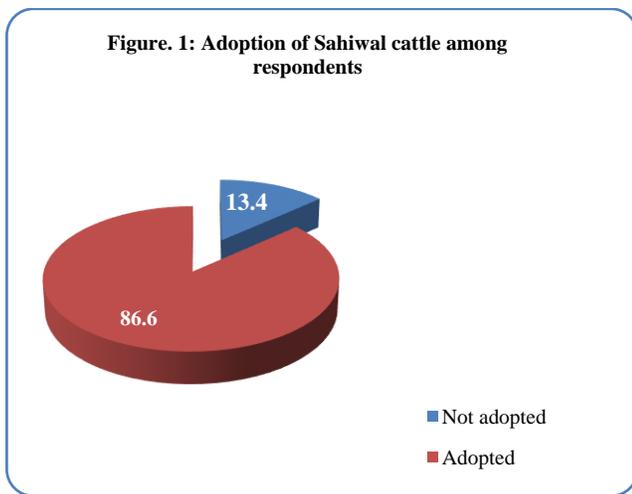
The climatic and socio-economic changes jeopardized the efforts of pastoralists to access sufficient resources necessary for the realization of their livelihood outcomes. As such they adopted numerous measures such as increasing food purchases, internal and external migration in Nepal [7], adopting crop cultivation in the Indian Himalaya [8], massive transportation of hay and supplementary feeds by the Chinese Tibetan plateau pastoralists [5] as well as changing the composition of herds and increasing grazing time by Bolivian pastoralists [9]. Other interventions undertaken by pastoralists include destocking in Benin [10], sedentarisation near urban centres [11] and marketing of milk and live animals in Kenya [5].

These efforts by pastoralists to address the effects of climatic and socio-economic changes that have affected pastoral production systems have been supplemented by government and non-governmental interventions. For instance, in Jordan and Israel government provided housing, food aid and drilled wells for

pastoralists as a mechanism of settling them [12]. In Thailand and Philippines, governments promoted improved tamed tilapia in poor rural households [13] while in the Lao Peoples Democratic Republic, production of cultivated forage was promoted [14]. Governments also promoted the adoption of improved crossbred dairy cattle in Bangladesh [15] and Senegal [16] and in Ethiopia, Kenya and Tanzania improved goats and sheep [17, 18].

Among the critical interventions undertaken to improve the livelihood outcomes for pastoralists in Kenya was the introduction of improved cattle breeds. In 1991, the Government of Kenya, with support from the Federal Republic of Germany initiated improved cattle production through an integrated multi-sectoral rural development programme – the Trans-Mara Development Programme (TDP). The programme aimed at improving pastoralist livelihood outcomes [19]. TDP introduced the Sahiwal breed of cattle among Isiria Maasai pastoralists of Narok County. The strategy adopted by TDP was cross-breeding; where traditional smallholder livestock producers obtained incentives to buy pedigree Sahiwal bulls and cross-breed them with their conventional Zebu cows.

Studies on the effect of adopting improved cattle breeds on social capital are few compared to those on the impact on household income and food security. Existing studies on the subject consider at most three aspects of social capital, which is really limiting. Thus, this study was formulated to investigate the association between adoption of Sahiwal cattle and household social capital by considering its ten aspects of membership to groups, friendship, solidarity with others and trust. The other social capital aspects considered included helping others. The proportion of adopters of Sahiwal cattle among the respondents is indicated in Figure 1.



As shown in Figure 1, more than three quarters of the respondents had adopted Sahiwal cattle.

A. Levels of Social Capital among Study Respondents

In the determination of respondents social capital the study designed a Social Capital Score (SCS) where respondents either

information and communication as well as level of interaction, sociability and safety. The study also considered the social capital aspect of empowerment and political action.

II. DATA COLLECTION

The design of the study was a cross-sectional social survey which employed quantitative and qualitative data collection and analysis methods. This study was undertaken in Narok County of Kenya and it targeted pastoral communities with a focus on Isiria Maasai. The sampling unit was the household while the unit of analysis was the household head. The sample size was 400 households selected using multi-stage proportional random sampling. Key informants were purposely selected. Primary data was collected from households using a questionnaire while a focus group discussion guide facilitated data collection from the focus groups. Data from key informants was collected using key informant interview guide.

Filled questionnaires were cleaned, coded and analysed using IBM SPSS version 26. Results were summarised using frequencies, percentages, mean, and mode and presented as tables, bar graphs, and histograms. To test for the association between the adoption of Sahiwal cattle and household social capital, the study relied on Spearman Correlation Coefficient and hypotheses tested using the P-value approach at the 0.05 level of significance. Qualitative handwritten data generated was typed into a word document, read several times back and forth in order to discern recurring categories, opinions and themes. Areas of agreement and disagreement were noted and interpreted.

III. STUDY FINDINGS

had a strong or high, moderate or medium, or a weak low social capital. The score allocated weighted points to items of the ten dimensions. An average overall score was calculated by finding the mean of the total summed scores. Respondents with a score of less than 3 were described as having a weak/low social capital while those with 3 to 6 and over 6 scores were described as having a moderate/medium and strong/high social capital respectively. The findings are presented in Figure 2.

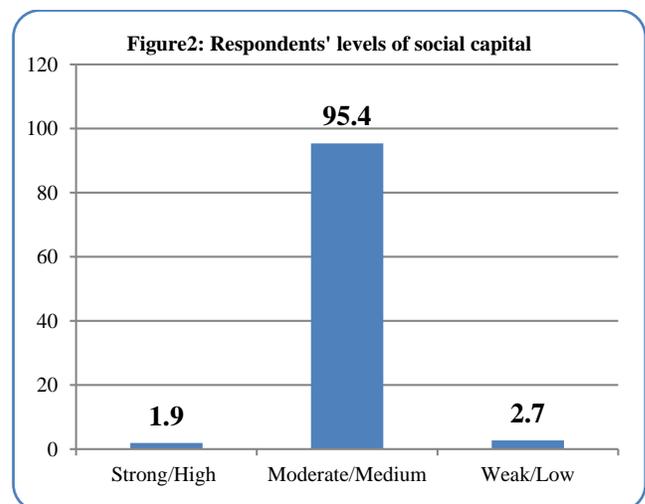


Figure 2 indicates that the majority (95.4%) of the respondents had a moderate/medium social capital. However, there were also numerous respondents with weak/low (2.7%) as well as strong/high (1.9%) social capital.

This study also compared respondents' age, adoption of Sahiwal cattle, level of formal education and their social capital scores. Results of the comparisons are summarized in Table 1.

Table 1: Respondents' social capital, age, Sahiwal cattle adoption and level of formal education

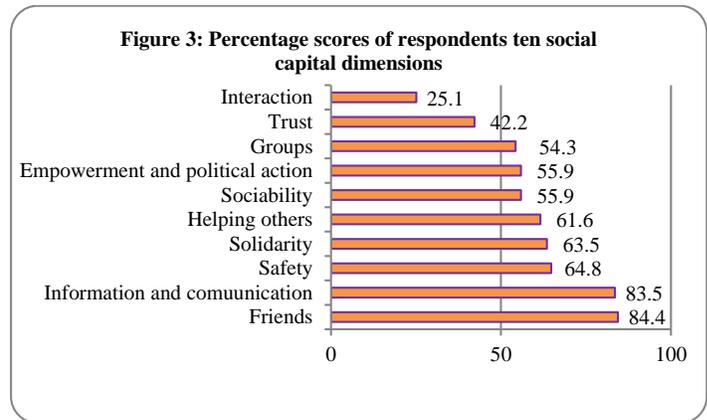
Element	Frequency			%
Level of social capital				
Age of respondents	Strong	Moderate	Weak	
Below 25 years	0	25	2	27
25 to 34 years	0	105	1	106
35 to 44 years	2	84	3	89
45 to 54 years	2	65	3	70
55 to 64 years	3	34	0	38
65 years and above	0	24	1	25
Not answered	0	20	0	20
Total	7	357	10	374
Sahiwal cattle adoption				
Level of social capital	No	Yes		
Strong/high	0	7		7
Moderate/medium	49	308		356
Weak/low	1	9		10
Total	50	356		374
Level of social capital				
Level of formal education	Strong	Moderate	Weak	
None	2	114	3	119
Some Primary	1	77	3	81
Primary	2	52	3	57
Some Secondary	0	7	0	7
Secondary	0	38	0	37
Tertiary	2	56	1	59
Not answered	0	13	0	13
Total	7	357	10	374

Source: Survey data, October 2019

As indicated in Table 1, respondents' data revealed that middle age (35 to 64 years) respondents were the only group with a strong/high social capital. There were no youthful (below 35 years) and elderly (65 years and above) respondents with strong/high social capital. Similarly, only Sahiwal cattle adopters had a strong/high social capital; not a single non-adopter respondent had this level of social capital. Data also revealed that although respondents who had higher (tertiary) or lower (primary and below) levels of education were likely to have a weak/low level of social capital; the evidence was stronger for lower levels of educational attainment.

B. Respondent's Social Capital Dimensions

The study scored respondents on items for each dimensions to obtain a total score for it. Results of the task indicated that respondents varied on their score for the ten dimensions of social capital. Figure 3 summarizes the respondents' scores on the ten dimensions.



Source: Survey data, October 2019

As shown in Figure 3, this study observed that more than half of the respondents scored 50% on eight of the dimensions. In particular, high scores were recorded for the two dimensions of friendship as well as information and communication where more than 80% of households had a score of 50% and above. A fairly high proportion of respondents had a score of more than 50% on safety, solidarity and helping others. On sociability, empowerment and political action and groups half of the households had a score of 50% and above. A majority of households scored less than 50% on the dimension of trust and interaction.

Study results revealed that a majority (80.7%) of the respondents belonged to some kind of group. Respondents mainly belonged to five types of group – merry-go-round (54.4%), age-group committee (31.4%), neighbourhood committee (27.9%) church committee (26.8%) and school committee (21.2%). Membership to groups tended to increase with age and level of formal education. Most of the respondents were also involved in the decision-making processes of their groups either as committee members (29.5%) or leaders (22.8%).

Half of the respondents (50.4%) had up to five friends whom they can share private matters and whom they can turn to when in need of help without getting disappointed. The proportion of respondents with 6 – 10 close friends was high for Sahiwal adopters (26.6%) compared to non-adopters (12.2%).

The level of social solidarity among respondents seemed moderate as only a third indicated that most of the people in their neighbourhoods can be trusted (36.2%) and were willing to help when one needed help (39.7%). Three-quarters (75.5%) of non-adopter respondents had higher scores on social solidarity as compared to slightly less than half of the adopters (48.8%).

In terms of trusting others, the study observed that respondents had great trust for their spiritual leaders (39.9%) and own age-group members but no trust for the police (48.8%), other Maasai sections (30.0%) and veterinary officers (24.4%). A larger proportion of adopters (59.6%) had below average level of solidarity compared to non-adopters (51.0%).

The frequency of helping others among the respondents depended on how closely they were to the respondent. Most respondents (82.8%) always helped their siblings, age-group members (30.3%) and own clan members (29.5%) but either rarely (46.4%) or never (24.5%) helped other tribes. Three-quarters of the respondents were willing to contribute own resources (time and money) towards community projects in their neighbourhood that did not benefit them but others. Adoption of Sahiwal cattle did not have any effect on the willingness of helping others among the respondents.

Three-quarters of the respondents listen to radios for news, information and entertainment but only 19.6 watch a television daily. A larger proportion of Sahiwal cattle adopters tended to watch TVs (4.0%) daily compared to non-adopters (2.0%). To know what the Government is doing respondents relied on radios, local markets as well as relatives, friends and neighbours. However, the order changes where respondents depend on relatives, friends and neighbours, local market and radios for the prices of milk and cattle.

In terms of interactions, the study found out that few respondents interacted with places beyond their local market centres and that adoption of Sahiwal cattle did not have any effect on the level of respondents' interaction. The same was also true for sociability. However, adopters tended to experience theft of property more than non-adopters. A third of the respondents (32.7%) reported having total control over decisions that affect their daily lives and a high majority (97.1%) participated in elections.

IV. ASSOCIATION BETWEEN ADOPTION OF SAHIWAL CATTLE AND HOUSEHOLD SOCIAL CAPITAL

The two variables -adoption of Sahiwal cattle and household social capital were at the ordinal level of measurement. Thus, the appropriate test statistic for their association was Spearman's rho. Using IBM SPSS (version 26) for the test, this study obtained results as indicated in Table 2.

Table 2: Correlation between adoption of Sahiwal cattle and social capital

Spearman's rho		Adoption of Sahiwal cattle
1	Social capital score	Correlation Coefficient
		Sig. (2-tailed)
		N

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed)

Source: Survey data, October 2019

As indicated in Table 2 indicates the correlation coefficient between the adoption of Sahiwal cattle and social capital was $r_s = -.017$ but not significant at the 0.05 level. The association was also negative and weak. Since the calculated p-value of $-.749$ was more than the α - value of $.05$, the study accepted the null hypothesis that adoption of Sahiwal cattle among Isiria Maasai is not associated with household social capital.

The study further tested for the association between adoption of Sahiwal cattle and the ten aspects of social capital. Results showed that there were significant relationships with the aspects of solidarity, information and communication, safety as well as empowerment and political action. The information is presented in Table 3.

Table 3: Correlation between adoption of Sahiwal cattle and ten aspects of social capital

Spearman's rho		Adoption of Sahiwal cattle
1	Score on solidarity	Correlation Coefficient
		Sig. (2-tailed)
		N
2	Score on information and communication	Correlation Coefficient
		Sig. (2-tailed)
		N
3	Score on safety	Correlation Coefficient
		Sig. (2-tailed)
		N
4	Score on empowerment and political action	Correlation Coefficient
		Sig. (2-tailed)
		N

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed)

Source: Survey data, October 2019

Table 3 shows that the associations were positive and weak for the social capital aspects of information and communication as well as empowerment and political action but negative and weak for solidarity and safety. There was no significant relationship between adoption of Sahiwal cattle and six aspects of social capital – membership to groups, friends, trusting others, helping others, interactions and sociability.

V. DISCUSSION

The rate of Sahiwal cattle adoption were in line with the assumptions of the Diffusion of Innovations theory which proposed that overtime adoption of an innovation occurs in stages throughout the social system [20]. The innovation of Sahiwal cattle introduced by the Transmara Development Programme in 1995 was in its final stage of adoption as the 13% of the respondents yet to adopt Sahiwal cattle were the laggards.

Studies on the level/strength of social capital and adoption of improved cattle breeds were scant. Among them was a study undertaken in Sulawesi in Indonesia [21]. The study observed that social capital among the beef farmers who had adopted improved beef cattle breeds was high. This finding differed with those of the current study which found that majority of the respondents had a moderate/medium level of social capital. Two factors may have caused the discrepancy of the result. In assessing the level of social capital among Isiria Maasai, the study took into consideration ten dimensions of social capital compared to only three considered by the Indonesian study. It was also probable that the divergence emanated from the observation that the Indonesian study was on improved beef cattle strictly distributed through farmer groups while Sahiwal

cattle adopted by Isiria Maasai were dual-purpose and there were no restrictions of accessing them via membership to groups.

Studies that tested the association between adoption of technology and social capital were mainly on crop production. [22] showed that there was a positive and significant relationship between adoption of agricultural production technologies and three aspects of social capital – group involvement ($r=0.539$), social support ($r=0.312$) and social networks ($r=0.29$). [23] also found a positive relationship between adoption of rice intensification technologies and participation of farmers in cooperative societies. The same results were also obtained in China by [24] and in Kenya by [25].

The variation in the outcomes was likely to be due to differences in the conception of social capital. This study conceived social capital as a livelihood outcome of technology adoption while the other studies considered it a facilitating the process of adoption. It is also possible that differences in the dimensions of social capital studied may have also contributed to the differentiation of the results.

VI. CONCLUSION

From the findings, this study concludes that whereas there may not be an association between adoption of improved cattle breeds and the overall household social capital, it may be possible that an association exists with its dimensions. Specifically, it increases the number of friend but weakens a household's level of safety, social solidarity and trust with others. Adoption of improved cattle does not affect the willingness to help others.

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