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Journal homepage: www.rangeland.ir

Research and Full Length Article:

Socio-economic Factors Affecting Acceptance of Livestock and Rangelands Insurance (Case Study: Agh Ghala county, Golestan Province, Iran)

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Abstract. Insurance services and financial compensation are regarded for the consequences of events that may happen or not. Farmers and stakeholders can be benefited from the agricultural and natural resources insurance so that they can attain much more stability in resources management, especially through mitigating the effects of potential and imminent risks. The current research was aimed to determine the effective factors in the acceptance of livestock and rangeland insurance by stakeholders in Agh Ghala, Golestan Province, Iran in 2015. Data were collected based on the survey-descriptive research method. Statistical population was all the rangers having a range management plan. Among 93 subjects, sample size was determined as 76 people based on Cochran formula. The effective socio-economic variables among stakeholders were determined using logistic regression. Results of logistic regression suggest that such variables as livestock insurance against previous 20-year risk factors, risk taking and insurance expert knowledge had positively significant effects and family size had negatively significant effects on the acceptance of livestock and rangeland insurance (P≤0.05). Variable of "insurance expert knowledge" had the highest impact on adopting livestock and rangeland insurance among the factors entered into logistic regression model (P≤0.05). It was concluded that holding the extension workshop on risk transfer and dealing with different aspects of insurance provided by an educator who is fluent in native language will be effective.

Key words: Rangeland management, Herding, Pastoralism, Insurance, Agh Ghala

Introduction

Operations undertaken in agriculture and natural resources sectors serve as risky ones due to heavy reliance on nature, climate and environmental conditions (Horowitz and Lichtenberg, 1993; Fraisse *et al.,* 2006; McCallister, 2014; Muzari *et al.,* 2014). Out of forty natural disasters recorded in the world, thirty-one disasters in Iran are likely to be imminent (Amini *et al.,* 2002); thereby, to mitigate the risk factor of economic activity by the activities of farmers and herders is the most important concern for planners, policy-makers and practitioners (Goodwin and Smith, 2013; Trujillo *et al.,* 2015; Amirnejad *et al.,* 2009). Among wide varieties of support policies, insurance of agricultural crops and natural resources has been taken as a useful and appropriate solution to cope with these risks into account. Crop insurance allows the farmers and stakeholders to alleviate the risk, and adopt the best management plans and sustainable strategies (Haq *et al.,* 2003; Fiskel *et al.,* 2014). Crop insurance operations in Iran were launched in 1984 with two crops (cotton and sugar beets) and currently, it covers 66 different crops in sub-sectors of farming, horticulture, livestock, poultry, aquaculture and natural resources (Javadian and Farzaneh, 2004). Livestock insurance in Iran has been launched since 1993 upon the implementation of sheep and cattle insurance and at the same time, insurance companies on forest and rangeland began research activities in this sector in 1995 while covering some rangelands across the country as well as afforestation in Gilan, Mazandaran and Golestan provinces, Iran (Esmaeilpour, 2001); insurance agencies in each city sell insurance in accordance with the specific timing of each crop. The most important factor in insurance is its acceptance by stakeholders (Rasekhi *et al.,* 2012). As for crop and natural resources insurance acceptance in particular livestock and rangeland insurance, literature is fraught with economic research (Rasekhi *et al.,* 2012; Yaghubi Farani, 2001; Raheli *et al.,* 2013; Mahul and Skees, 2007; Bishu, 2014; Little and McPeak, 2014; Vandeveer, 2001). To the best of our knowledge in case of factors affecting the acceptance of livestock and rangeland insurance, there has been a paucity of investigations on insurance acceptance in social perspective. According to collective management of rangelands in Iran, the acceptance of an innovation entails for collective determination of rangeland. There is an urgent need to consensus on the acceptance or rejection of rangeland insurance. So, addressing the determinant social factors affecting the acceptance of livestock and rangeland insurance is necessary. As to the best of our knowledge, there was no single research on social factors affecting the adoption of livestock and rangeland insurance so that a literature review was done on other agricultural insurance products. Tabaeian *et al.* (2010) studying the determination of factors affecting the apple crop insurance adoption among apple growers in Semirom city, Iran proved that some variables including risk-taking, individual's knowledge on insurance, apple orchard size and confident attitude towards insurance companies affected the crop insurance. Boyd *et al.* (2011) evaluated factors affecting crop insurance purchases by farmers in Inner Mongolia, China and suggested eight important variables for crop insurance purchases involving knowledge of crop insurance, previous purchases of crop insurance, trust of the crop insurance company, amount of risk taken on by the farmer, importance of low crop insurance premium, government as the main information source for crop insurance, role of head of village, and number of family members working in the city. In another research, Suresh kumar *et al.* (2011) studied the understanding and awareness of farmers

from crop Insurance as a risk management tool in Tamil Nadu and showed that more than 65 percent of farmers are aware of the risks and only half of them are aware of insurance plans. The results of the probit analysis showed that community involvement can increase the farmers' knowledge about insurance plans and on the other hand, non-agricultural income, presence of risk in agriculture, number of farm workers, the satisfaction of insurance and reduction of premiums were positively related with accepting wheat insurance. Mirzad (2014) investigated the factors affecting the use of agricultural products insurance between dates of farmers in Iranshar, Iran and showed that such variables as education, date yield, commitment to the Agricultural Bank, awareness and attitudes toward agricultural insurance of insured farmers were placed at a higher level than non-insured ones.

There have been enormous researches on crop insurance and factors affecting its different aspects in Golestan province;

however, livestock and rangeland insurances are ignored to some extent. As a result, dealing with socio-economic factors affecting the acceptance of livestock and rangeland insurance can provide promising scientific and practical strategies to improve and develop insurance industry for practitioners. The aim of this study was to determine the effective factors in the acceptance of livestock and rangeland insurance by pastoralism.

Materials and Methods
Study area
Study area is located in eastern part of the Caspian Sea and northern part of Agh Ghala city in Golestan province, Iran. These rangelands have overlapped with Turkmenistan border from north, Agh Ghala farms from south and to wetlands from East and from west, are limited to saline lands of Gomishan. The area locates between 37º23'14" to 37º9'41" N and 54º14'53" to 54º39'12" E (Fig. 1).
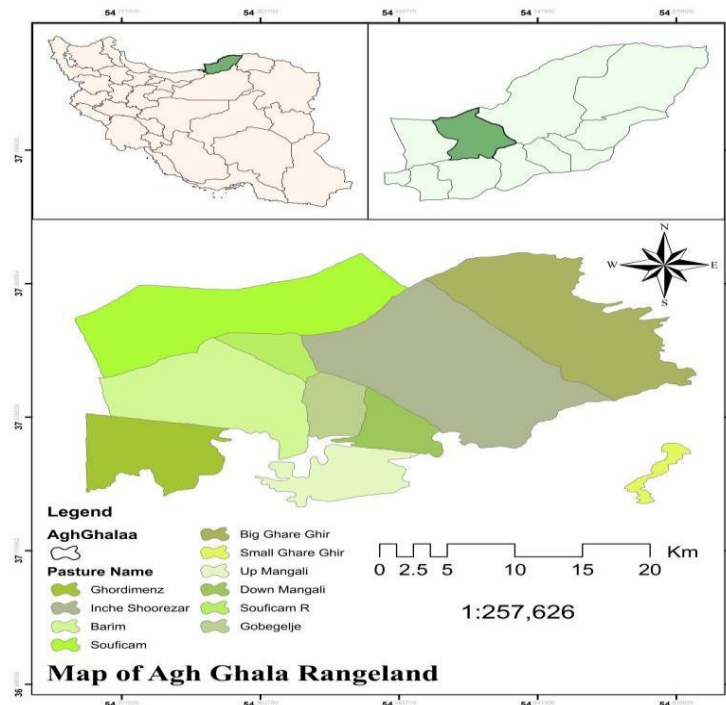

Fig. 1. Location of study area

Methodology
Preliminary data series were collected in the late summer of 2015 and the main

data series were obtained in fall, 2015. Initial data were collected based on the structured interviews with herders and

experts of institutions providing Agricultural Products Insurance Fund and the Department of Natural Resources of Golestan province. Pre-test was prepared based on the interviews and review of literature. 30 questionnaires were completed randomly in order to test reliability and consequently, the weaknesses of questionnaire were investigated and then solved (Cronbach's alpha was 0.85). Ultimately, the final questionnaires were completed based on random sampling between herders in eight common rangelands of Agh Ghala city. All the surveyed rangelands were under the Crop Insurance Fund facilities. There were some other rangelands in vicinity of village that were ignored in this research. Overall, 137 herders (ranchers) had the grazing licenses (All farmers who had livestock grazing licenses had crop insurance facilities). During winter 2015, 92 herders who were present in the rangelands participated in this study. Simple random sampling method was used for subject selection and Cochran formula was applied for the estimation of sample size (Sarmad *et al.,* 1999). By substituting 93 as participants, the sample size was estimated as 76. The collected data were analyzed in SPSS 20 software. First, independent variables were compared by Mann-Whitney test and as independent variables, were used in the research; probability of each dependent variable level in logistic regression was calculated.

In the present study, to compare the ordinal variables, Mann-Whitney test was used. After comparing the variables between two groups of herders, logistic regression model was used to identify factors affecting the acceptance of livestock and pasture insurance. In logistic regression, the type of dependent variables is nominal (two-sided or four-sided). Based on independent variables, the probability of each dependent variable can be calculated in this method. Therefore, this type of regression maximized the possibility that an event will occur rather than minimizing the squared errors. Also, in the logistic regression model to test the goodness of fit and significance of the effect of each variable, Wald and chi-square statistics were used. In this study, the dependent two-sided variables were "livestock and pasture insurance acceptance" and "rejection of livestock and pasture insurance" and the effects of independent variables were evaluated individually.

Results

As Table 1 illustrates, the insurances of those policyholders who have used the facilities of Agricultural Insurance Fund or non-policyholders differ significantly at probability level of 1 and 5% in age groups, expert knowledge, access to insurance expert, knowledge of the insurance process, trust in insurance institutions and expert, family size, consultation, risk-taking, attitude toward livestock and rangeland insurance, and willingness to get livestock insurance against last 20-year risk factors. According to the most important variable in the study, insurance adopters had a high level of knowledge, high consultation, provident, less risk taking, more confident to insurance expert and institution and a positive attitude towards livestock and rangeland as compared to control. On the other hand, those variables including education, optimism to rangeland management at present, lamb consumption for domestic purpose (year), sale of lambs (year), lamb sale condition (year), ranching method, optimism to ranching at present, number of family working members, average family expense, average income of main job (monthly), average income from part-time job (monthly), rangeland area, rangeland production, threatening risk factors in last 20 years and number of small livestock between policyholders and non-policyholders showed no significant differences in levels 1 and 5% among others.

Table 1. Results on comparison of individual, economic and environmental components among respondents

code	Factor/ Variable	Type of data @	Adoption (Y/N) [#]	Frequency	Average Scores	Z	U	Sig.
1	Age of herder	R	Y	28	46.09	-2.29	459.0	0.022**
			N	48	34.07			
2	Education	N	Y	28	39.32	-0.26	649.0	0.794 [ns]
			N	48	38.02			
3	Optimism for range management future (the possibility of rangeland utilization in near future regarding current condition)	R	Y	28	38.07	-0.13	660.0	0.889 [ns]
			N	48	38.75			
4	Lamb consumption for domestic purpose	R	Y	28	37.18	-0.40	635.0	0.686 [ns]
			N	48	39.27			
5	Lamb sale (per year)	R	Y	28	41.20	-0.82	596.0	0.409 [ns]
			N	48	36.93			
6	Lamb sale condition (per year)	R	Y	28	38.05	-0.14	659.0	0.886 [ns]
			N	48	38.76			
7	Ranching method	N	Y	28	39.41	-0.29	646.5	0.771 [ns]
			N	48	37.97			
8	Optimism for continuing ranching (the possibility of herding continuation in near future regarding current condition)	O	Y	28	42.00	-1.08	574.0	0.280 [ns]
			N	48	36.46			
9	Consult other stakeholders	O	Y	28	51.77	-4.13	300.5	0.00*
			N	48	30.76			
10	Contact and access to insurance expert	N	Y	28	54.63	-5.29	220.5	0.00*
			N	48	29.09			
11	Awareness on insurance process	O	Y	28	54.68	-5.27	219.0	0.00*
			N	48	29.06			
12	Trust to insurance institution	O	Y	28	49.07	-3.43	376.0	0.001*
			N	48	32.33			
13	Trust to insurance expert	O	Y	28	53.61	-4.94	249.0	0.00*
			N	48	29.69			
14	Family size	R	Y	28	48.64	-3.09	388.0	0.002*
			N	48	32.58			
15	Number of working family members	R	Y	28	43.64	-1.70	528.0	0.085 [ns]
			N	48	35.50			
16	Average family income(Rial)	R	Y	28	43.32	-1.47	537.0	0.140 [ns]
			N	48	35.69			
17	Average family income from full time job (Rial)	R	Y	28	37.07	0.43	632.0	0.664 [ns]
			N	48	39.33			
18	Average family income from part time job(Rial)	R	Y	28	36.02	-0.77	602.5	0.436 [ns]
			N	48	39.95			
19	Rangeland area (hectare)	R	Y	28	40.50	-0.62	616.0	0.529 [ns]
			N	48	37.33			
20	Rangeland production (Kg)	R	Y	28	35.86	-0.68	623.0	0.543 [ns]
			N	48	40.04			
21	Risk factors on rangeland in past 20 years	I	Y	28	32.18	-1.93	469.0	0.053 [ns]
			N	48	42.19			
22	Willing to have rangeland insurance against last 20 years	I	Y	28	38.14	-0.11	622	0.912 [ns]
			N	48	38.71			
23	Risk factors on livestock in past 20 years	I	Y	28	37.54	-0.30	645.0	0.764 [ns]
			N	48	39.06			
24	Willing to have livestock insurance against last 20 years	I	Y	28	28.73	-2.99	398.5	0.003*
			N	48	44.20			
25	Risk taking index	I	Y	28	21.89	-5.01	207.0	0.00*
			N	48	48.19			
26	Attitude towards rangeland and livestock insurance	I	Y	28	51.13	-3.89	318.5	0.00*
			N	48	31.14			
27	Futurism index	I	Y	28	53.84	-4.69	242.5	0.00*
			N	48	29.55			
28	Awareness index	I	Y	28	52.59	-4.39	277.5	0.00*
			N	48	30.28			
29	Low weight livestock	R	Y	28	40.95	-0.73	603.5	[ns]0.461
			N	48	37.07			

*, ** represent significance at 1 and 5% probability levels, respectively.
Y and N respectively mean on policyholders and non-policyholders.
@ N, R, I and O=' Nominal, Ratio, Interval and Ordinal data, respectively.

The results of logistic regression model are illustrated in Table 2. In this study, variables characterized with positive impact on the insurance acceptance are insurance expert knowledge. An increment of one unit in insurance expert knowledge is likely to increase to 9.808 (see Table 2). Willingness to have livestock insurance in the last 20-year risk factors is variable that has a positive impact on the probability of accepting livestock and rangeland insurance so that the increments of one livestock insurance unit against risk factors in last 20 years

increase probability policy holding to 1.487. Another variable that has a positive effect on the acceptance of insurance is risk-taking. In increments of one risk, insurance acceptance is likely to rise than 1.186. One of the variables which had a negative impact on the acceptance of insurance was the family size (r). As family increased by one unit, insurance acceptance is likely to be reduced to 0.662. Optimism for future ranching and range management variable was not significant

Table 2. Result of logistic regression model including the most important variables entered in the final equation

code	Variable	Lable	B value	S.E.	Wald	Df	Sig	Exp (B)
1	Willing to have Livestock insurance in the last 20 years	X_1	0.397	0.151	6.878	1	0.009**	1.487
2	Risk taking	X_2	0.170	0.054	10.106	1	0.001**	1.186
3	Optimism for future ranching and range management	X_3	0.514	0.266	3.724	1	0.054 ns	1.672
4	Insurance expert knowledge	X_4	2.283	0.920	6.164	1	0.013*	9.808
5	Family size	X_5	-0.413	0.174	5.603	1	0.018*	0.662
6	Constant value		-15.161	5.044	9.033	1	0.003**	0.000

*,** = significance at 5 and 1%, probability levels, respectively.

Regarding the conducted analysis, it can be noted that probability of policy-holding among stakeholders is logistic

function of the factors that can be estimated as follows:

$$P_i = (\exp(-15.161+0.397x_1+0.170x_2+0.514x_3+2.283x_4-0.413x_5))/ (1+\exp(-15.161+0.397x_1+0.170x_2+0.514x_3+2.283x_4-0.413x_5))$$

As seen in Table 3, log-likelihood statistic is low. Also, the determination coefficient of Cox and Snell R Square and Nagelkerke R Square show that amount of two variables changes between 0.492 and 0.672 indicating that five

variables in regression model had the modest explanatory power to account for dependent variable variance and insurance adoption. In fact, these five variables explained 49.2% to 67.2% of the changes in dependent variables.

Table 3. The Model summary of regression including Log-likelihood statistic, Cox & Snell R Square and Nagelkerke R Square

code	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	48.584	0.492	0.672

As Another test, chi-square statistic is Hosmer and Lemeshow Goodness-of-Fit test statistic; chi-square statistic value was 16.70 with 8 degrees of freedom and had p values of 0.038 indicating that the logistic model was a good fit to the data.

In this test, null hypothesis is zero value for all the regression coefficients or lack of relationship between the independent and dependent variables. As it can be seen from the significant level at 95 percent, the hypothesis is rejected (significance value is less than 0.05). So,

the significance of independent variables in the regression coefficients can be inferred from this test. In fact, according to the value of this test, fitting predicted value of dependent variable was significant at error level smaller than 0.05. This means that the model is a good representative for data. Independent variables are able to predict a high proportion of dependent variable (policy-holding). We can also use the classification table to specify model powers in the separation of dependent variable classes. In fact, in the logistic regression, model accuracy criterion is the sample classification accuracy for goodness of fit. Results of classification table with the accuracy percentage are presented in Table 4.

Table 4. Sample Percentage Correct

code	Accuracy percentage	Predicted			reality
		noninsured	Insured		correct
1	78.6	6	22	insured	observed
2	87.5	42	6	noninsured	
3	84.2				Total percent

As seen in Table 4, out of 28 insured responds (22 + 6), the model detected 22 respondents correctly (as policyholders) and misdiagnosed 6 policyholders or noninsured. Also, in this group, the percentage of correctness was 78.6%. The correct prediction model for noninsured ones was 87.5%. This means that among 48 noninsured ones, it detected 42 cases correctly. In general, model accuracy is 84.2% and this figure is very valid. So, it can be noted that given the percentage of independent variables, it is possible to predict the acceptance or non-acceptance of insurance by herders in Agh Ghala city. In other words, this model predicts policy and non-policy of insurance by people with authenticity of 84.2 percent. As well, model is more robust in non-policy-holding than policy holding (87.5 vs 78.6).

Discussion and Conclusion

As logistic regression results showed, "insurance expert's knowledge" was a variable having positive effects on the probability of "acceptance insurance" i.e. those herders who have more trust in the insurance expert (Mirzad, 2014). As a result, they are much more aware of insurance benefits and conditions and get insurance news earlier than others showing much more willingness to livestock and rangeland insurance. There was also a positive and significant relationship between risk taking and policy-holding. This means that stakeholders with higher risk-taking mood transfer their commodity risk to policyholder's institution and thereby, provide them with financial security and trust (Tabaian, 2010; Nikuee and Torkamani, 1997; Mirzad, 2014; Ali Begay *et al.,* 2012; Boyd *et al.,* 2011).

Another variable that had a positive effect on insurance adoption was "willingness to take livestock insurance against last 20-year risks". The reason is that natural hazards imposed great livestock loss and the stakeholders with hazard experiences incur some of the cost to reduce risk and hence adopt livestock and rangeland insurance. A variable that had a negative impact on the insurance adoption is family size. The reason is that the greater family size, more living expenses and thus stakeholder prefers to allocate cost of insurance to his family (Karbasi *et al.,* 2009). Livestock and rangeland insurance improves rangeland productions and also can increase livestock production provided that challenges obviated considering stakeholder satisfaction.

According to the results, followings are some recommendations for livestock and rangeland development. Given positive

consequence of risk taking on policy-holding, it is recommended that farmers can be encouraged to adopt new technologies and strengthen risk-taking among stakeholders. Risk management principles and other concepts to be included in the plans and insurance as the risk transfer solution should be well explained; in addition, there is a need to pave the way for farmers to be familiar with risk taking individuals who adopted other innovations and benefited from them. Given that most of stakeholders in the study area speak in local language and they are low educated, it is suggested to employ a practitioner skilled in Turkmen language to convey the concepts in a comfortable manner. It is recommended that the government and banking institutions encourage policy-holding by giving long-term low interest rate loans to encourage their work and preventing from any migrations from rural areas to urban ones.

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بررسی عوامل اجتماعی ـ اقتصادی موثر بر پذیرش بیمه دام و مرتع (مطالعه موردی استان گلستان؛ شهرستان آق‌قلا)

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چکیده. بیمه‌ی محصولات کشاورزی و منابع طبیعی، به کشاورزان و دامداران کمک می‌کند بـا کـاهش اثرات خطر احتمالی، ثبات بیشتری در مدیریت منابع داشته باشند. در این تحقیق عوامل موثر بر پـذیرش بیمه دام و مراتع توسط بهره‌برداران شهرسـتان آق‌قـلا در اسـتان گلسـتان در پـاییز ۱۳۹۴ بررسـی شـد. جمع‌آوری اطلاعات از جنبه توصیفی- پیمایشی انجام گرفت. جامعه آماری شامل تمام مرتعدارن ذی‌حـق دارای طرح مرتعداری بودند. حجم نمونه از بین ۹۳ نفر جامعه آماری، بر اساس فرمـول کـوکران، ۷۶ نفـر تعیین شد. در تحقیق حاضر متغیرهای اجتماعی- اقتصادی بین بهره‌برداران بر اسـاس آزمـون رگرسـیون لوجستیک مورد بررسی قرار گرفت. نتایج برآورد مدل رگرسیون لوجستیک نشان داد که تاثیر متغیرهـای "تمایل به بیمه دام در مقابل عوامل خطر ۲۰ سال اخیر"، "ریسک‌پذیری" و "شناخت کارشناس بیمـه از منطقه" بر پذیرش بیمه دام و مرتع، در سطح ۱ و ۵ درصد مثبت و معنی‌دار بـود و تـاثیر متغیـر "تعـداد افراد خانواده" در سطح ۵ درصد منفی و معنی‌دار بود. متغیر "شناخت کارشناس بیمه منطقه" در سطح احتمال ۵ درصد بیشترین تاثیر را در پذیرش بیمه دام و مرتع بین عوامـل وارد شـده در مـدل رگرسـیون لوجستیک داشت. بنا به نتایج کلی تحقیق برگزاری کـلاس‌هـای ترویجـی در خصـوص انتقـال ریسـک و بررسی ابعاد مختلف بیمه تحت شرایطی که مجری کلاس مسلط به زبان محلی باشد، پیشنهاد می‌گردد.

کلمات کلیدی: مدیریت مرتع، گله‌داری، دامداران، بیمه، آق قلا