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RESEARCH ARTICLE

Farmers' Flood Risk Perception in Turkey: The Case of Mersin Province

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ABSTRACT

Understanding perception of the farmers' flood risks has become increasingly important. This study aimed to evaluate the flood risk perception of farmers by constructing a farmer risk perception score based on eight statements. Data was gathered from 250 randomly selected farmers and analyzed using descriptive statistics, factor analysis, and binary logistic regression. Based on the flood risk perception score, the farmers were classified into two groups, and the results revealed that 46.00% of surveyed farmers had a high level of flood risk perception. The binary logistic regression analysis showed that seven factors, including gender, age, household size, children, farm size, insurance intention, and flood experience, had a significant impact on farmers' flood risk perceptions. The findings of this study may aid government organizations and farmers in enhancing their flood risk management strategies.

Keywords: Flood disaster; Risk perception score; Turkey

INTRODUCTION

The increasing frequency and severity of natural disasters and extreme weather events such as floods, storms, tornadoes, and hail, caused by climate change, pose a threat to agricultural production and food security worldwide (Abid et al., 2016). This situation may lead in changes to agricultural production systems, particularly in underdeveloped and developing countries (Pham et al., 2021). Flood disasters, in particular, can damage dams, irrigation facilities, engineering structures, and other assets, negatively affecting agricultural productivity, rural and agricultural populations' income levels, and general food security (Poussin et al., 2014). Furthermore, the intensity and frequency of flood disasters have increased in recent years (Lechowska, 2022).

Table 1 provides data on the agricultural land use in the research region, which reveals that Mersin accounts for 1.42% of Türkiye's 23 million hectares of agricultural land. Mersin has a significant share in fruit and vegetable production and greenhouse production, which is essential for Turkish agriculture. Specifically, 14.42% of the total greenhouse land in Türkiye is located in Mersin, where 14.82% of the greenhouse production takes place. The Akdeniz and Tarsus districts, which are the research regions in Mersin Province, account for 8.16% and 43.32% of Mersin's total greenhouse production, respectively (Table 2) (TUİK, 2021). Thus, a flood disaster in Mersin may have adverse effects on Türkiye's food security, resulting in significant price fluctuations.

Mersin is situated in a region highly susceptible to flood disasters, with occurrences recorded in 2018, 2019, and 2020, which caused extensive damage to agricultural land and facilities such as greenhouses and irrigation canals. The total area affected was 9,534.53 hectares of land used for growing field crops, vegetables, fruits, ornamental plants, among others. The total cost of damages incurred during this period was estimated at 228,148,520.21 TL (Anonymous, 2021).

Risk perception studies stem from the observing of different opinions/views between experts and society about whether a phenomenon is a "risk" and the "harm" it will cause if it occurs. For example, although experts declared nuclear energy to be safe in the early 1960s, societies perceived nuclear energy as a risk factor and opposed use of it (Douglas, 2003). There are a few reasons

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Table 1: Agricultural Land Use (2020)

Products	Türkiye (ha)	Mersin	
		ha	%
Fruits, beverage and spice plants	3,558,749.30	150,211.60	4.22
Fallow	3,173,252.10	24,807.30	0.78
Vegetable	779,246.30	30,268.10	3.88
Ornamental plants	5,406.97	79.82	1.48
Cereals and other herbal products	15,628,479.00	124,299.60	0.80
Total	23,145,133.67	329,666.42	1.42

Source: TUIK, 2021

Table 2: Greenhouse Production (2020)

Türkiye		Mesin			%
ha	Tonne	ha	%	Tonne	
70,897.50	7,771,766.00	10,500.90	14.81	111,3291.00	14.32

Source: TUIK, 2021

why experts may define some phenomena as "risks" while society may not perceive them as such. Firstly, experts may have access to different types of information and analysis than the general public. For example, experts may use scientific data, modeling, or risk assessments to evaluate the likelihood and potential consequences of a particular phenomenon, whereas the general public may rely on personal experiences or perceptions. Secondly, experts may have a different perspective on the potential consequences of a risk. For example, experts may consider the long-term or indirect impacts of a risk, while the public may focus more on immediate or tangible impacts. Thirdly, experts may be more attuned to the potential for systemic or catastrophic failures, while the public may perceive risks as isolated events. This can lead to a disconnect between experts' assessments of risk and the public's perception of risk. Fourthly, cultural and social factors can also influence the perception of risk. For example, some risks may be viewed as more acceptable or tolerable than others depending on societal norms and values. Finally, the media and other information sources can also play a role in shaping public perceptions of risk. The way that risks are communicated to the public can influence the level of concern or action taken in response to a particular risk.

A basic early study had been conducted by Starr (1969) on perception of risk. Since this study, risk perception studies have attracted more attention of experts in different fields. The examining farmers' perceptions of flood risk is an essential step in preparing a flood management plan that is effective, sustainable, and tailored to the needs of the local community. By engaging with farmers and incorporating their perspectives into flood management planning, planners can build trust, identify vulnerabilities, and develop targeted interventions that reduce the impact of floods on local communities. Although there are many risk perception studies, there is still no common and consistent consensus on risk assessment, especially on flood risk. Birkholz et al. (2014), Lechowska (2018) ve Kellens et al. (2013) reviewed literature related to flood risk perception of people. As a result of evaluating the findings of the three studies, it can be concluded that different scales which consist of different questions/items are used to examine various dimensions of flood risk perception in the most study. The different number of questions/items used can also be reduced to five key variables; (1) the possibility of flooding, (2) the effects/results of the flood, (3) anxiety/fear/concern about the flood, (4) awareness about the flood, and (5) the factors causing the flood. In addition, there is no consistent consensus on the factors affecting the risk perception. Buchenrieder et al. (2021) examined the flood risk perception of the households in rural Cameroon, and found that risk perception was affected by a number of variables such as age, family size, and land ownership, and also reported that religion was an important factor determining risk perception. Ge et al. (2021) studied the risk perception of people in China, and found that risk perceptions differed according to experience, social trust and protective behaviors. Liu et al. (2018) declared that the flood risk perception of rural households differed according to gender, education, proximity to the river, age, and household size in Henan Province, China. Pham et al. (2021) studied flash flood perceptions of indigenous people, and found associations between perceptions and socio-economic characteristics, such as gender, agricultural experience, ethnic groups, climate information, and household income conditions. Özsayın (2022) explored flood risk perception in relation to some socioeconomic variables.

To develop a flood risk management plan that is effective, it is crucial to examine the way farmers perceive flood risks, recognize the factors influencing their perception, and incorporate them into the plan (Lechowska, 2022). In this context, this study aims to achieve two main objectives: (1) assess how farmers perceive flood risks in the area, and (2) analyze the significant socioeconomic factors that impact farmers' perceptions of risks.

MATERIALS AND METHODS

Study area, questionnaire and data collection

A structured questionnaire was used as the data collection tool in this study, which consisted of two parts. The first part of the questionnaire included questions about the farmers' socio-economic characteristics. The second part consisted of an 8-item scale designed to evaluate farmers' perceptions of flood risks. The expressions used in the scale were based on previous research on flood risk perception and management (Bosschaart et al., 2013; Ho et al., 2008; Kellens et al., 2011; Kellens et al., 2013; Salvati et al., 2014).

The research questionnaire was pre-tested with 10 farmers from both the Akdeniz and Tarsus Districts, and then revised to avoid any ambiguity. The data set used in the study was collected by experienced and trained enumerators from 250 farmers in the Akdeniz and Tarsus Districts of Mersin Province during August-September 2020. The sample size was determined using a multi-stage sampling procedure. First, two districts (Akdeniz and Tarsus) were selected based on their agricultural importance and flood history. Then, the study villages were determined (Fig. 1). The sample size was calculated (238 farmers) using the following formula (Ullah et al., 2015a; Yamane, 1967).

$$n = \frac{N}{1 + Ne^2}$$

In the formula,
N: The total number of farmers,
N: The sample size,
E: The precision value, which in this study is set as 7%.

Risk perception score

To calculate the Risk Perception Score (RPS), a method suggested by ul Huq and Boz (2020) and Vasu et al. (2016) was employed. First, a Principal Component Analysis (PCA) was conducted on the flood risk perception scale to reduce the number of statements related to farmers' perception of flood risk into a smaller set of components. Prior to PCA, Kaiser-Maier-Olkin (KMO) and Bartlett's sphericity tests were used to confirm the suitability of the scale for analysis. The results showed that the study data was appropriate for PCA, with a KMO value of 0.830 and a significance level of Bartlett's sphericity test at $p < 0.00$ (Hair et al., 1995). The number of factors selected based on the Kaiser's criterion, where only factors with eigenvalues > 1.00 and statements with factor loadings > 0.5 were chosen. The internal consistency and reliability of the scale were tested using Cronbach's alpha coefficient, which was highly adequate in this case (0.862). Two common components (CC) were extracted from the PCA analysis, which explained 67.421% of the total variance. In the second step, the weight for each statement was obtained using a specific formula.

$$W_{Lj} = \frac{(factor\ loading_{Lj})^2}{eignvalue_j}$$

In the formula, showed the weight of statement L in j component. In than, RPS calculated following formula.

$$RPS_j = \sum_{i=1}^{i=n} (I_{LK} * W_{Lj})$$

In the formula, was Risk Perception Score of i_{th} farmer in j components. I represented the value of statements L of K farmers. In the final step, the total percentage of variance from each CC was divided by percentage of cumulative variance to derive the weightage. RPS_j was multiplied by the

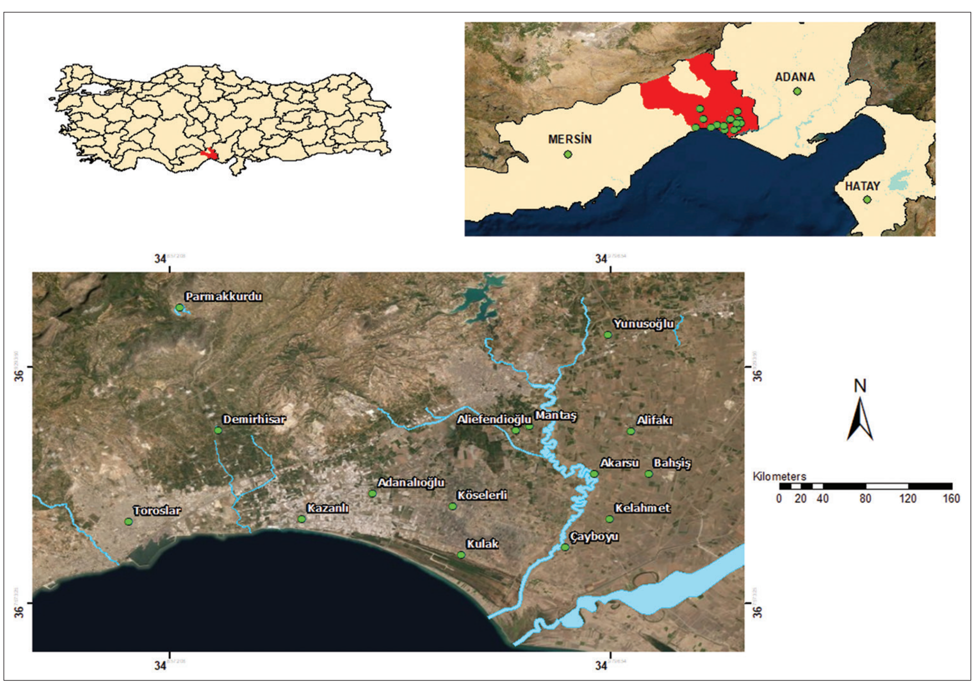

Fig 1. Study area.

derived weightage. And then, the weighted RPS_j belong to CCs were summed up to derive RPS value for each farmer.

Farmers was divided into two groups by their flood risk perception score using mean value as follows:

Low risk perception group (LRPG) ≤ Mean < High risk perception group (HRPG)

Binary logistic regression analysis

Econometric models that can be used in cases where the dependent variable takes two categorical values (such as this case) are limited; (1) Probit or (2) logistic regression models (Hair et al., 1995). In this study, the sample farmers were classified as low risk perception group and high risk perception group, and logistic regression analysis was used to determine the factors affecting farmers' risk perceptions. Variables used in regression analysis are represented in "Farmers' descriptive statistics" section.

RESULTS AND DISCUSSION

Farmers' descriptive statistics

At the end of the procedures that explained in the "data analysis section", farmers' risk perception scores with an average of 6.319 and a standard deviation of 5.189 were obtained. And then, farmers divided into two groups by their flood risk perception score using mean; 46.00% of the farmers were in the high risk perception group, while the rest were in the low risk perception group. On the average, 94.40% of farmers were male. Surveyed farmers' mean age was 49.95 years, and their educational level was low; such that only 29.60% of the farmers were high school or university graduates. Farmers' household consisted of an average of 4.77 people, and 61.60% of farmers had at least one child under 12 years old at home. In the research area, 23.20% of the farmers had a house in the city. The farmers within the scope of the research were realizing their production on an average of 56.70 decares of agricultural land, 65.60% of the farmers intended to purchase agricultural insurance against a future flood risk, and 71.20% of them had experienced a flood disaster in the past (Table 3)

Farmers' flood risk perception

The frequency distributions and descriptive statistics (mean and standard deviation) of the responses given by the sample farmers to the expressions of flood risk perception scale are presented in Table 4. While the responses given to the expressions of flood risk perception scale are examined, it is seen that the majority of the farmers declared that their families would be adversely affected in case of a possible flood disaster. On average, 90.00% of the farmers stated that their village is located in a flood-sensitive area, and 87.60% of the farmers expected a flood disaster to occur in their village in the next ten years. The rate of farmers who believed that a flood disaster would be cause to damages on the irrigation canals is 84.80%. In addition, 79.20% of the farmers believed that in the case of flooding, drinking water resources would also be damaged. 73.20% of the farmers stated that in the event of a flood disaster, freshwater products and other fisheries grown naturally or cultured in the flooded stream would be damaged, but 13.2% of the farmers stated that they did not agree with this statement. 68.80% of the farmers declared that if a flood disaster occurs, it may damage the houses and other properties in the region, while 64% believed that a flood would cause soil erosion.

While the standard deviations of the responses given to the expressions of flood risk perception scale are examined, it can be concluded that the farmers were in agreement that they live in a flood risk-sensitive village and that if a flood disaster occurs, it would adversely affect their families. But, there was no consensus among farmers that a flood disaster would cause soil erosion.

Factor affecting farmers' risk perception

Tables 5 present the impact of each socio-economic variable on farmers' flood risk perception, obtained through binary logistic regression analysis. The analysis revealed that the

Table 3: Descriptive statistics of variables used in the regression analysis

Dependent Variable	Description	Min	Max	Mean	SD
RPSGroup	0: Low risk perception group (LRPG), 1 High risk perception group (HRPG)	0.000	1.000	0.460	0.499
Independent Variables					
Gender	(1: Male; 0: Female)	0.000	1.000	0.944	0.230
Age	Farmers' age as year	20.000	80.000	49.956	9.914
Education	0: Low (primary or secondary school), 1: high (high school or university)	0.000	1.000	0.296	0.457
Household size	Size of households as person	1.000	14.000	4.768	1.743
Children	1: Children under 12 in home, 0: no children under 12 in home	0.000	1.000	0.616	0.487
Farm size	Farm size as decare	2.000	800.000	56.700	84.104
Insurance Intention	1: The farmer has the intention to insure against the risk of flooding; 0: No intention	0.000	1.000	0.656	0.476
House ownership	1: Household owns a house in the city, 0: No house in the city	0.000	1.000	0.232	0.423
Past experience	0: no flood experience, 1: with experience	0.000	1.000	0.712	0.454

correlation coefficients between all independent variables were insignificant, and the variance inflation factors (VIF) ranged from 1.027 to 1.742 (mean: 1.345, SD: 0.189), confirming the absence of multicollinearity problems. Heteroscedasticity problems were also checked, and the Breusch-Pagan test results showed that heteroscedasticity was not a problem at P-values < 0.05 (Gujarati, 2009).

Out of the nine independent variables, seven were found to be statistically significant (at different levels including P<0.1, P<0.05, and P<0.01) in influencing farmers' flood risk perception. These significant explanatory variables include (1) gender, (2) age, (3) household size, (4) children, (5) farm size, (6) insurance intention, and (7) flood experience. However, education level and house ownership in the city were found to be statistically non-significant (>10% confidence level) regarding farmers' perception of flooding (Table 5). Further explanation of the regression results is discussed below.

In terms of gender, females may be more prone to overstating the effects of natural disasters like floods as they are physically and mentally more sensitive than males. This may be particularly true in developing countries where women are more likely to be in a lower socioeconomic status and have concerns about property and income loss. Studies have shown mixed results on the relationship between risk perception and gender. The present study found that female farmers had higher risk perceptions than their male counterparts, which is consistent with the findings of Zabini et al. (2020).

Age is an important indicator of farmers' agricultural experience, and older, more experienced farmers are better

Table 4: Descriptive statistics and frequency of farmers to expressions

Expressions	Strongly Disagree	Disagree	Moderately Agree	Agree	Strongly Agree	Min.	Max.	Mean	Std. Dev.
	%	%	%	%	%				
In case of a flood, it would be affect my family negatively	0.00	0.80	4.40	43.60	51.20	2	5	4,45	0.62
There is a high probability of a flood disaster in the next 10 years in the village where I live	0.40	0.80	11.20	47.60	40.00	1	5	4.26	0.72
The village where I live is in a sensitive area to flood disasters	0.40	0.00	9.60	53.60	36.40	1	5	4.26	0.66
In case of a flood, the damages on irrigation channels would occur	0.80	2.00	12.40	44.00	40.80	1	5	4.22	0.80
In case of a flood, the damages on drinking water resources would occur	0.00	10.80	10.00	44.40	34.80	2	5	4.03	0.94
In case of a flood, the damages on fishes and/or other freshwater products/seafood would occur	0.40	12.80	13.60	44.80	28.40	1	5	3.88	0.98
In case of a flood, the damages on homes and/or other properties would occur	0.80	13.60	16.80	37.20	31.60	1	5	3.85	1.04
In case of a flood, it would be cause soil erosion in the village	2.80	17.20	16.00	38.40	25.60	1	5	3.67	1.12

Table 5: Results of binary logistic regression analysis

Variables	B	S.E.	Wald	df	Sig.	Exp (B)	95% C.I.for EXP (B)	
							Lower	Upper
Gender	-1.187**	0.641	3.426	1	0.064	0.305	0.087	1.072
Age	-0.041**	0.019	4.996	1	0.025	0.959	0.925	0.995
Education	-0.550	0.346	2.523	1	0.112	0.577	0.293	1.137
Household size	0.187**	0.096	3.839	1	0.050	1.206	1.000	1.454
Children	-0.822**	0.344	5.701	1	0.017	0.440	0.224	0.863
Farmsize	0.004***	0.002	2.855	1	0.091	1.004	0.999	1.009
Insurance intention	-0.957*	0.324	8.715	1	0.003	0.384	0.204	0.725
House ownership	0.436	0.356	1.502	1	0.220	1.546	0.770	3.104
Past experience	0.833**	0.353	5.582	1	0.018	2.300	1.153	4.590
Constant	2.503**	1.217	4,.230	1	0.040	12.222		

*,**,*** Indicates significant differences at significance level P<0.01, P<0.05, and P<0.10, respectively.
Omnibus Tests of Model; Chi-square: 32.269, Sig.: 0.000
Coefficients Model Summary; -2 Log likelihood: 312.703, Cox & Snell R Square: 0.121, Nagelkerke R Square: 0162
Hosmer and Lemeshow Test; Chi-square: 4.412, df: 8, Sig.: 0.818

able to perceive the effects of a flood disaster. However, contrary to expectations, younger farmers in this study had higher perceptions of flood risk than their older colleagues, which is consistent with the findings of Liu et al. (2018).

In the current study, the relationship between farmers' perception of flood risk and their household size was examined, and a positive and significant correlation was found. This contradicts the findings of Buchenriede et al. (2021), who reported a negative and statistically significant correlation between participants' perceptions of flood risk and their household size in Cameroon. They explained the possible reason for this as in rural areas with low education levels, family size is considered a risk management tool, as family members can provide nonwage-earning labor and financial support, making it easier to cope with disasters. Additionally, bigger families have greater opportunity to diversify their income sources, which may help in managing risks (Buchenrieder et al., 2021).

The presence of children at home is another crucial factor that influences farmers' perception of flood risk. Liu et al. (2018) found that farmers with children at home had a higher perception of flood risk. However, the present study found a negative relationship between the presence of children at home and farmers' perception of flood risk, contradicting the findings of Liu et al. (2018). That was detected that families with children at home are more likely to adopted risk reduction measures, such as flood risk insurance by Bera and Daněk (2017) and Duží et al. (2017). Therefore, the flood risk perception of farmers with children at home may be lower as a result of they adopted the necessary risk reduction measures in the research area.

Farm size is also a significant factor that affects farmers' perception of flood risk. Farmers who work on larger farmlands require more inputs and capital, which leads to higher operational costs. Hayran and Gül (2017) found that farmers who work on larger farmlands have higher capital needs and are more likely to adopt agricultural credit in Mersin. Therefore, farmers with larger farmlands may be more sensitive to climate-related issues such as flood disasters. In this study, it was found that farmers with larger farmlands had higher flood risk perceptions, which is consistent with the findings of Ullah et al. (2015b).

Taking out insurance against flood risk is a crucial risk reduction measure that farmers can take on their own (Kellens, 2013). The study has also revealed that there is a negative association between farmers' intention to purchase flood insurance and their perception of flood risk. This finding is in line with Bera et al. (2017) but contradicts the results of Fahad et al. (2018).

Flood disaster experience can be divided into two categories: direct experience (where the farmer's assets and well-being are affected by the flood) and indirect experience (where the farmer observes the flood's effects on other people or learns through mass media or other communication tools). In this study, a positive and statistically significant relationship was found between farmers' direct experience with floods and their perception of flood risk. This indicates that farmers who have experienced the effects of a flood tend to have a higher perception of flood risk. This result is consistent with the findings of Ge et al. (2021) and Zabini et al. (2020).

CONCLUSION

This study aimed to assess the risk perception of farmers using an 8-item scale and to identify the determinants of their risk perceptions in Mersin Province, Türkiye. The methodology involved conducting factor analysis, calculating risk perception scores, dividing farmers into low and high risk perception groups, and determining the factors that influence flood risk perceptions using binary logistic regression analysis.

The key findings of the study indicate that 46% of farmers were classified as having high risk perception, and significant explanatory variables included gender, age, household size, children, farm size, insurance intention, and flood experience. However, education level and house ownership in the city were not statistically significant in determining farmers' flood risk perceptions. While many of the findings were consistent with previous literature, some were contradictory.

The Ministry of Agriculture and Forestry Provincial Directorate and General Directorate of State Hydraulic Works Regional Directorate, which are main responsible Government Organization for reducing flood risk in agriculture and minimizing its possible effects, may utilize the results of this research to improve their flood risk management strategies.

CONFLICTS OF INTEREST

The author declared no conflict of interest.

ETHICS APPROVAL

Not applicable. In the present study, survey respondents were notified that the questionnaire data will be used for scientific purposes. The questionnaire was performed with the required permissions from the respondents. Also, other ethical rules were taken into account in the current study.

Authors' contributions

Questionnaires was applied by enumerators. All other parts of article were conducted and approved the final draft by Seyit HAYRAN.

REFERENCES

Abid, M., J. Schilling and F. Zulfiqar. 2016. Climate change vulnerability, adaptation and risk perceptions at farm level in Punjab, Pakistan. Sci. Total Environ. 547: 447-460.

Anonymous, 2021. The Records of Ministry of Agriculture and Forestry Mersin Provincial Directorate.

Bera, M. K and P. Daněk. 2018. The perception of risk in the flood-prone area: A case study from the Czech municipality. Disaster Prev. Manag. 27: 2-14.

Birkholz, S., M. Muro, P. Jeffrey and H. M. Smith. 2014. Rethinking the relationship between flood risk perception and flood management. Sci. Total Environ. 15: 12-20.

Bosschaart, A., W. Kuiper, J. A. van der Schee and J. I. Schoonenboom. 2013. The role of knowledge in students' flood-risk perception. Nat. Hazards. 69: 1661-1680.

Buchenrieder, G., J. Brandl and A. R. Balgah. 2021. The perception of flood risks: A case study of Babessi in rural Cameroon. Int. J. Disaster Risk Sci. 12: 1-21.

Douglas, M. 2003. Risk Acceptability According to the Social Sciences. Psychology Press, Russell Sage Foundation, United Kingdom.

Duží, B., D. Vikhrov, I. Kelman, R. Stojanov and D. Juřička. 2017. Household measures for river flood risk reduction in the Czech Republic. J. Flood Risk Manag. 10: 253-266.

Fahad, S., W. Jing, G. Hu, H. Wang, X. Yang, A. A. Shah, N. T. L. Huong and A. Bilal. 2018. Empirical analysis of factors influencing Farmers crop insurance decisions in Pakistan: Evidence from Khyber Pakhtunkhwa province. Land Use Policy. 75: 459-467.

Ge, Y., G. Yang, X. Wang, W. Dou, X. Lu and J. Mao 2021. Understanding risk perception from floods: A case study from China. Nat. Hazards. 105: 3119-3140.

Gujarati, D. N. 2009. Basic Econometrics. TATA McGraw-Hill Education, New Delhi.

Hair, J. F., R. E. Anderson, R. L. Tatham and W. C. Black. 1995. Multivariate data analysis. Prentice-Hall, Englewood Cliffs, NJ.

Hayran, S. and A. Gül. 2018. Mersin İlinde Çiftçilerin Tarımsal Kredi Kullanım Kararlarını Etkileyen Faktörler. Iğdır Üniv. Bilim. Enstitüsü Der. 8:271-278.

Ho, M. C., D. Shaw, S. Lin and Y. C. Chiu. 2008. How do disaster characteristics influence risk perception? Risk Anal. 28: 635-643.

Kellens, W., T. Terpstra and P. De Maeyer. 2013. Perception and communication of flood risks: A systematic review of empirical research. Risk Anal. 33: 24-49.

Kellens, W., R. Zaalberg, T. Neutens, W. Vanneuville and P. De Maeyer. 2011. An analysis of the public perception of flood risk on the Belgian coast. Risk Anal. 31: 1055-1068.

Lechowska, E. 2018. What determines flood risk perception? A review of factors of flood risk perception and relations between its basic elements. Nat. Hazards. 94: 1341-1366.

Lechowska, E. 2022. Approaches in research on flood risk perception and their importance in flood risk management: A review. Nat. Hazards. 111: 2343-2378.

Liu, D., Y. Li, X. Shen, Y. Xie and Y. Zhang. 2018. Flood risk perception of rural households in western mountainous regions of Henan Province, China. Int. J. Disaster Risk Reduc. 27: 155-160.

Özsayın, D. 2022. Dairy farmers' risk attitudes and their perceptions towards environmental risks in Northwest Türkiye. Emir. J. Food Agric. 34: 888-903.

Pham, N. T. T., D. Nong and M. Garschagen. 2021. Natural hazard's effect and farmers' perception: Perspectives from flash floods and landslides in remotely mountainous regions of Vietnam. Sci. Total Environ. 759: 142656.

Poussin, J. K., W. J. W. Botzen and J. C. J. H. Aerts. 2014. Factors of influence on flood damage mitigation behaviour by households. Environ. Sci. Policy. 40: 69-77.

Salvati, P., C. Bianchi, F. Fiorucci, P. Giostrella, I. Marchesini and F. Guzzetti. 2014. Perception of flood and landslide risk in Italy: A preliminary analysis. Nat. Hazards Earth. Syst. Sci. 14: 2589-2603.

Starr, C. 1969. Social benefit versus technological risk: What is our society willing to pay for safety? Science. 165: 1232-1238.

TUİK. 2021. Crop Production Statistics. Available from: https://www.tuik.gov.tr [Last accessed on 2021 June 04].

Ul Haq, S. and I. Boz. 2020. Measuring environmental, economic, and social sustainability index of tea farms in Rize Province, Türkiye. Environ. Dev. Sustain. 22: 2545-2567.

Ullah, R., G. P. Shivakoti and A. Ghaffar. 2015a. Factors effecting farmers' risk attitude and risk perceptions: The case of Khyber Pakhtunkhwa, Pakistan. Int. J. Disaster Risk Reduc. 13: 151-157.

Ullah, R., D. Jourdain, G. P. Shivakoti and S. Dhakal. 2015b. Managing catastrophic risks in agriculture: Simultaneous adoption of diversification and precautionary savings. Int. J. Disaster Risk Reduc. 12: 268-277.

Vasu, D., S. K. Singh, S. K. Ray, V. P. Duraisami, P. Tiwary, P. Chandran, A. M. Nimkar and S. G. Anantwar. 2016. Soil Quality Index (SQI) as a tool to evaluate crop productivity in semi-arid Deccan plateau, India. Geoderma. 282: 70-79.

Yamane, T. 1967. Statistics; an Introductory Analysis. Harper and Row, New York.

Zabini, F., V. Grasso, A. Crisci and B. Gozzini. 2021. How do people perceive flood risk? Findings from a public survey in Tuscany, Italy. J. Flood Risk Manag. 14: e12694.