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Perception, Knowledge, and Behavior towards Climate Change: A Survey among Agricultural Professionals in Hamadan Province, Iran

O. Jamshidi[1], A. Asadi[1*], Kh. Kalantari[1], and H. Azadi[2]

ABSTRACT

The purpose of this study was to evaluate perception towards climate change, level of knowledge and climate change related behavior of agricultural professionals in Hamadan Province, Iran. The statistical population of the study consisted of 360 agricultural professionals and, by using Cochran formula, sample size was determined as 121 people, who were chosen via a simple random sampling method. Data was gathered using a structured questionnaire whose face validity was confirmed through a panel of experts and its reliability was estimated using Cronbach Alpha coefficient (above 0.70). The results revealed that mean age of sample study was almost 45 years and more than half of them had MSc. and PhD. degrees. Also, results showed that 91.7% of the respondents had strong perception, and about half of the respondents had high knowledge of climate change. While a great majority (78.5%) of the respondents was willing to join the practical efforts to mitigate effects of climate change, about one-fourth indicated they were willing to sacrifice some individual benefit to solve existing problems. The results indicated a significant (P< 1%) difference between 3 major job groups, i.e. managers, faculty members, and experts, regarding climate change related behavior. Also, correlation analysis confirmed that education level, knowledge of climate change, and perception of climate change had a significant relation with climate change related behavior.

Keywords: Adaptation, Effects of climate change, Environmental issues, Individual characteristics, Public perception.

INTRODUCTION

Climate change has been recognized globally as an ever-increasing threat to our planet that is becoming impossible to ignore (Sarkar *et al*., 2012). Despite a few skeptical views (Dunlap, 2011), many researcher believed that climate change is one of the most important environmental issues facing the world today (Ekpoh and Ekpoh, 2011; FAO, 2012; Ayanwuyi *et al*., 2010; Parry *et al*., 2004; Wang, 2012; Karfakis *et al.*, 2012; Arbuckle Jr *et al*., 2013; Brooks *et al*., 2009; Pishbahar, 2016). However, there exists a widespread claim by researcher that climate change is happening and is being driven by human activities, like the burning of fossil fuels, industrial pollution, deforestation, and land use changes (IPCC, 2014; Oreskes, 2004). Climate change poses wide-range impacts on earth and global ecosystems including increases in air and water temperatures (IPCC, 2007), impact on water resources (Pradhan *et al*., 2015), change in precipitation pattern (IPCC, 2014; Hardy, 2003), decrease in agricultural production (Viala, 2008; Pishbahar and Darparnian, 2016) and land productivity (Kumar *et al*., 2016), livelihood of rural communities (Aydogdu and Yenigün, 2016), sea

[1] Department of Agricultural Development and Management, University of Tehran, Islamic Republic of Iran.
[*] Corresponding author; e-mail: aasadi@ut.ac.ir
[2] Department of Geography, Ghent University, B-9000 Ghent, Belgium.

level rises (El-Beltagy and Madkour, 2012), reductions in snow cover, lacers, and permafrost (IPCC, 2007), and human health (Hardy, 2003; Patz *et al*., 2005). In different economic sectors, agriculture, upon which society depends for the food, feed, and fiber that enable sustainable livelihoods, is one of the most vulnerable sectors to shifts in climate (IPCC, 2014; Arbuckle Jr *et al*., 2013; Burton and May, 2004; Hardy, 2003; Apata *et al*., 2009; Ayanwuyi *et al*., 2010; Apata, 2011). Apata *et al*. (2009) argued that climate change is expected to influence crop and livestock production, hydrologic balances, input supplies and other components of agricultural systems. However, climate change-related threats to agriculture also represent threats to quality of life on a global scale (Arbuckle Jr *et al*., 2013) and have led to an increasing amount of attention to public awareness, perceptions, and behavior.

As mentioned earlier, there is different point of view about climate change and its impact, but to reach an agreement about severe climate impact, it is necessary to build a consensus among the general population and agricultural professionals. More specifically, policy actions to address climate change and global warming will have to account for public perceptions and must be understood and accepted in order to be politically feasible and successfully implemented (Lorenzoni and Pidgeon, 2006; Jamelske *et al*. 2013).

As Sarkar *et al*. (2012) mentioned, it is necessary to understand climatic change from the socio-economic perspective to prepare a road map for capacity building of people and to help the policymaker in formulating future policy based on human perception and attitude. Therefore, it is very crucial to investigate what people know, think, believe and behave across a spectrum of issues related to climate change (Jamelske *et al*. 2013). Although the study of perception of climate change as a threat across the world has been increasing over the years thanks to the severity and increased frequency of climate change impacts (Ochieng and Koske, 2013; Sarkar *et al*., 2012), it is not considered as a top priority global issue, especially in the developed countries (Leiserowitz *et al*., 2005) and very little research effort has been focused on this area (Arbuckle Jr *et al*, 2013), especially with regard to agricultural professionals. In this context, Burnett *et al*. (2014) believed that, although the general public perceptions of climate change are well documented, few studies focused specifically on the beliefs and perceptions of agriculture and natural resource professionals. However, there are considerable researches directed to study perception, attitude, awareness, and behavior about climate change based on surveys (Junni Wei *et al*., 2014; Fonta *et al*., 2015; Al Buloshi and Ramadan, 2015; Sahu and Mishra, 2013; Howlader, 2015; Apata *et al*., 2011; Ayanwuyi *et al*., 2010; Belachew and Zuberi, 2015; Debela *et al*., 2015; Kamruzzaman, 2015; Okonya *et al*., 2013; Mengistu, 2011; Sarkar *et al*., 2012; Al Buloshi and Ramadan-Franco and Haan, 2015; Ndamani and Watanabe, 2015; Fosu-Mensah *et al*., 2012; Maponya and Mpandeli, 2013; Maddison, 2007; Skalík, 2015).

Global concern regarding the devastating impact of climate change has emphasized the need for creating awareness and building community capacity for adaptation strategies to mitigate the effects of climate change (Ekpoh and Ekpoh, 2011). In other hands, as Arbuckle Jr *et al*. (2013) argued, the farmers are critical decision makers who could effectively manage the agricultural lands and adapt to changing climate conditions, but these farmers also consider agricultural professionals of official organizations as a qualified reference group that provides them with technical information. Moreover, to date, the majority of existing studies examining farmers' perception and knowledge of climate change (Niles *et al*., 2016) and a few research focused on professionals and experts perception (Rodriguez-Franco and Haan, 2015).

Attitudes and expectations play a significant role in society, development, environment, and resource economics (Aydogdu and Yenigün, 2016). As Dietz (2015) implied, attitudes can be strong predictors of behaviors or acceptance of ideas. In this regard, Howden *et al*. (2007) emphasized that if farmers do not believe that climate change is occurring and/or do not perceive it to be a threat to their livelihoods, they will not likely act to adapt to or mitigate climate change effects. This is also important to understand how the agricultural professionals' perceive climate change and assess their knowledge level of climate change. A better

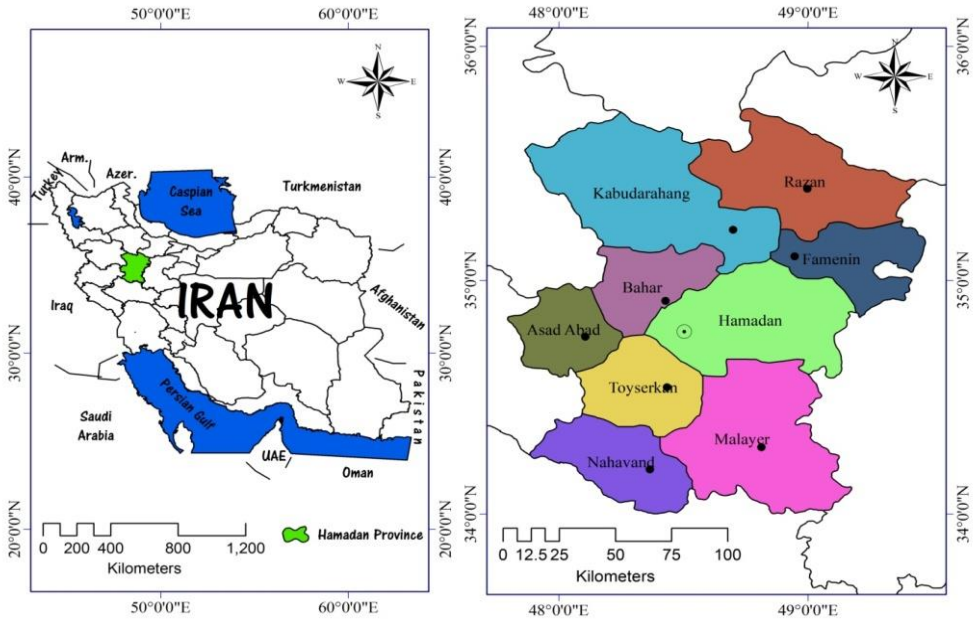
understanding of public perceptions, attitude and behavior in relation to climate change will provide an important foundation for government's policy-making, service provider's guideline development, and the engagement of local communities (Junni Wei *et al*., 2014). Agricultural professionals are an important group in the battle against effects of climate change and it is therefore crucial to understand their perception, attitude and behavior in relation to climate change. However, such information is still scarce and reported mainly in developed countries. So, the primary aim of the study was to investigate perception, knowledge and climate change related behavior among agricultural professionals in Hamadan Province, Iran

MATERIALS AND METHODS

Study Area

This study was conducted in Hamadan Province, located in the west of Iran. Hamadan was chosen as the study site because of the climate change and its risks that confront the agriculture sector and farmers. Numerous researches have shown that this area has experienced climate change in recent years and it is anticipated that future climate is hotter and dryer. For example, IMO (2013) concluded that mean temperature of the area will increase by 0.5 to 0.8°C and annual precipitation will drop off about 23 mm in short period of time 2010-2039, compared with base period of 1976-2005. Similarly, Nazari *et al*. (2016) concluded that temperature would rise 1.12 to 2.12°C and rainfall would drop by almost 1.4-6.1 percent for the period 2045-2065. Amiri *et al*. (2015) mentioned significant increasing trend in mean temperature and Zare *et al*. (2011) implied that annual precipitation of the area declined while value of *SPI* index increased. As climate is changing in the area and agriculture is directly dependent on climatic conditions, with the limited capabilities and recourses, agriculture can be considered as one the most vulnerable sectors to climate change. (Figure1).

The main purpose of this research was to investigate perception, knowledge, and behavior towards climate change in agricultural professionals. This research was descriptive and analytical survey and applied a self-developed structured questionnaire to collect information. The validity of the questionnaire, as shown in



Location of Hamadan Province within Iran Hamadan counties

Figure 1. A general map of Iran illustrating the location of the study area.

Table 1, was ensured through the expert opinion and its reliability was confirmed by Alpha Cronbach over 0.7 for different scales of research.

The targeted study population was 360 agricultural professionals who were employed at Jihad-e- Agriculture Organization of Hamadan Province and Research and Education Center for Agriculture and Natural Resources of Hamadan. Sample size, determined by Cochran formula, was 121 people. The research survey questionnaire consisted of 4 main parts including section A (demographic information like gender, age, education, experience, etc.); section B (perception about climate change, which was measured by using a scale consisting of 11 items patterned on a five-point continuum ranging from strongly agree (5) to strongly disagree (1) for positive items and reverse for negative items); section C (15 yes, no or don't know items to assess knowledge of climate change); and section D (6 questions to evaluate climate change related behavior). Data were gathered in 2016, and analyzed using SPSS statistical software version 18. Both descriptive and analytical statistics were applied.

RESULTS

A total of 121 agriculture experts took part in this study and their personal characteristics are shown in Table 2. Based on the results, 85.1% of respondent were male and 14.9% were female. Mean age of the study sample was almost 45 years and 52.5% were aged 41-50 years old. In terms of education, more than half (53.7%) of the respondents had MSc. and PhD. degrees. Almost half of respondents had 21 to 35 years of job experience, with average of 19.88 years. 59.5% of respondents were expert, while 12.4% were manager, and 28.1% were faculty member.

Perception is the way of processing raw data that a person receives through his sensory organ from the environment into meaningful pattern. Human perception depends not only on individual personality but also on community, environment, and interaction among these components (Sarkar *et al*., 2012). Before taking any further action to adapt to climate change, at

Table 1. Reliability analysis for different scales of research instrument.

Dimension	Number of item	Cronbach's Alpha
Perception	11	0.814
Knowledge	16	0.725

Table 2. Personal characteristic of respondents.

Variable	Group	Frequency	Percent	Description
Gender	Male	103	85.1	Mode: male
	Female	18	14.9	
Age	≤ 30	5	4.1	Maximum:62 Minimum:27 Mean:45.19 SD: 6.41 Mode:48
	31-40	21	17.4	
	41-50	72	52.5	
	51-65	23	19	
Education level	Associate Degree	6	5	Mode: MSc. and PhD.
	MB	50	41.3	
	MSc. and Ph.D.	65	53.7	
Job experience	0-10 years	17	14	Maximum: 32 Minimum: 2 Mean: 19.88 *SD*: 7.22 Mode: 20
	11-20 years	42	34.7	
	21-35 years	62	51.2	
Job major	Experts	72	59.5	Mode: Expert
	Manager	15	12.4	
	Faculty member	34	28.1	

first, we should assess the peoples' perception about climate change. Result of Table 3 shows that majority of respondents (92.5%) in the study perceived that climate of the region is changing. According to 90% of the professionals, "snowfall in the region dropped compared to previous years" and 84% strongly agreed with the statement of "regional temperature is rising every year". The mean score of statement "coldness increased in region over recent years" was rather low (2.63) and about 70% of respondents rejected that statement.

To assess agricultural professionals' knowledge of climate change and variability, a scale with 15 climate change related questions was used. Then, the score of each respondent was calculated in the range of 0 to 30 (each correct response scored 2). To group the respondents, score 0 to 10 was considered as low knowledge, 11-20 as moderate knowledge, and 21-30 as high knowledge. From Table 4, about half of the respondents had high knowledge of climate change, 43.8% had moderate knowledge, while only 7.4% had low knowledge of climate change.

To simplify the data and summarize and categorize the items of climate change knowledge, factor analysis was utilized. The computations revealed that the internal coherence of the data was appropriate [Kaiser-Meyer-Olkin (KMO)= 0.703] and Bartlett's statistical data was significant at 99% confidence level. According to *Eigen* value more than one, there were 4 factors which explained 61% of total variance. Factor 1 explained 19.76% of the total variance; it was named "process knowledge". Factor 2 explained 15.78%, factor 3, 12.94%, and factor 4 explained 12.58% of the

Table 3. Distribution of respondents according to their perception of climate change.[a]

Rank	Item	DK (%)	SD (%)	D (%)	U (%)	A (%)	SA (%)	Mean	Std dev	CV
1	Climate of region is changing	1.7	0	0	5.8	65.3	27.3	4.15	0.760	0.18
2	The snowfall in the region dropped compared to previous years.	3,3	0	3.3	3.3	46.3	43.8	4.21	1.04	0.25
3	Region heat is rising every year.	2.5	1.7	3.3	8.3	63.6	20.7	3.91	0.983	0.25
4	Climate change more than the benefits, poses risk to the agricultural sector around the world	3.3	0	5.8	19	50.4	21.5	3.78	1.06	0.28
5	Human activity such as burning fossil fuels is main cause of climate change	3.3	0	8.3	26.4	54.5	7.4	3.51	0.984	0.28
6	Climate change more than the benefits, poses risk to the agricultural sector in Hamadan Province	5.8	0	0	13.2	54.5	26.4	3.90	1.15	0.29
7	Disruption in the distribution of rainfall is higher than past.	5	1.7	0	22.3	47.1	24	3.77	1.16	0.31
8	The annual precipitation in the region is declining.	5	0	5.8	14.9	47.9	26.4	3.80	1.18	0.31
9	Climate change has created new opportunities for agriculture in the world.	5	4.1	14.9	33.1	36.4	6.6	3.12	1.17	0.38
10	The warm wave in the region has increased compared to the past.	8.3	2.5	6.6	22.3	40.5	19.8	3.44	1.39	0.40
11	Coldness increased in region over recent years.	7.4	5	34.7	25.6	24.8	2.5	2.63	1.19	0.45

[a] DK (Don't Know); SD (Strongly Disagree); D (Disagree); U (Uncertain); A (Agree); SA (Strongly Agree), Std dev[7] (Standard deviation), CV (Coefficient Variance).

Table 4. Frequency distribution of respondents, based on the level of climate change knowledge.

Rank	Item	Frequency	Percentage	Cumulative Percentage
1	Low knowledge	9	7.4	7.4
2	Moderate knowledge	53	43.8	51.2
3	High knowledge	59	48.8	100.0
	Total	121	100	-

total variance; they were labeled as "terms knowledge", "impact knowledge", and "number knowledge", respectively (Table 5).

In this section, to assess respondents' climate change related behavior, a 5 items survey in different related categories was used, based on Junni Wei *et al.* (2014). Result showed that the majority of respondents (76.9%) believed that climate change could be avoided, but through great endeavors; while about one tenth indicated that climate change could not be avoided. While great majority (78.5%) of respondents were willing to join the practical efforts to mitigate climate change, about one fourth indicated they were willing to sacrifice some individual benefit to solve the existing problems. As a sample of climate change related behavior, 37.2% of participants used public transportation all the

Table 5. The component of knowledge towards climate change.

Item	Knowledge component				*Eigen* values	% Variance
	Process	Terms	Impact	Number		
The main reason for climate change was human activity such as burning fusil fuels, changing land use and.. since 1750s	0.722				2.76	19.768
Climate change is caused by imbalance in incoming and outgoing energy from the Earth's atmosphere due to increased greenhouse gas emissions.	0.624					
Clouds and water vapor made the Earth's surface cooler.	0.842					
Climate, changes the same in everywhere	0.811					
The more CO_2 in atmosphere, the more absorbance of heat and warmer earth	0.509					
ChloroFluoroCarbons (CFCs) are the most serious threat to the ozone layer.		0.795			2.21	15.785
Life on Earth could not exist without the protective shield of the ozone layer		0.657				
Human activity is the main reason for climate change		0.836				
Conceptually, climate change is the same as climate variation		0.506				
Climate change by increased temperature and increased plant growth raise agricultural production.			0.512		1.81	12.943
Global warming will increase the incidence of infectious and contagious diseases.			0.753			
Destruction of tropical forests, will intensify global warming			0.684			
Climate change effects can be mitigated by cutting off GreenHouse Gases (GHG) emission			0.666			
About 25% of GHG emission emitted from agriculture sector				0.774	1.76	12.585
CO_2 in the atmosphere has contributed the most to global warming				0.644		
Extraction method: Principal component analysis Rotation method: Varimax with Kaiser normalization	KMO: 0.703 Bartlett's Test; 536.11**					

** 99% confidence level

time, and 31.4% used it sometimes. However, about half of the respondents indicated they participated in some environmental protection activities related to climate change (Table 6).

The results of the applied analysis of variance showed that there was no significant evidence of the effect of the studied major job groups concerning perception of climate change and knowledge towards climate change. However, the results indicated a significant difference between the 3 major job groups regarding climate change related behavior, at 99% confidence level in which the level of climate change-related behavior of faculty members was significantly more than the two groups of managers and experts. There was also a statistically significant difference between gender groups of female and male in some variables. In terms of perception, females' score was statistically higher (95% confidence level), but in terms of climate change related behavior, males' score was greater. In other words, gender does make a difference in the studied variables as women know more about climate change, but men take more action.

An overview of the intercorrelations of the variables used in this study is provided in Table 7. The level of education, knowledge toward climate change, and perception of climate change as the predictor variables are significantly

Table 6. Distribution of respondents according to their climate change relevant behavior.

Climate change relevant behavior	Frequency	Percent (%)
Can climate change be avoided?		
Absolutely possible	13	10.7
It's possible but through great endeavor	93	76.9
Climate change cannot be avoided	11	9.1
Don't know	4	3.3
If someone called for, would you like to join the practical efforts to mitigate climate change?		
Yes	95	78.5
No	6	5.0
Uncertainty	20	16.5
Are you willing to sacrifice some individual benefit to solve existing problems?		
Very willing	31	25.6
Not very willing	86	71.1
Not at all willing	4	3.3
Do you usually use public transportation		
All the time	45	37.2
Sometimes	38	31.4
Rarely	20	16.5
Not at all	18	14.9
Did you participate in some environmental protection activities related to climate change?		
Yes	64	52.9
No	57	47.1

Table 7. Inter-correlations of studied variables.

	Age	Education	Knowledge	Information	Perception	Behavior
Age	1					
Education	-.005	1				
Knowledge	$-.037^{NS}$	$.239^{**}$	1			
Information	$-.063^{NS}$	$.133^{NS}$	$.107^{NS}$	1		
Perception	$-.182^{*}$	$.004^{NS}$	$.255^{**}$	$.181^{*}$	1	
Behavior	$.058^{NS}$	$.238^{**}$	$.226^{*}$	$.085^{NS}$	$.255^{**}$	1

* 95% confidence level; ** 99% confidence level, NS: Not Significance.

positively correlated with climate change behavior, ranging from 95 to 99% significant confidence level. Also, it is clear that there was no significant relation between climate change-related behavior and variables of age and climate change information seeking. However, perception of climate change was the most strongly correlated with climate change related behavior.

DISCUSSION

Climate change related variables such as perception, knowledge, and behavior are clearly complex and multidimensional. The purpose of this study was to provide wide and comprehensive of the some determinates that underline climate change related behavior. To this context, this study aimed to assess the perception of climate change, knowledge towards climate change, and climate change related behavior of agricultural professionals in Hamadan Province, Iran. Understanding the views, perception, and beliefs of the public on climate change will be very instrumental in the climate adaptation and mitigation process (Shome *et al*., 2009). Most studies on perception, knowledge or behavior on climate change focused on public (Leiserowitz *et al*., 2005; Lorenzoni and Pidgeon, 2006; Skalík, 2015; Dana *et al*., 2015; Patchen, 2006; Al Buloshi and Ramadan, 2015). Some focused on vulnerable communities (Kabir *et al*., 2016; Semenza *et al*., 2008), instructors (Nwosu and Ofili, 2016), health professionals (Junni Wei *et al*., 2014), students (Christensen and Knezek, 2015; Ochieng and Koske, 2013), extension agents (Ogunlade *et al*., 2014; Becerra *et al*., 2016; Burnett *et al*., 2014), environmental managers (Rodriguez-Franco and Haan, 2015) and lots of research has been done on farmers (Arbuckle Jr *et al*., 2013; Niles *et al*., 2016; Sarkar *et al*., 2012; Battiste, 2016; Apata, 2011; Ayanwuyi *et al*., 2010; Belachew and Zuberi, 2015; Fonta *et al*., 2015; Nwobodo and Agwu, 2015; Aydogdu and Yenigün, 2016). But, little research has been conducted concerning the perceptions, knowledge, or behavior of agricultural professionals.

In terms of perception, that is, the views and interpretations of the climate issue based on beliefs, experiences, and understanding (Wolf and Moser, 2011), the evidence from this study showed that most of the respondents had strong perception of climate change. It should be noticed that perception of climate change is clearly complex and multidimensional (van der Linden, 2015), so, in interpretation of result, some personal factors should be taking into account. Human perception depends not only on individual personality but also on community, environment, and interaction among these components (Sarkar *et al*., 2012). Another major point is that perception is a substantial determinant of behavior. For instance, Arbuckle Jr *et al.* (2013) found that perceptions of climate risk are central to farmers' adaptation, while in Gandure *et al.* (2013), farmers have perceived increase in temperature, warmer summer temperatures, and colder winter temperatures. According to the results of this study, respondents believed that in the study region climate is changing; temperature is rising, while precipitation is decreasing. Also, respondents strongly believed that the snowfall in the region dropped compared to previous years. Similarly, Becerra *et al.* (2016) found that the majority of extension educators believed the climate was changing, and in research of Aydogdu and Yenigün (2016) conducted in Turkey, more than half of the studied farmers perceived climate change as a risk and they were more likely to take adaptation practices.

Another important personal variable studied was knowledge of climate change. The result showed that about half of the respondents had high knowledge of climate change. In consistent with Ogunlade *et al*. (2014) and Al Buloshi and Ramadan (2015), more than half of the respondents had excellent level of knowledge. But, different from our finding, in Nwobodo and Agwu (2015), only 6.5% of respondents who were farmers had high knowledge of climate change. But, in Rodriguez-Franco and Haan (2015), over 90% of respondents were well-informed about climate change. In Kabir *et al.* (2016) also, the knowledge level of the participants on climate change was more than the study assumption and almost half of the respondents had heard about it. It could be concluded that high level of respondents' knowledge in this study was due to their high education level. Similarly, Aydogdu and

Yenigün (2016) found that when education level of farmers increases, there is an increase in risk perception of climate change.

As mentioned earlier, more than half of respondent had MSc. and PhD. degrees, which is not inconsistent with other studies farmers' education. In using factor analysis, it turned out that four knowledge components, namely, process, terms, impact, and number explained more than 60% of total variance. Similarly, in Skalík (2015), four factors called document, processes, terms, and numbers were extracted as the components of climate change-related knowledge.

Regarding climate change related behavior, great majority of respondents were inclined to join the practical efforts to mitigate climate change effects, while about one fourth indicated they were inclined to sacrifice some individual benefit to solve the existing problems. In the study by Al Buloshi and Ramadan (2015), more than nine tenth of respondents declared readiness to contribute to reduce the causes of this phenomenon, and in the study of Junni Wei et al. (2014) the majority of respondents were willing to change their behavior. While in Burnett et al. (2014) only fifteen percent of respondents reported they had previously participated in climate programs. However, in current study, about one third of respondents used public transportation all the time and about half of them had participated in some environmental protection activities related to climate change.

The results of the comparative analysis showed significant differences between the three major job groups in terms of climate change related behavior. Faculty members' behavior was assessed more environmentally friendly and there was no significant difference about the perception, knowledge, and information seeking. Similarly, in the work of Rodriguez-Franco and Haan (2015), there was no significant difference between professional groups in terms of expected climate change and source of information.

Based on our findings, it is clear that females' climate change perception and information seeking was higher than males, but in terms of climate change related behavior, males' score was greater than females' score. Similar observation has been reported in McCright (2010) study, where women were more concerned about environmental issues than men. Also, Junni Wei *et al*. (2014) indicated that female staff were more likely to access climate change information through the internet. Contrary to the findings of this research, Dana *et al*. (2015) found that, in Dhaka, males were significantly more knowledgeable compared to females, and in Kisauzi *et al*. (2012) women's knowledge was lower than men. Women and men have dissimilar attitudes, interests and preferences, which lead to environmental risk perception and predict behavioral responses (Bord *et al*., 1997). McCright (2010) suggested that gender differences may stem from differing socialization experiences between men and women, which can lead to differing levels of environmental concern. However, understanding gender dimensions of climate change perceptions, knowledge, and behavior contributes to effective climate change adaptation planning. Consequently, climate change response interventions need to engage both men and women, but it seems that more favorable conditions for agricultural professional women's decision-making are needed. Given the social and cultural conditions of the region, this group can make better relationship with the vulnerable rural women and improve their adaptive capacity.

The result of intercorrelations of the variables confirmed that behavior is related to education, knowledge, and perception. Results of some other studies are in agreement; for instance, Kabir *et al*. (2016) found that education was significantly associated with climate change knowledge. In the work of Niles *et al*. (2016), perception was correlated with climate change belief and future climate concerns and risks. In Tsitsoni and Toma (2013) study, some demographic factors were the main determinants of environmental behavior; also, environmental attitudes and perceptions had a significant impact on behavior. Niles *et al*. (2016) concluded that farmers who had a favorable perception of environmental regulations were positively associated with adaptation behaviors, and Jiri *et al*. (2015) found that perceptions of climate change have a positive effect on adaptation strategies, which is a kind of climate change related behavior. In addition, our finding was consistent with existing studies where farmers

with climate belief and risk perceptions were more likely to adopt mitigation and adaptation behaviors (Niles *et al*., 2016; Arbuckle Jr *et al*., 2013; Haden *et al*., 2012). The finding proves that education, access to information, and perception matter and determine climate change related behavior. As Tsitsoni and Toma (2013) mentioned "The more we know about the world we live in, the more likely we are to care about it and the more motivated we can be in order to protect it".

CONCLUSIONS

Climate change and its risk are global concern (Al Buloshi and Ramadan, 2015) but, due to different social context, the way in which communities and individual perceive it, the level of knowledge, and how they behave in facing with this phenomenon are different. In this regard, Niles *et al*. (2016) stated "The ways that individuals perceive climate change is highly personal, place-based, and influenced by a number of factors". Although some studies have investigated perception, knowledge, and behavior of agricultural professionals towards climate change, but researches usually focus on farmers. Thus, in this study, we assessed how agricultural professionals perceive climate change, how much is their knowledge of climate change, and how they behave toward climate change.

The result showed that agricultural professionals' perceive climate change clearly and are concerned about its impact on, specially, agriculture sector in Hamadan Province, Iran. Noticeable proportion of respondent acted environmentally friendly as their behavior related to climate change, but it can be even better. Another important point is that agricultural professionals, due to contact with the various population groups, especially those at the grass roots, can make significant contributions to improve public awareness of climate change issues by making it a priority issue when they teach, speak, and conduct research. As Ochieng and Koske (2013) stated, "Increasing people's awareness on climate change through education is an important measure to persuade people at all levels in the community to play an active role in mitigating and adapting to climate change" and agricultural professionals can participate in such activity as well.

The study showed that agricultural professionals have a widespread knowledge of climate change and its impact, so, they should be part of climate change adaptation and mitigation planning in the region. But still, it is recommended that agricultural professionals should be trained and re-trained in information and knowledge acquisition in order to further enhance their knowledge of climate change impact and adaptation strategies.

Finally, although a number of best practices in conducting research were employed in this study, some limitations must be addressed. First, the response rate obtained in this study was almost ideal, but some respondents did not fill up the questionnaire carefully. Second, as this study was conducted at the divisional level and focused only on agricultural professionals, it may not represent the perceptions of elsewhere, thus some consideration should be taken into account.

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نگرش، دانش و رفتار مرتبط با تغییر اقلیم: مطالعه متخصصان کشاورزی در استان همدان، ایران

ا. جمشیدی، ع. اسدی، خ. کلانتری و ح. آزادی

چکیده

هدف مطالعه حاضر ارزیابی وضعیت ادراک، دانش و رفتار مرتبط با تغییر اقلیم در بین متخصصان کشاورزی استان همدان بود. جامعه آماری تحقیق حاضر شامل ۳۷۰ کارشناس خبره کشاورزی بود که با استفاده از فرمول کوکران حجم نمونه ۱۲۱ نفر تعیین و داده‌ها با استفاده از روش نمونه‌گیری کاملاً تصادفی از آنها جمع آوری گردید. ابزار اصلی تحقیق پرسشنامه ساختارمند بود که روایی ظاهری آن با پنل متخصصین و پایایی آن با ضریب آلفای کرونباخ بالاتر از ۰/۷ برای مقیاس‌های مختلف آن، مورد تایید قرار گرفت. نتایج نشان داد که میانگین سن نمونه مورد مطالعه ۴۵ سال بود و بیش از نیمی از آنها دارای مدرک کارشناسی ارشد و دکتری بودند. همچنین نتایج حاکی از این بود که ۹۱/۷٪ از پاسخگویان دارای ادراک قوی و حدود نیمی از آنها دانش بالایی از تغییر اقلیم داشتند. درحالیکه ۷۸/۵ ٪ از پاسخگویان مایل به پیوستن برای اقدام عملی در خصوص مقابله با تغییر اقلیم بودند، حدود یک چهارم، حاضر بودند در راه حل این مشکل از منافع شخصی خود هزینه کنند. نتایج نشان داد بین سه گروه اصلی شغلی مدیران، اعضای هیات علمی و کارشناسان در خصوص رفتار مرتبط با تغییر اقلیم تفاوت معنی‌دار آماری در سطح ۹۹ درصد وجود دارد. همچنین نتایج تحلیل همبستگی تایید کرد که سطح سواد، دانش تغییر اقلیم و ادراک آن ارتباط مستقیم معنی‌داری با بروز رفتارهای مرتبط با تغییر اقلیم دارد.