KONYA FOOD AND AGRICULTURE
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FARMERS' PERCEPTIONS OF FUTURE DROUGHT: INSIGHTS FROM A SURVEY AND PROBIT ANALYSIS OF KEY INFLUENCING FACTORS

MASTER'S THESIS

Yiğit YAŞAR

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This study titled **“Farmers’ Perceptions of Future Drought: Insights from a Survey and Probit Analysis of Key Influencing Factors”** prepared by Y***t Y***R has been accepted with consensus/majority jury on 13/09/2024 as a **MASTER THESIS** in the DEPARTMENT OF INTERNATIONAL TRADE AND BUSINESS ADMINISTRATION.

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I certify that this thesis which has been accepted by the jury satisfies all the requirements as a thesis for the degree of Master of Science.

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ABSTRACT

FARMERS' PERCEPTIONS OF FUTURE DROUGHT: INSIGHTS FROM A SURVEY AND PROBIT ANALYSIS OF KEY INFLUENCING FACTORS

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Master of Science Thesis, Department of International Trade and Business
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This study examines drought perceptions, awareness, and the precautions of farmers in 11 districts of Konya province, Türkiye. Data were collected using a structured questionnaire conducted face-to-face over one year with farmers growing crops such as barley, sunflower, wheat, carrot, and sugar beet. The questionnaire included both closed and open-ended questions, providing a combination of quantitative data and qualitative insights. Frequency analysis was employed to analyze the data and present descriptive statistics, assisting in identifying key patterns and trends regarding farmers' perceptions of and precautions for drought. The findings reveal participants' awareness and attitudes toward drought, as well as the most commonly deployed drought mitigation techniques. Relatedly, the results of the Probit Model revealed that education, social media, household size, irrigation, keel irrigation, and job satisfaction The participants also addressed drip irrigation and reduced water consumption as precautions that they took. This research provides valuable insights for policymakers and stakeholders aiming to enhance drought preparedness in the region. The findings highlight the need for targeted interventions and support mechanisms to maintain agricultural productivity and mitigate the effects of drought in Konya while also underscoring the prerequisite for raising awareness of drought among farmers.

Keywords: Konya, Disaster Management, Drought, Drought Perception, Agricultural Sustainability, Probit Analysis

ÖZET

ÇIFTÇILERIN GELECEK KURAKLIK ALGILARI: BIR ANKET VE PROBIT ANALIZI ILE ANAHTAR ETKILEYEN FAKTÖRLER ÜZERINE İÇGÖRÜLER

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Bu çalışma, Türkiye'nin Konya ilinin 11 ilçesindeki çiftçilerin kuraklık algılarını, farkındalıklarını ve aldıkları önlemleri incelemektedir. Veriler, arpa, ayçiçeği, buğday, havuç ve şeker pancarı gibi ürünler yetiştiren çiftçilerle bir yıl boyunca yüz yüze yapılan yapılandırılmış bir anket kullanılarak toplanmıştır. Ankette hem kapalı hem de açık uçlu sorular yer almış ve nicel veriler ile nitel bilgilerin bir arada sunulmasını sağlamıştır. Verileri analiz etmek ve tanımlayıcı istatistikleri sunmak için frekans analizi kullanılmış ve çiftçilerin kuraklık algıları ve önlemlerine ilişkin temel kalıp ve eğilimlerin belirlenmesine yardımcı olunmuştur. Bulgular, katılımcıların kuraklığa yönelik farkındalık ve tutumlarının yanı sıra en yaygın olarak kullanılan kuraklıkla mücadele tekniklerini de ortaya koymaktadır. Bununla bağlantılı olarak, bu çalışmanın bulguları katılımcıların demografik bilgileri (yaş ve gelir gibi) ile kuraklık konusundaki farkındalıkları arasındaki ilişkiyi ortaya koymuştur. Analizde din, kuraklık algısını etkileyen önemli bir unsur olarak öne çıkmıştır. Katılımcılar damla sulama ve su tüketimini azaltmayı aldıkları önlemler arasında göstermiştir. Bu araştırma, bölgede kuraklığa hazırlığı artırmayı amaçlayan politika yapıcılar ve paydaşlar için değerli bilgiler sunmaktadır. Bulgular, Konya'da tarımsal verimliliği korumak ve kuraklığın etkilerini azaltmak için hedefe yönelik müdahalelere ve destek mekanizmalarına duyulan ihtiyacı vurgularken, çiftçiler arasında kuraklık konusunda farkındalık yaratmanın ön koşul olduğunun da altını çizmektedir.

Anahtar Kelimeler: Konya, Afet, Afet yönetimi, Kuraklık, Kuraklık algısı, Tarımsal Sürdürülebilirlik, Probit Analizi

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Y***t Y***R

September-2024

TEXT OF OATH

The study titled "Farmers' Perceptions of Future Drought: Insights from a Survey and Probit Analysis of Key Influencing Factors", which I presented as a master's thesis, has been written by me without any help that would contradict scientific ethics and traditions, and that the works I have benefited from consist of those shown in the bibliography, and that they have been used by referring to them, and I confirm this with my honor.

13.09.2024

Y***t Y***R

To my family…

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ABBREVIATIONS

AFAD	Disaster and Emergency Presidency
EM-DAT	The International Disaster Database
ÇKS	Farmer Registration System
TAGEM	General Directorate of Agricultural Research and Policies
TKDK	Agriculture and Rural Development and Support Institution
DSİ	General Directorate of State Hydraulic Works

1. INTRODUCTION

1.1. Motivation and Aims

Water has been considered one of the most basic life resources for the life cycle of humanity since the day humanity was born. Water, which is an indispensable element of human life such as drinking, cleaning, agriculture, industry, and energy production, is also vital for the health and diversity of ecosystems (Griebler & Avramov, 2015). However, today, factors such as increasing world population, acceleration of industrialization, and climate change have led to increased use and scarcity of water resources, and as a result, the sustainability of water has become a threat to future generations. Effective management, protection, and sustainability of water is critical for the continuation of humanity.

The flow of water is the flow of life, but when this flow is interrupted by a severe reality such as drought, the importance of water as the most basic source of life for humanity becomes even more evident. Drought can be summarized as an environmental and societal problem that affects the availability of water, such as prolonged absence of precipitation, uncertainty of precipitation, lack of precipitation resulting in water scarcity for human activities, and an increase in human demand (Trenberth et al., 2013). Drought is a major disaster in our world, with increasingly globalized and widespread impacts, with devastating effects on agricultural production, water resources, people's lives, and the environment (Sternberg, 2011).

During droughts, water consumption tends to increase continuously as people and societies try to compensate for the lack of rainfall by using more water for various purposes (Faye, 2022; Layati et al., 2022). In alignment with this increase, one of the biggest challenges faced by farmers during drought periods is the severe depletion of water resources. In agricultural production, the presence of water causes plant growth and development, keeps the soil moist, and increases productivity, and is an important factor affecting human life, such as access to food, income, and the economy of states. The interplay between drought and agriculture surfaces its significant and sometimes destructive impact on our everyday experiences, and the historical record illustrates numerous instances of these destructive outcomes. One of the detrimental results of drought is the extinction of a great civilization such as the Mayans (Hodell et al., 1995). Drought caused the death of 1.5 million people and affected 100 million people in India in 1965-1967 (EM-DAT, 2024) and led to loss of life due to the famine in Somalia (Maxwell & Fitzpatrick, 2012) and Ethiopia (Mulualem et al., 2024).

Türkiye, like most countries in the world, is among the countries that are highly affected by drought. Although the annual rainfall in Türkiye is around 640 mm, it faces water shortage and drought in many regions due to the irregularity in the amount of rainfall (Kapluhan, 2013). The fact that Türkiye ranks first in Europe and tenth in the world in terms of agricultural output shows how important the concept of drought is in the national economy (Ministry of Agriculture and Forestry, 2022. Konya province, which is depicted as the "wheat warehouse" of the Central Anatolia region is the center of our research as well as being one of the most important cities of the country in the field of agricultural production. Konya Basin is the largest land area of the country with a surface area of 40,838 km2, which corresponds to 5.42% of the surface area of 780,043 km2; agriculture is carried out on 18,502,788 decares (Konya Agriculture and Forestry Directorate. (n.d.). According to Farmer Registration System of Türkiye (ÇKS) and Türkvet data in Konya Basin, in 2022, 133,629 farmers are actively working in the agricultural sector. The threat of drought in recent years has had extremely negative impacts on agricultural production, water resources and farmers' incomes in Konya.

The fact that such fertile lands of Konya are affected by drought during the catastrophic days of drought makes disaster management and disaster perception in the region a critical factor affecting the lives of people in the region. The concept of disaster management refers to a management process that includes planning, preparation and recovery activities to minimize the damages that disasters may cause (OECD, 2009; OECD 2023). For Konya's drought response, disaster management have the potential to facilitate the city by providing secure agricultural production and economic stability while protecting both vital and livelihood resources. Farmers' perceptions and awareness of disasters in Konya play an important role in drought preparedness and implementation. Identifying farmers' perceptions of disasters can improve the effectiveness of disaster management against drought and enable them to take more effective and protective measures against drought.

By drawing upon the significance of agriculture in Türkiye’s economic growth and everyday living, the present study attempts to portray farmers’ drought perceptions and preparedness in Konya with the goal of accelerating agricultural practices and sustainability while also contributing to the lasting nature of the world by addressing the dynamics between drought, disaster management, and economic and agricultural sustainability. In order to put the arguments provided on a solid basis, this thesis begins with the theoretical and empirical background of the study in the existing scholarly attempts. In the second chapter, the concepts of disaster, drought, water footprint, disaster management, disaster perceptions, agricultural sustainability, and Türkiye’s policies on agricultural practices are discussed in detail. The third chapter provides information about the data, participants, and data collection procedures, along with the descriptive statistics. The fourth chapter presents the results of the research, and in the final chapter, the findings are discussed, and policy recommendations are given.

1.2. Questions Addressed

Within the scope provided above, this study set out to seek answers to the following questions:

1. How do farmers in Konya perceive drought?
2. What are the factors affecting the farmers’ drought perception in Konya?

In addition to the above questions, some issues were highlighted such as the difficulties faced by the farmers in the region during agricultural production and whether they are open to innovation. These aspects were also addressed to identify and evaluate the perceptions of farmers in the region against drought and to provide information to researchers and policymakers on what kind of studies can be carried out in the region to prevent drought in this region.

2. THEORETICAL AND EMPIRICAL BACKGROUND

2.1. Theoretical Background

2.1.1. Disaster

Disasters are events and situations that cause significant disruptions in the normal life of a community, often exceeding the ability of the affected community to cope using its own resources, resulting in widespread human, material, economic or environmental losses (Al-Madhari & Keller, 1997; Chmutina & von Meding, 2019; Salmoral et al., 2019; Stratton, 2022). While defining the concept of disaster, it has been observed that it varies from region to region or from person to person. The main reason for this is the differences in the hazards and risks faced by different countries (Alam, 2015; Shaluf et al., 2003). Other factors affecting the definition, and its change may vary from country to country depending on cultural, geographical and socio-political factors (Al-Madhari & Keller, 1997). While farmers in Maharashtra region in India defines disaster as no rainfall and little rainfall (Udmale et al., 2014), in Japan they defined it as drought, flood and typhoon (Mori et al., 2021).

In Türkiye, the Disaster and Emergency Presidency (AFAD) defines disasters as "... unexpected and undesirable situations in which communities are under threat, intervention with local means is usually insufficient, national resources must be mobilized, and which cause great loss of life and property" (Gökçe & Tetik, 2012). As in the world, the definition of disaster varies in different settlement regions of Türkiye, although it is not very different. Karataş (2022) conducted a study in Çorum and found that farmers associated the concept of disaster with climate change, drying of water resources and increasing drought. In Hayran et al.'s study (2021) conducted in Mersin region, farmers associated disaster with excessive rainfall, floods and storms while defining the concept. If an event occurs in a region where people do not have interests and does not pose any danger to people, it cannot be considered a disaster (Wisner et al., 2004).

Disasters can be classified according to their types and categories depending on various factors such as their causes, effects and characteristics. In the literature, disasters are generally examined in two groups as natural and human-induced (Halkos, 2015; Baxter, 2002; Tansel, 1995), but in some studies, the hybrid category has been added in addition to natural and human-induced disasters (Shaluf, 2007; Vij 2022). The variation of classifications emerges in the existing literature; however, this study focuses on the categorization of AFAD was taken as a basis since it was conducted in Türkiye and the sample group included participants being affected from the occurrences happening in this region (see Table 2.1.1.).

Table 2.1. Types of Disasters

Natural Disasters			**Man-Made Disasters**	
Geological Disasters	Climatic Disasters	Biological Disasters	Social Disasters	Technological Disasters
Earthquake	Drought	Erosion	Fires	Mining Accidents
Landslide	Hail	Forest Fires	Wars	Industrial Accidents
Rockfall	Hose	Outbreaks	Terrorist Attacks	Transportation Accidents
Volcanic Eruptions	Heavy Snowfall	Insect Infestation	Migrations	Biological, Nuclear, and Chemical Weapons and Accidents
Tsunami	Hurricane			
Mud Flows	Thunder			
Landside	Typhoon			
	Flood			
	Avalanche			
	Blizzard			
	Cyclone			
	Tornado			
	Mist			
	Icing			
	Acid Rain			
	Forest Fires			
	Air Pollution			
	Heat Wave			
	Cold Wave			

Source: Afet ve Acil Durum Yönetimi Başkanlığı [AFAD]. (n.d.)

Table 2.1. demonstrates the classification of disaster proposed by AFAD (Afet ve Acil Durum Yönetimi Başkanlığı [AFAD]. (n.d.)). In general terms, natural disasters are defined as events caused by non-human forces that pose a risk and potential danger to people's lives and property (Alexander, 1993). They can be summarized as events that humans cannot control or influence in any way, such as hurricanes, earthquakes and volcanic eruptions. The earthquake disaster in Türkiye on February 6, 2023, which affected 11 provinces and killed 45,089 people, is one of the biggest examples of natural disasters in the region (AFAD, 2023). The earthquake, centered in Kahramanmaraş province, struck people in their sleep at night. Hundreds of people lost their families, friends and property after the event that people could not control. Another example is the 2004 Indian Ocean tsunami that killed more than 250,000 people and left 1.7 million homeless (Ramalanjaona, 2011).

In contrast to natural disasters, man-made disasters are disasters caused by human error, negligence or intentional actions and are caused by human activities rather than natural forces (Salmon, 2004; Shaluf, 2003). In man-made disasters, the Chemical Spill Disaster varies in frequency according to regional chemical production, level of development and human errors. In Europe, which has a strong chemical production capacity, 32 chemical spills were reported in Europe, 51 in the Americas and 20 in Asia. On the other hand, 1 chemical spill was reported in Oceania and 4 in Africa. Another example is industrial accidents caused by factors such as occupational safety violations, technical failures, maintenance deficiencies, lack of training and human activities (Wagenaar et al., 1990). There were 89 industrial accidents in Asia, 16 in Africa and 15 in the Americas, which have strong industrial production capacity whereas there were 5 industrial accidents in Europe and 1 industrial accident in Oceania (see Table 2.2.).

Chernobyl nuclear power plant disaster, having occurred in 1986 in Ukraine, is an example of man-made disaster which was caused by a combination of design flaws, operator error and inadequate safety measures (Cardis & Hatch, 2011). Another example is the 301 miners who lost their lives as a result of the explosion and fire that occurred in the coal mine in Soma district of Türkiye due to insufficient occupational safety, lack of supervision and failure to provide conditions suitable for worker health (TMMOB, 2014).

Table 2.2. Types of Disasters and Their Distribution between 1900-2024 across the Continents (Adapted from EM-DAT Database)

		Africa	Europe	America	Asia	Oceania	Total
Natural Disaster							
	Earthquake	75	205	326	954	58	1618
	Flood	1243	693	1391	2466	161	5954
	Volcanic Activity	21	12	96	112	33	274
	Drought	362	51	177	190	35	815
Man-Made Disaster							
	Industrial Accident	16	5	15	89	1	126
	Oil Spill	0	2	4	2	0	8
	Chemical Spill	4	32	51	20	1	108
	Poisoning	6	10	10	50	0	76

Source: EM-DAT (2024)

As evident in Table 2.2., the distribution of disasters has never been uniformed across the five major continents (Eshghi & Larson, 2008). The frequency of occurrence of disasters in a region depends on many factors, including geophysical, hydrological, meteorological, meteorological, climatological, biological, environmental, economic and sociopolitical considerations (Chaudhary & Piracha, 2021). Table 2.2. shows the numbers and dates of disasters between continents reported in the International Disaster Database (EM-DAT) between 1900 and 2024. According to the data in Table 2.2., the number of disasters varies according to the characteristics of the region and the probability and number of potential disasters. Within the framework of natural disasters, 205 earthquakes have been recorded in Europe, 326 in the Americas and 954 in Asia since 1900. On the other hand, 75 earthquakes occurred in Africa and 58 in Oceania. Regions along fault lines are more susceptible to earthquakes and the frequency of earthquakes is higher in this region (Shi et al., 2018).

Flooding is a natural disaster that occurs as a result of rivers, streams, dams, tropical storms, and hurricanes (Kundzewicz et al., 2013). During the formation phase, many regional factors can increase the occurrence of disasters, but it has been observed that this is not the same in every continent. 2466 floods were recorded in Asia, 1391 in the

Americas and 1243 in Africa, while 693 floods were recorded in Europe and 58 in Oceania (see also Shen et al., 2018).

Volcanic activity is an example of the regional characteristics of disasters being a contributing factor in their formation. There were 112 volcanic activities in Asia, 96 in America and 33 in Oceania. On the other hand, there were 12 volcanic activity disasters in the European continent and 21 volcanic activity disasters in the African continent since there are not many active volcanic mountains.

Drought disaster, which is one of the main topics of our thesis, depends on the climatic factors of the region, even with many factor components. In line with these climatic factors, 362 drought disasters were recorded in Africa, 177 in the Americas, 190 in Asia, 51 in Europe and 35 in Oceania.

Disasters, whether natural disasters or man-made disasters, do not occur in the same amount in every region, and the number of occurrences varies depending on regional characteristics and factors (Widodo et al., 2022). While earthquakes last seconds, disasters such as drought and chemical spills can last days, months and years. In addition, socioeconomic factors such as income inequality, poverty and access to resources also contribute to shaping both natural and man-made disasters in different dimensions (Brecht et al., 2013).

2.1.2. Drought

Water is an invaluable resource for human life, not only as a basic source of food for human life, but also for growing food, producing household needs and generating energy (Acreman, 2001). Approximately 97.5% of the water on the earth's surface consists of salty water that is not suitable for consumption and production. The remaining 2.5% is mostly composed of glaciers and geological strata. The amount of clean water available for human use constitutes 0.10% of the total amount of water (MGM, n.d.). Such scarce water resources have continuously changed the ways and amounts of people's utilization of water resources since creation. For example, one of the biggest reasons why the Egyptian Civilization, Sumerians, Babylonians, Assyrians were established close to a productive water source is that they were near rivers (Ashraf et al., 2022). Rivers such as the Tigris and Euphrates provided one of the basic needs of great civilizations in ancient times, allowing them to grow agricultural products and support large populations in addition to water resources (Altaweel, 2019). Water consumption has increased in the last century with the development of various factors and the emergence of new uses (Kummu et al., 2016). These factors include population growth, economic development, industrialization, changes in agricultural production methods and changes in lifestyles (Mishra & Singh, 2010; Nhapi & Savenije, 2007). In 2019, the United Nations (UN) World Water Development Report highlighted unlimited and unjust economic growth and high population growth rates as the main causes of drought (Okeke, 2015). The rapid consumption of water in the last century shows that it is on its way to becoming a scarce resource by constantly increasing water stress (Manavoğlu, 2007). According to the data announced by the UN, the amount of water consumption, which was 16,800m3 in 1950 and 7,300m3 in 2000, will decrease to an estimated 4,800m3 in 2025 (Manavoğlu, 2007). In a country like Türkiye, which is rich in water and nature, the amount of freshwater consumed per capita in 2024 decreased to 1,297 m3 (State Hydraulic Works [DSİ], 2024).

Increases in temperature and ever-increasing precipitation variability due to anthropogenic climate change are increasingly posing major threats to the amount of water available for use on the earth (Baez, 2019; Dai, 2013). This threat is coupled with prolonged periods of erratic and low precipitation, resulting in significant ecological impacts (Bernardo et al., 2015; Fan et al., 2014). The reciprocal relationship between climate change and the depletion of water sources ultimately aggravates drought and makes it a crucial element mutually integrated system. Accordingly, the global definition of drought can be summarized as an environmental and societal problem that affects the availability of water, such as prolonged absence of precipitation, uncertainty of precipitation, lack of precipitation resulting in water scarcity for human activities, and increased demand (Trenberth et al., 2013).

Water consumption shows a continuous increase as people attempt to find different solutions for the lack of rainfall and use more water for various purposes (Faye, 2022; Layati et al., 2022). This behavior of people and societies can worsen the situation of limited water resources and exacerbate drought impacts. Therefore, the discursive relationship between drought and water consumption has become evident, further revealing the aggravation of water resources (Wada et al., 2013). Keshavarz (2013) conducted a study in the Morocco region of Iran, which has been facing severe drought for a long time, and it was observed that people turned to the use of groundwater after the decrease in surface water resources used for agricultural production. Subsequently, it was observed that the overuse of water resources in the region led to the gradual drying up of underground resources. Increased water consumption during droughts can worsen already limited water resources and exacerbate the effects of drought (Faye, 2022).

Drought is a widespread phenomenon that affects many sectors of society around the world and can reach beyond the region where drought occurs (Kogan, 1997). Drought should not be seen only as a physical event or a natural phenomenon (Kapluhan, 2013). Contrary to this, it has a very important impact on societies due to its dependence on water resources that are necessary for people to survive. Among these impacts, there are a wide range of economic, social and environmental impacts that distinguish drought from other natural disasters (Elmahdi, 2008; Elmahdi et al., 2009; Shahid, 2008; Wilhite, 2000).

From an economic point of view, drought can lead to a major reduction in agricultural production as the lack of water leads to inadequate growth of agricultural crops and affects animal health (Layati et al., 2022). This can result in food shortages, higher food prices, and loss of income for farmers (Rosegrant et al., 2009). Drought is a disaster that seriously threatens the energy, industry and water sectors as well as agriculture and animal husbandry (Jenkins, 2013). This situation significantly affects the economic development of countries (Menapace, 2015). With drought threatening the development of the state in such a serious way, states pay more attention to their current development and increase water consumption (Xiao-jun et al., 2012). Drought not only poses a threat to the existing state economy but also disrupts the workflow of people and businesses that do not participate in production activities and causes a high amount of damage (Edwards, 2010). The drought seen worldwide has seriously affected countries that have a large population earning income based on agriculture and adopting an agriculture-based economic development model (Deressa, 2010, Jenkins, 2013; Wheaton & Kulshreshtha, 2017; Xiao, 2012). According to the data announced by the European Commission, the financial loss suffered by the states in the European Union region due to drought in the last 30 years is 139 billion dollars (Jenkins, 2013).

From a social point of view, drought causes human suffering, deaths, difficulties in accessing food, permanent uncertainties (Malhi et al., 2021) and psychological stress due to the increasing amount of debt and workload of farmers, especially for people earning income from the agricultural sector, inability to benefit from health services due to income, family and social conflict, increased marriage age, emotional and psychological distress (Kezhavarz, 2013). Edwards (2014) investigated the mental consequences of drought in Australia and observed that drought causes severe mental distress to people and negatively affects human life, even if they are not engaged in agriculture.

Environmental impacts of drought include the reduction and contamination of both surface and groundwater resources (Lubyanova et al., 2023; Wada et al., 2010), drying out of plants and soil while also increasing the risk of forest fires (Littell et al., 2016) and decreasing yields by negatively affecting vegetation (Udmale et al., 2014), all of which can have irreversible impacts on environmental conditions. For example, in 2019-2020, the ever-growing fires in Australia not only affected the natural environment and wildlife, but also severely impacted human life (Lindenmayer & Taylor, 2020).

Drought is one of the most important disasters in our world with increasingly globalized and widespread impacts, with devastating effects on agricultural production, water resources, human life and the environment (Sternberg, 2011). Temperatures, strong winds, low relative humidity, abnormal changes in rainy days during growing seasons, amount, intensity and duration of rainfall are among the most important factors affecting the occurrence of drought (Mishra & Singh, 2010). Drought disasters can occur in different parts of the world and be caused by various reasons, but coping capabilities may vary depending on the region's vulnerability and preparedness (Algur et al., 2021; Quandt, 2021). In this direction, drought can be seen in all climate types of the world, but its effects and negativities show differences according to these factors. In the table below (Table 2.3.), some important drought events in the world are given according to the official records of the states of disasters from 1900 to 2024.

Table 2.3. Droughts between 1900-2024 and Their Impacts (Adapted from EM-DAT Database)

Beginning	End	Continent	Country	Died	Affected
1910	1914	Africa	Niger	85000	32000
1920	1920	Asia	China	500000	20000000
1921	1921	Europe	Soviet Union	1200000	5000000
1928	1928	Asia	China	3000000	Unknown
1943	1943	Asia	Bangladesh	1900000	Unknown
1965	1967	Asia	India	1500000	100000000
1967	1969	Oceania	Australia	600	Unknown
1983	1984	Africa	Ethiopia	300000	7750000
1983	1983	Americas	Brazil	20	20000000
1987	1987	Asia	India	300	300000000
1988	1988	Asia	China	1400	49000000
1988	1992	Africa	Madagascar	200	950000
1997	1997	Asia	Indonesia	672	1065000
1997	1998	Oceania	Papua New Guinea	60	500000
1999	2002	Africa	Kenya	85	23000000
2001	2001	Americas	Guatemala	41	113596
2002	2002	Africa	Malawi	500	2829435
2006	2006	Asia	China	134	18000000
2010	2011	Africa	Somalia	20000	4000000
2019	2019	Asia	Pakistan	77	4680912
2023	2023	Americas	United State	247	Unknown

Source: EM-DAT (2024)

The examples in the table above take into account the numbers of people affected and dying. Table 2.3. shows a period of massive and devastating famine in the Ukrainian region of the Soviet Union beginning in 1921. The main causes of the famine were severe drought, economic impotence and the Russian civil wars, which greatly affected agricultural production (Dalrymple, 1964; Siegelbaum, 2016). According to EM-DAT data, 1,200,000 people died in the 1921 drought in the Soviet Union and 5,000,000 people were severely affected by the drought, although the data varies in the sources after the current drought, economic difficulties and the impact of the civil war. This is not the number of people who died in the war, but the number of deaths caused by food shortages and the effects of drought.

Table 2.3. shows that between 1965 and 1967, India experienced a devastating famine resulting in starvation and death. One of the main causes of this famine was drought (Brass, 1986; Ferrier, 2005; Greenough, 1976). After the drought, agricultural production was heavily affected in this region, and as a result of the government's policy of exporting grain (Daryanto et al., 2016), 1,500,000 people died and 100,000,000 people were heavily affected by the famine. This table is based on precise data from EM-DAT prepared as a result of a rigorous analysis of reports obtained from governments and research institutions; however, different sources may present various arguments regarding the number of people killed and affected.

The 1987 drought in Ethiopia, shown in Table 2.3., was a devastating humanitarian crisis that affected hundreds of thousands of people, and one of the most important causes of this devastating humanitarian crisis was drought (for further details, see Kassaye et al., 2020; Mulualem et al., 2024). As a result of the famine, agricultural production and animal husbandry were heavily affected and people were highly affected due to various disaster-related events such as food and water shortages and diseases. According to EM-DAT records, 300,000 people lost their lives due to the effects of drought and 7,750,000 people were heavily affected by drought.

The 2010-2011 drought in Table 2.3. is a disaster with the highest number of deaths and affected people in the last century according to recent data. The drought in Somalia is a widespread and devastating event with serious impacts on the country's population and environment (Maxwell & Fitzpatrick, 2012). The causes of drought in Somalia can broadly be seen as a combination of climate change, population growth, overgrazing and forest scarcity but one of the most important causes is the drastic reduction of water availability in the region due to rising temperatures and changing rainfall (Van der Molen et al., 2011). According to official figures, 20,000 people died in Somalia and more than 4,000,000 people were affected. According to the data provided by the state in this region, the number of losses is estimated to be between 130,000 - 260,000.

Drought is a widespread phenomenon that affects many sectors of society, including economies around the world (Lund et al., 2018), and can reach beyond the drought-affected region (Kogan, 1997). In today's world, with the development and ease of communication and transportation networks, the effects of drought have begun to spread beyond the drought-affected region. For this reason, drought should not be analyzed in a single dimension, and it has been observed that the effects of drought affecting a state like Australia, which is a strong agricultural supplier and a powerful state in the international commodity market, can also seriously affect other countries (Kiem & Austin 2013). Of all the natural disasters of the 20th century, drought has caused the greatest damage (Bruce, 1994), and this can be said not in any specific region but worldwide.

Drought has a significant impact on agricultural production (Alauddin & Sarker, 2014; Jenkins, 2013). In a region experiencing drought, rainfall decreases and becomes erratic, and water resources are rapidly depleted (Elhang & Zhang, 2018). During drought, the lack of water availability can directly affect the growth and development of crops (Milovančević et al., 2024, Salehi-Lisar & Bakhshayeshan-Agdam, 2020). Since farmers need to maintain appropriate soil moisture levels for optimum yields of an agricultural crop, the combination of rainfall and rainfall instability in agricultural production and other effects of drought will increase farmers' consumption of surface and groundwater resources (Nhemachena et al., 2020; Siebert et al., 2010) Groundwater is the most important source of irrigation for the agricultural sector in times of water scarcity, as the levels of surface water resources are constantly decreasing due to rainfall and other conditions during drought (Dou, 2016; Gómez & Blanco, 2012). Furthermore, crops can become vulnerable if they are not adequately irrigated, and drought and disease outbreaks can increase (Liu & Liu, 2016). This important relationship between drought and water highlights the vulnerability of agricultural systems to drought and emphasizes the need for effective drought monitoring, forecasting, and mitigation methods (Hao et al., 2017).

2.1.3. Water Footprint

The concept of water footprint is an important indicator for understanding water consumption in agricultural production and has a significant role in crop production

(Hai, 2020; Lovarelli et al., 2019). This notion explains the water use of consumers and producers in agricultural production, industrial production and household water consumption (Vanham & Bidoglio 2013). The water footprint takes into account both the amount of water used directly and the amount of water used in the raw material production process and for waste disposal (Hoekstra, 2017). The concept of water footprint was developed jointly by the University of Twente and the Water Footprint Network (WFN) (Turan, 2017). To summarize, water footprint is the quantitative measurement of the amount of freshwater used and polluted by individuals, communities, and businesses to produce and consume goods and services while producing a product (Chapagain, 2018). The water footprint consists of three different components (1) blue water, referring to surface and groundwater that is consumed and polluted; (2) green water regarding rainwater and soil moisture used by plants, and (3) gray water pertaining to freshwater polluted during various production and industrial processes. This concept is of great importance in understanding and managing the limited number of freshwater resources in our world (Chapagain, 2017). It provides opportunities to measure and report the water consumption of freshwater resources in the sector, evaluate their potential and environmental impacts, and find solutions for sustainable water use (Jeswani & Azapagic, 2011).

Water footprint is crucial for understanding and managing the state of the agricultural sector. By measuring the water footprint of the processes of agricultural production activities, the water footprint helps us to assess whether water use in production can be optimized and reduced (Wilhite et al., 2007). The water footprint directly affects the yield and agricultural productivity of the products produced in the agricultural sector (Yang et al., 2020). In this way, it can help develop strategies and policies to mitigate the effects of drought and ensure sustainable water management.

According to Türkiye's water footprint data calculations, 80% of production and consumption depends on freshwater resources (Turan, 2017). 89% of this consumption belongs to the agricultural sector (WWF, 2014). The water footprint, which measures the amount of water consumed per unit of agricultural product produced, provides important data to assess agricultural productivity and resource management (Fu et al., 2019). Investigating the water footprint is especially important in recognizing drought in agricultural production, determining the measures that can be taken against drought, protecting groundwater resources and preventing water scarcity.

Konya basin is a city that is heavily affected by drought and has intensive agricultural production (Sarış & Gedik, 2021). With the information provided by the concept of water footprint to the Konya region, it can support people engaged in agricultural production to obtain information and to understand the perception of drought and water perception in the development of activities carried out to gain drought perception. The farmers in the region where the research was conducted receive irrigation information from family elders or people from whom they learned agriculture. Since most of this information is old and based on experience, it is used uncontrollably to increase the amount of income.

The data in Table 2.4 below shows the monthly amounts of water footprint measurements of the 10 most produced agricultural crops in Konya province. These crops include Barley (Winter), Sunflower, Wheat (Winter), Beans (Dry), Carrot, Lentil (Green), Corn (Grain), Chickpea (Summer), Sugar Beet, Clover (TAGEM, 2017).

As indicated in Table 2.4, the irrigation requirement of sugar beet in June is 228 mm. While 7.6 mm of this irrigation requirement is met from green water footprint sources such as rain and dew, 220.4 mm is met from aboveground and underground water sources, which are blue footprint sources. Another sunflower plant provides 6.3 mm of the 181 mm of water it needs in August from green water sources, while the remaining 174.7 mm is provided from blue water sources. As given in these two sample crops, surface and groundwater, which are called blue water sources, are very important for the production of these crops in the region. In contrast to these two crops, green water resources are sufficient for Barley (Winter) production in November and December. For Wheat (Winter) production, 17 mm of green water in January is sufficient. This shows that the green water footprint is not sufficient for the agricultural products produced in the region and that the underground resources in the region are seriously depleted.

Table 2.4. Calculation of Green and Blue Water Trail of the Most Produced Crops in Konya Region Based on Monthly Precipitation Data

		Barley (Winter)	Sunflower	Wheat (Winter)	Beans (Dry)	Carrot	Lentil (Green)	Corn (Grain)	Chickpea (Summer)	Sugar beet	Clover
Jan	G	17	0	17	0	0	0	0	0	0	0
	B	0	0	0	0	0	0	0	0	0	0
Feb	G	28.8	0	28.8	0	0	0	0	0	0	0
	B	1.2	0	1.2	0	0	0	0	0	0	0
Mar	G	29.7	0	29.7	0	0	0	0	0	0	0
	B	36.3	0	36.3	0	0	0	0	0	0	0
Apr	G	31.8	8	31.8	0	0	0	0	23	23	31.8
	B	74.2	0	74.2	0	0	0	0	0	0	28.2
May	G	43.4	43.4	43.4	35	43.4	43.4	39	43.4	43.4	43.4
	B	96.6	14.6	103.6	0	4.6	15.6	0	30.6	19.6	109.6
June	G	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2
	B	2.8	144.8	63.8	97.8	95.8	133.8	86.8	132.8	134.8	131.8
July	G	0	7.6	0	7.6	7.6	7.6	7.6	7.6	7.6	7.6
	B	0	214.4	0	210.4	191.4	190.4	217.4	178.4	220.4	182.4
Aug	G	0	6.3	0	6.3	6.3	6.3	6.3	6.3	6.3	6.3
	B	0	174.4	0	179.7	169.7	49.7	197.7	67.7	194.7	150.7
Sep	G	0	13.4	0	13.4	13.4	13.4	13.4	13.4	13.4	13.4
	B	0	24.6	0	16.6	56.6	0	91.6	0	110.6	97.6
Oct	G	29.6	0	29.6	0	0	0	8	0	24	0
	B	4.4	0	4.4	0	0	0	0	0	0	0
Nov	G	17	0	17	0	0	0	0	0	0	0
	B	0	0	0	0	0	0	0	0	0	0
Dec	G	13	0	13	0	0	0	0	0	0	0
	B	0	0	0	0	0	0	0	0	0	0

G: Green Water B: Blue Water

Source: TAGEM and Türkiye Meteorological Directorate

The relationship between drought and water has gained increasing importance in academic studies in the last century and it has been seen that drought as a disaster affects people very seriously. Some studies in the world literature have revealed that drought in India has severely threatened water scarcity in the country and has caused many negative effects such as high-income losses, especially for people earning income from the agricultural sector (Famiglietti, 2014; Roy et al., 2022; Sikka et al., 2020; Udmale et al., 2014). In addition to similar results, after the effects of drought, Bangladesh has caused flooding and contamination of groundwater resources (Alam, 2015; Alauddin et al., 2014). Similarly, in the US state of California, it caused groundwater to mix with seawater and reduced the quality of water (Langridge & Daniels, 2017). In addition to similar results, in the Mediterranean region, especially in the Sa Pobla basin, Spain, island regions without groundwater threatened to almost end agriculture (Candela et al., 2012). In another study, in addition to similar results, it was observed that family unity and social structure were affected more in Iran than in other regions (Goodarzi et al., 2016; Keshavarz et al., 2013; Zarafshani et al., 2012). In addition to these results, studies conducted in the Australian region have also shown that international commodity prices have changed and there is a danger of supply chain disruption (Kiem & Austin, 2013; Udmale et al., 2014).

Most farmers in developing and undeveloped parts of the world earn most of their income from agricultural production. It is incomplete to state that only agricultural water consumption increases the consumption of surface and groundwater. Continuous population growth, improved technologies and production methods, improved quality of life, increased demand for food, and growing energy needs are increasing the stress on groundwater in the world (Famiglietti, 2014; Konikow & Kendy 2005B). Implementing the right disaster management mechanism or practice to mitigate the effects of drought and to produce a sustainable solution to water consumption is important for a sustainable life.

2.1.4. Disaster Management

The term disaster management is a management process that covers planning, preparation, response and recovery activities to minimize the damages caused by natural and man-made disasters (OECD, 2009; OECD 2023; Shang & Xiong 2021). These processes are crucial for the protection of life processes and livelihoods of individuals, communities and entire nations (Cuny, 1992; Sharma, 2003). Disaster management is therefore crucial for people to be able to assess the challenges and consequences of disasters (Coppola, 2015).

Disaster management plays a critical role in the perception and prevention of drought (Vasvári, 2015; Wilhite, 2016). If effective disaster management strategies are implemented, communities can proactively prepare for drought and take measures to mitigate its impacts (Sharma, 2003). Drought mitigation strategies generally include measures such as developing drought early warning systems, implementing drought monitoring and forecasting tools, promoting water conservation and management practices, and providing both financial and moral support and resources to affected communities during drought periods (Global Water Partnership & Integrated Drought Management Programme, 2023). By focusing on disaster management methods, decision-makers can better understand the risks and vulnerability associated with drought (Khan et al., 2017; Shang & Xiong, 2021).

Many researchers have found that food security risk is increasing (Famiglietti, 2014; Keshavarz et al., 2013; Roy et al., 2022; Shang & Xiong 2021). Without appropriate disaster measures, the availability of food products produced by farmers and agricultural communities may decrease at high risk, resulting in human and economic losses (Misra, 2014).

The concept of disaster management should not only be considered in the context of food security. The human population in most developing or undeveloped countries depends on income from the agricultural sector (Roy et al., 2022). For example, most people living in India depend on agriculture for their income, and in the event of a drought, almost all of them will either lose their income or lose it completely (Sikka et al., 2020). Farmers in economic distress will tend to abandon production and migrate in search of new jobs (Ashraf & Routnay, 2013; Keshavarz et al., 2013; Sikka et al., 2020). Effective disaster management can quickly support farmers to resume their livelihoods and agricultural activities, and thus agricultural production can be a solution for both the economy and the food crisis in the long term (Vitale, 2018).

In disaster management, it is crucial not only for human food security and food crises, but also to protect the availability of water. Water strategies in disaster management play a critical role, especially in the context of agricultural production (Kannan & Anandhi 2020). Effective water management practices have a great impact on disaster risk reduction in agricultural communities (Kansal & Suwarno, 2010; Rey et al., 2017). On the other hand, effective disaster management strategies help to reduce the impact of these events on the environment and minimize their ecological damage (Srinivas & Nakagawa, 2008). As a result, the integration of disaster management in agriculture is crucial to ensure the livelihoods of people around the world, food security, environmental sustainability and to take action against unexpected adverse events such as droughts that may occur in the agricultural sector (Farooq et al., 2023).

Failure to manage disasters can have devastating consequences for a region. It is very important that multiple regional actors take responsibility for disaster management, such as government agencies, non-governmental organizations, entrepreneurs and agricultural experts (Brammer, 1982). In most studies in literature, it is very important that the organization and community engaged in disaster management activities have a sense of trust by farmers (Hanifa et al., 2019; Madramootoo, 2012; Marshall, 2020; Power, 2014; Wachinger et al., 2012) because farmers are one of the main actors of disaster management strategies such as ensuring food security and maintaining access to livelihoods during and after the disaster (Alam, 2015; Jumiyati et al., 2021). In addition, farmers play a critical role in disaster management due to their knowledge and expertise in agricultural practices (Tingsachali, 2012). They are the first responders during disasters and have the necessary skills and resources to quickly assess the impact of the disaster, perceive the extent of the disaster, organize emergency measures, and provide support to affected communities (Li et al., 2020). (Li et al., 2020) Therefore, farmers' participation, cooperation and support in disaster management strategies and practices are crucial for successful disaster management and effective recovery efforts (Brammer, 1982).

2.1.5. Disaster Perception

There is a powerful link between the concepts of disaster perception and disaster management because both play an important role in understanding and effectively addressing disasters (Quarantelli, 1988; Simon et al., 2015). Disaster perception generally refers to the way individuals perceive, interpret, and make sense of disasters, including their potential risks, their impact on society and the environment, and the probability of occurrence (Khan et al., 2020; Shi et al., 2020). Disaster perception has an important role in shaping individuals' behavior, decision-making, and preparedness processes in the face of disasters (Pennings & Grossman, 2008).

Factors affecting disaster perception vary from person to person and from region to region (Alam, 2015). Factors such as previous experiences, cultural background, media influence, level of education, trust in authorities, and religion of the individual shape the disaster perception of individuals (Nurjanah & Rezza, 2021). During a disaster, people may experience a wide range of emotions that will affect their perceptions and reactions, and the result of this is reflected in human activities.

People's previous experiences are an important factor in shaping their perception of drought and its impacts (Manandhar et al., 2015). Experiencing water scarcity, agricultural losses and disease can improve people's understanding of the severity and consequences of drought (Al-Khafaji & Al-Ameri, 2021; Kiem & Austin, 2013; Khan et al., 2017; Menapace et al, 2015; Wachinger et al., 2012). A person may have an experience of groundwater depletion, food shortages and reduced income, but if they have no experience of flooding due to drought impacts, they may have a low perception of taking any precautions or preparation for flooding.

People's cultural background is another important factor in shaping the perception of drought and its impacts (Evans et al., 2015; Ashraf & Routnay, 2013). The social values, symbols, history and ideology of the region in which people live have a great impact on drought perception (Mañez et al., 2016). An example of this is that farmers constantly pray for rain against drought. In various cultures, rain prayer can be seen as a kind of ritual performed with certain rituals to the ancestor spirit, the forces believed to realize natural events (Polat, 2007).

With the development of technological possibilities in the century we live in, media influence is a very important factor in drought perception (Manandhar et al., 2010). The exposure of farmers to meteorological data (Zarafshani et al., 2012) and climatic events through the media is a factor that positively affects drought perception (Wachinger et al., 2012). For example, in Zarafshani's study (2012) in Iran, it was observed that the lack of proper communication of weather and drought information to the public negatively affected drought perception.

Education level is one of the most researched factors in drought perception in academic studies (Khan et al., 2017). An increase in the level of education of farmers can increase drought perception by enabling them to search for solutions to drought, research and communicate with people about drought (Zarafsha et al., 2012). In many literature studies on climate change and drought perception, it has been stated that the education factor is directly proportional to drought perception and education level (Alam, 2015; Alauddin & Sarker, 2014; Deressa et al., 2010; Edwards et al., 2014; Khan et al., 2017; Keshavarz et al., 2013; Zarafsha et al., 2012).

Trust in authorities or rule-makers is a factor that increases the perception of drought (Peng et al., 2020; Wachinger et al., 2012). As a result of the trust that authorities and state institutions will create in people, people may participate in the information provided by the authorities and the activities implemented by the authorities (Udmale et al., 2010). For example, in a study conducted by Kiem & Austin (2013) in Australia, although the state has a lot of activities and support against drought, people react to state policies and changing water culture as a result of inequalities caused by the state.

Religious views of some people are one of the perceptions that affect drought perception (Ashraf & Routnay, 2013). Religious perception leads people to believe that drought comes as a punishment from Allah (the Creator) and that only Allah can relieve drought (Ashraf & Routnay, 2013; Khan el al., 2017). People who believe that drought is a punishment have a very low perception of drought.

In addition to the factors described above, many more factors can influence the perception of drought by people and farmers in different countries around the world. In general, this means that all the plants that people grow, live, experience, learn from their families and learn from their environment from the moment they are born shape the perception of drought. Assuming that these factors are different in almost every person, drought perception may vary.

Accurate drought perception enables individuals and communities to be better prepared for drought, more efficient water consumption, more efficient agricultural production and resource allocation, and more informed decision-making (Hao et al., 2017). It has been observed that understanding the factors affecting disaster perception leads to more positive developments in drought mitigation and adaptation policies and improves the policies of institutions and organizations that make disaster management policies (Kallis, 2008). Understanding the factors affecting people's perceptions of disasters leads to more positive developments in drought mitigation and adaptation policies and improvements in the policies of institutions and organizations implementing disaster management policies (Quarantelli, 1998). In many studies in the literature, the fact that policy makers or rule makers perceive people's perceptions of disasters as uniform and implement policies according to them as uniform has caused the failure of disaster management policies (Alam, 2015; Edwards et al., 2014; Kiem & Austin 2013; Madramootoo, 2012; Manandhar et al., 2013; Udmale et al., 2014; Xiao et al., 2012; Zarafshani et al., 2012.) and the significance of accessing accessing accurate data to fortify policies (Saulnier et al., 2019).

2.1.6. Sustainability in Agriculture

Sustainability, in general terms, is identified as “an approach to development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.” (Aksoy & Kayral, 2022). The concept of sustainability is of critical importance in today's world because agricultural production systems protect the environment, natural resources and long-term livability (Lal, 1991). The relationship between sustainability and agricultural production is crucial to ensure the long-term viability of food systems and the habitability of our planet (Pretty, 2008). With practices such as efficient water consumption and regenerative agriculture, the negative impacts of agriculture on the environment can be minimized and the productivity of agricultural land can be increased for future generations (Branca et al., 2013). Furthermore, sustainability in agricultural production is crucial as it ensures sufficient food production to meet the needs of the growing global population without harming the environment and preserving the availability of natural resources (Velten et al., 2015).

Drought and agricultural sustainability are linked for several reasons. First, drought poses a significant threat to the sustainability of the ecosystem and natural resources in agriculture (Kallis, 2008). It has many impacts such as depletion of both surface and groundwater along with degradation of biodiversity, seriously affecting soil properties for years to come (Copeland et al., 2016). Drought can threaten food security by reducing agricultural production in the region (Roy et al., 2022) and cause income irregularities for both farmers and the economy (Deressa et al., 2010; Keshavarz et al., 2013; Xiao-jun et al., 2012).

Another reason is the excessive increase in water consumption caused by drought (Konikow & Kendy, 2005). Groundwater is one of the only resources to ensure sustainability in agriculture. However, unsustainable use of groundwater leads to depletion of aquifers and environmental damage (Madramootoo, 2012). Farmers have always considered groundwater resources as a sustainable solution to drought, but groundwater use is not a sustainable solution (Alam, 2015; Xiao-jun et al, 2012). Many researchers have investigated sustainability and groundwater use and the consensus is that using groundwater is detrimental to sustainable agriculture, contrary to what farmers say (Alam, 2015; Gómez, 2012; Langridge & Daniels, 2017; Langridge & Daniels, 2017; Roy et al., 2022; Sikka et al., 2020; Xiao-jun et al., 2012). The depletion of water resources and pollution of water resources pose a major threat to human livelihoods. The concept of sustainability in agriculture aims to minimize environmental impacts and ensure the long-term viability and productivity of agricultural systems.

2.2. Türkiye’s Agricultural, Water Resource, and Disaster Management Policies

Türkiye has developed comprehensive and systematic strategies for the management of droughts and other disasters, as well as for the promotion of sustainable agricultural practices. These strategies are implemented in collaboration with a range of public institutions and organizations. The management of disasters and droughts constitutes a pivotal aspect of Türkiye’s endeavors to anticipate and mitigate the effects of such occurrences. In the past, the Disaster and Emergency Management Presidency (AFAD) has sought to enhance its preparedness for both natural and man-made disasters by developing strategies for the reduction of disaster risks (see Disaster and Emergency Management Authority [AFAD], 2016). One of AFAD's primary concerns has been the formulation of emergency response plans, particularly in the context of natural disasters such as drought (Disaster and Emergency Management Authority [AFAD], 2019). The objective of these plans is to guarantee a prompt and efficacious response in the event of a disaster. Among the extant policies, the National Disaster Management Plan occupies a significant position (see Disaster and Emergency Management Authority [AFAD], 2019 for AFAD’s 2019-2023 strategic plan). This plan determines the activities to be undertaken in response to various types of disasters

and provides a comprehensive disaster management strategy. Additionally, drought management strategies have been developed for the protection and effective deployment of water resources, also addressed in AFAD’s strategic plan proposed in Disaster and Emergency Management Authority [AFAD] (2019).
The primary aim of water management policies is to guarantee the effective and sustainable management of Türkiye's water resources. The General Directorate of State Hydraulic Works (DSI) has historically concentrated its efforts on the reinforcement of water infrastructure through the implementation of extensive water projects, including irrigation initiatives and the construction of dams. These projects are of critical importance in terms of supporting agricultural productivity, protecting water resources, and ultimately preventing drought (State Hydraulic Works [DSİ], 2023). Among the extant policies, the National Water Policy is particularly noteworthy (see Ministry of Agriculture and Forestry, n.d.-a). This policy provides a comprehensive framework for the protection and management of water resources. The implementation of drought management and water conservation policies serves to promote the efficient use of water resources, whilst simultaneously enhancing resilience to the effects of water scarcity.

The General Directorate of Agricultural Research and Policies (TAGEM) has an important role in agricultural research and policy development. In the past, agricultural R&D projects and sustainable agriculture policies have been among the focus areas of TAGEM (see the General Directorate of Agricultural Research and Policies [TAGEM], n.d. for an overview). Current policies include agricultural R&D strategies and sustainable agriculture practices. TAGEM develops various strategies to increase agricultural productivity and reduce environmental impacts. In addition, research and projects are carried out on drought and water management issues in cooperation with Konya Soil, Water and Deserting Control Research Institute.

Provincial and District Directorates of Agriculture provide agricultural support and management services at the local level. In these directorates, the aim is to provide consulting services for farmers (see the Konya Provincial Directorate of Agriculture and Forestry, n.d. for details) and develop projects (see the Living Soils Project, n.d.), for an example to raise farmers’ awareness and enhance agricultural production. Current policies include training and awareness raising programs. Trainings and awareness raising activities for farmers aim to improve agricultural practices. In addition, disaster and crisis management practices are carried out at the local level. Furthermore, Agricultural Credit Cooperatives provide financial support and credit facilities to farmers. Agricultural loans and support programs have been among the services offered by these cooperatives. Current policies include financial support and loans. A variety of financial support and credit facilities are offered to farmers operating in the agricultural sector. In addition, support programs are in place to promote sustainable agricultural practices.

Türkiye is implementing a comprehensive and integrated set of policies on water management and irrigation systems. These policies are designed for effective management of water resources, increasing agricultural productivity and ensuring environmental sustainability. The National Water Policy is one of the most important documents in this framework. The National Water Policy aims at the conservation and sustainable management of water resources. Efficient use of water resources, increasing resilience against water scarcity and protection of water quality are among the main objectives of this policy. Drought management includes action plans developed to determine the measures to be taken in emergency situations such as water scarcity. These plans aim at water-saving strategies, the development of alternative water resources, and efficiency in water use while encouraging agricultural practices suitable for drought conditions. Türkiye has developed various systems to monitor and manage water use through the General Directorate of State Hydraulic Works (DSI) and other relevant institutions.

One of the factors affecting the perception of drought is the activities carried out by the state and non-governmental organizations to increase the perception of drought and water management. Improving the financial literacy level of farmers, such as through the “1000 Farmers Endless Prosperity [1000 Farmers 1000 Bereket] program carried out under the leadership of Foder, is very important for farmers to gain awareness against drought, to raise awareness of the financial crises that will be faced when facing drought disaster, and to carry out water management and saving efforts effectively (1000 Çiftçi 1000 Bereket, n.d.). In addition, TAGEM's Drought Action Plan, such as the Drought Action Plan, is very important to raise awareness against drought by ensuring that the state and social institutions act together in a common stakeholder and to provide training and information for drought response. DSI's modernization and feasibility studies for water management and water distribution against drought in the Türkiye Flood and Drought Management Project allow the perception of drought and activities against drought to grow and develop.

Ideas about the future of agriculture envisage significant innovations and improvements in Türkiye's policies on water management and irrigation systems. According to the Strategic Plan proposed by the Ministry of Agriculture and Forestry and comprising 2024-2028, more comprehensive strategies and technologies are attempted to adapt to climate change, protect water resources, and increase efficiency (Ministry of Agriculture and Forestry, n.d.-b). Moreover, the integration of digital technologies and data analytics will provide more effective solutions for water management. These policies and programs enable Türkiye to effectively manage water resources, increase agricultural productivity, and promote environmental sustainability. Strategies implemented on drought and water management issues aim to maintain environmental balance by increasing resilience to the water crisis.

2.3. Empirical Background

The empirical literature on climate change and disaster perception in the world and in Türkiye, which is the study area, is given below. Based on this information, almost all of the empirical studies have tried to identify drought perception in studies around the world. Farmers' information is crucial for the study of drought perception. The causes and actions against drought are similar in almost all drought-based studies. Udmela et al. (2014) surveyed 223 people on their perceptions of socio-economic activities and their impact on the environment. After this research, farmers defined drought disasters as lack of water, irregular and low rainfall, drying up of water resources, atmospheric temperatures and commodity pricing. Similar results were found in studies in different regions in the literature (Ashraf & Routnay, 2013; Çuhadar, 2021; Karataş, 2022; Manandhar et al., 2015; Sevim & Somuncu, 2018). In addition to similar studies, Ashraf & Routnay (2013), while defining drought, associated drought with religion and defined drought as a punishment given to them by the "Religion" factor, not environmental factors. Menapace et al. (2015) found that farmers' perceived risk perception in the long term was more successful than in the short term.

Zarafshani et al. (2012) observed an increase in drought sensitivity of farmers in response to an increase in their educational attainment, which in turn led them to seek different methods to cope with drought. In addition to educational attainment in perceiving drought, Alam (2015) observed that farmers with farming experience, safer land use, access to institutional facilities and electricity are more likely to adopt adaptation strategies against drought and water scarcity. These results are similar to those found by Khan et al. (2017) and Alauddin & Sarker (2014). Kiem and Austin (2013) found that people in the study area suffered from water shortages during droughts and that policy makers did not take drought into account because they were unfair and incompetent.

Deressa et al. (2010), in a study conducted with 1000 farmers on the Nile coast of Ethiopia, stated that they planted trees, protected the soil, planted crops suitable for the soil, and paid attention to irrigation against the negative effects of drought. In addition, Astraf and Routnay (2013) stated in their study that to cope with drought, they also tried to reduce their agricultural inputs, tried to obtain non-agricultural inputs and wanted to migrate. Çuhadar (2021), in his study to determine the drought perceptions of farmers, it was observed that a high number of farmers had the idea of preferring drought-resistant products. In the study conducted by Sevim and Somuncu (2018), they tried to cope with the effects of drought on income by increasing the amount of fertilizer. On the other hand, Manandhar et al. (2015) stated that it should be done by the state that farmers do not have enough power themselves against drought, and in addition, they stated that they stored the most water. An equivalent result is that Çuhadar (2021) concluded that people are concerned about drought, but they are very hesitant to take action. In addition to these studies, Shang and Xiong (2021) observed that the seriousness against natural disasters is low and that insurance is one of the leading policies to mitigate the risk of disasters.

Taken together, the scholarly attempts having been proposed point to the requirement for investigating farmers' drought perceptions and their measures to enhance agricultural activities that possibly result in economic growth and sustainability in agricultural practices. Much has been revolved around the farmers' drought perception in the existing literature embracing significant research studies from different parts of the world. However, despite the significance of Konya as prominent agricultural place, the drought perception of farmers in Konya has yet to be understood. To fill this gap, this study attempts to portray farmers' drought perception in Konya, which can facilitate farming practices and ultimately the economic progress in the region. With an aim to provide a solid explanation and depiction, the following chapter entails information about the dataset, participants, setting, and descriptive statistics.

3. DATA AND DESCRIPTIVE STATISTICS

This study aims to identify farmers' views on the increasing impact of drought, their awareness of drought, and the measures they take, attempting to offer perspectives on agricultural practices, sustainability, and economy. Accordingly, this chapter provides an overview of the dataset and descriptive statistics. The first section includes information about the participants and the setting in which the survey was conducted while the second section of this chapter entails the details about descriptive statistics including participants’ demographic information.

3.1. Data

3.1.1. Participants and Setting

This study was conducted on the perception of drought and the measures taken by farmers in 11 districts of Konya province, which is located in the Central Anatolia Region of Türkiye with high agricultural production. A total of 301 farmers participated in the survey, covering a wide demographic range from 18 to 82 years of age. These farmers cultivate a variety of agricultural crops such as barley, sunflower, wheat, carrots, maize and sugar beet, representing the diverse agricultural practices in the region. A purposive sampling approach was used to select the participants for this survey. In particular, farmers in 11 districts of Konya were targeted based on their significant demographic diversity, wide range of production differences, knowledge and experience in agricultural practices. The sampling strategy can potentially offer multiple perspectives on how drought is perceived by farmers of different demographics. Such a diversity of participants suggests that the study aims to reveal different aspects of farmers' perceptions of drought and the different strategies they use in response.

The province of Konya is located in the middle of the Central Anatolia region of Türkiye where this study was conducted. Konya is known for its rich agricultural heritage with its vast plains and fertile soils, which are described in many textbooks as important places of agricultural production and popularly referred to as wheat granaries. As one of Türkiye's major agricultural centers, Konya has a wide range of agricultural activities, including the cultivation of cereals, pulses, fruits and vegetables. Its climate, already characterized by its own hot and dry summers with meteorological factors such as increasing temperatures and rainfall imbalance over the last century, presents both opportunities and major challenges for farmers in terms of water management and drought resilience, especially with regional variations. In this framework, Konya offers a rich setting for studying the dynamics of agriculture and facing environmental challenges.

3.1.2 Data Collection Procedures

Data for this study was collected through a structured questionnaire that included both closed and open-ended questions to gain a comprehensive understanding of farmers' drought perceptions and adaptation strategies. The survey data was designed to collect quantitative data on various aspects of agricultural practices and drought awareness, as well as qualitative insights into farmers' experiences and solutions to drought. To ensure a high response rate and accurate data collection, the questionnaire was administered face-to-face with highly educated and agriculturally knowledgeable interviewers. This method helped to clarify the questions and ensure that participants fully understood the questions and content, thus increasing the reliability and validity of responses. Face-to-face administration also facilitated the collection of in-depth responses to open-ended questions, providing a rich source of data for analysis. Data collection took place over the course of one year (between 2022 and 2023) and interviews were conducted in participants' villages and local community centers to ensure ease and accessibility for farmers. At the end of the data collection process, a total of 301 questionnaires were collected.

3.2. Descriptive Statistics

This section provides details about the participants' demographic information and statics that highlight the background of the current study. Relatedly, the regarding information is presented with figures and tables to elucidate farmers' agricultural and daily practices that establish the grounds of the thesis.

Figure 3.1. shows the distribution of participants according to districts in the face-to-face survey conducted with 301 farmers in Konya province. The research cite includes Ilgın (62, 21%), Kadınhanı (61, 20%), Karatay (46, 15%), Çumra (35, 12%), Karapınar (19, 6%), Derbent (18, 6%), Akören (17, 6%), Seydişehir (16, 5%), Güneysınır (12, 4%), Yalıhüyük (9, 3%), Cihanbeyli (6, 2%), 11 districts of the regarding city.

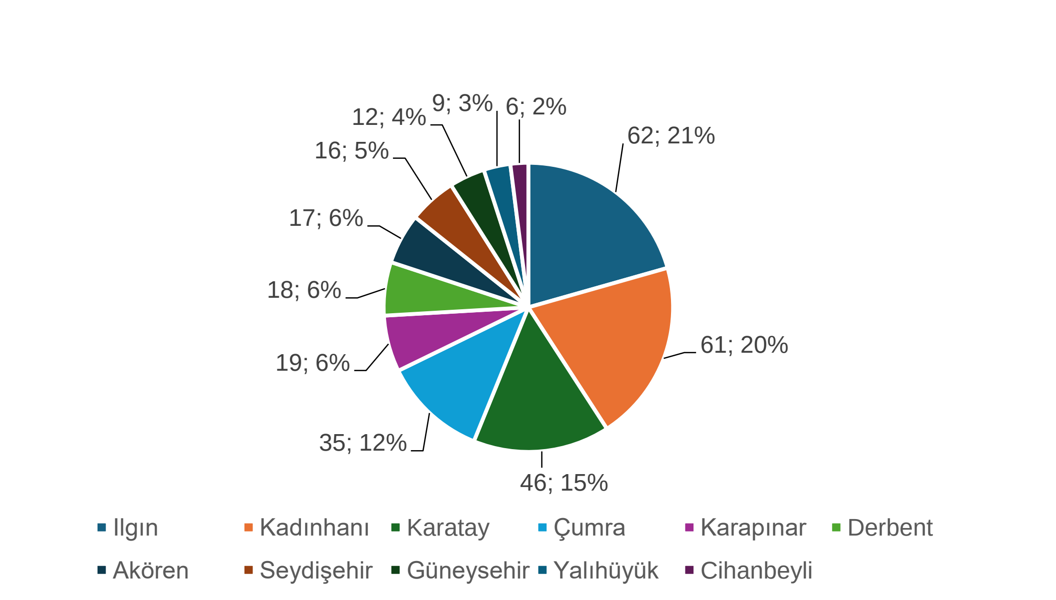

Figure 3.1. Research Scope: Districts in Konya and Participant Distribution

Figure 3.2. further illustrates the age ranges of the participants. The results of the analysis suggested that 10% of the participants are 18-25 years old, 19% are 26-35 years old, 24% are 36-45 years old, 22% are 46-55 years old, 15% are 56-65 years old, 9% are 66-75 years old and the remaining 1% are over 75 years old. The general average age of the participants is 45.

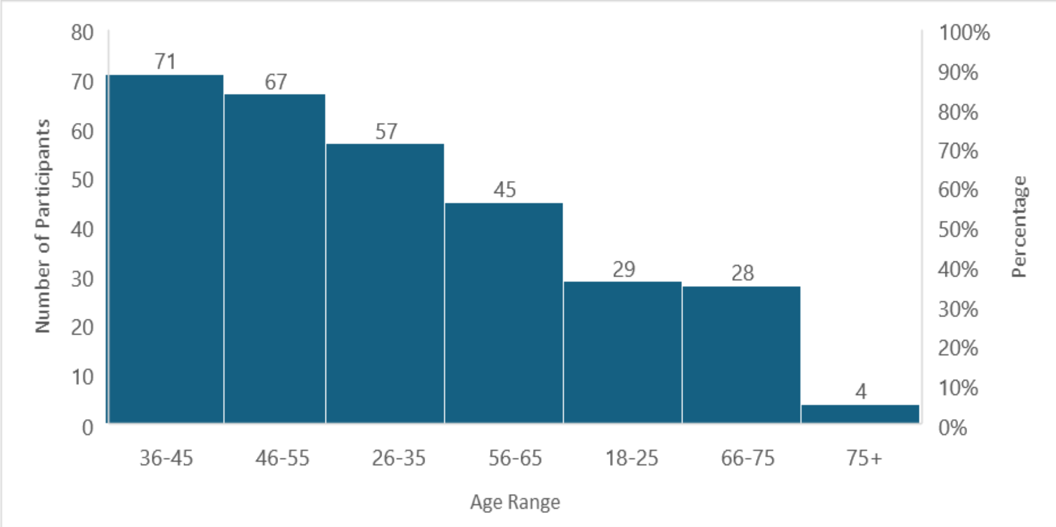

Figure 3.2. Participants' Age Distributions

The marital status of the participants is shown in Figure 3.3. Based on the results of the frequency analysis, 82% of the participants are married, 16% are single, and 2% of the participants are separated from their marriages as "widows".

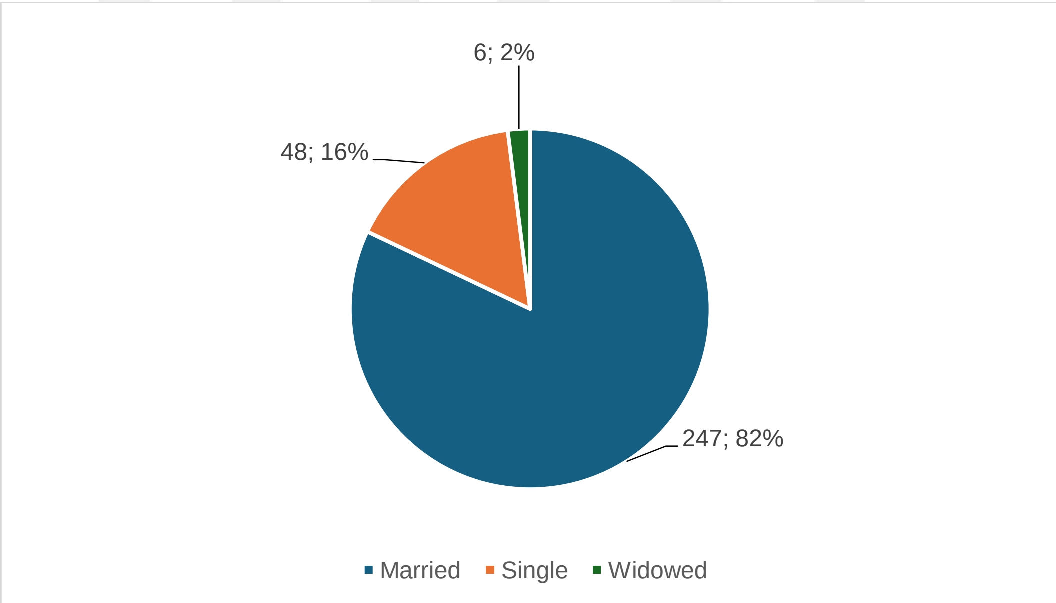

Figure 3.3. Participants' Marital Status

Figure 3.4. illustrates whether the participant received advice and information from someone else while practicing agricultural production. The frequency analysis demonstrated that 73% of the participants planned their agricultural practices on their

own will without consulting anyone else for advice and information, while the remaining 27% consulted someone else for advice and information while engaged in agricultural production.

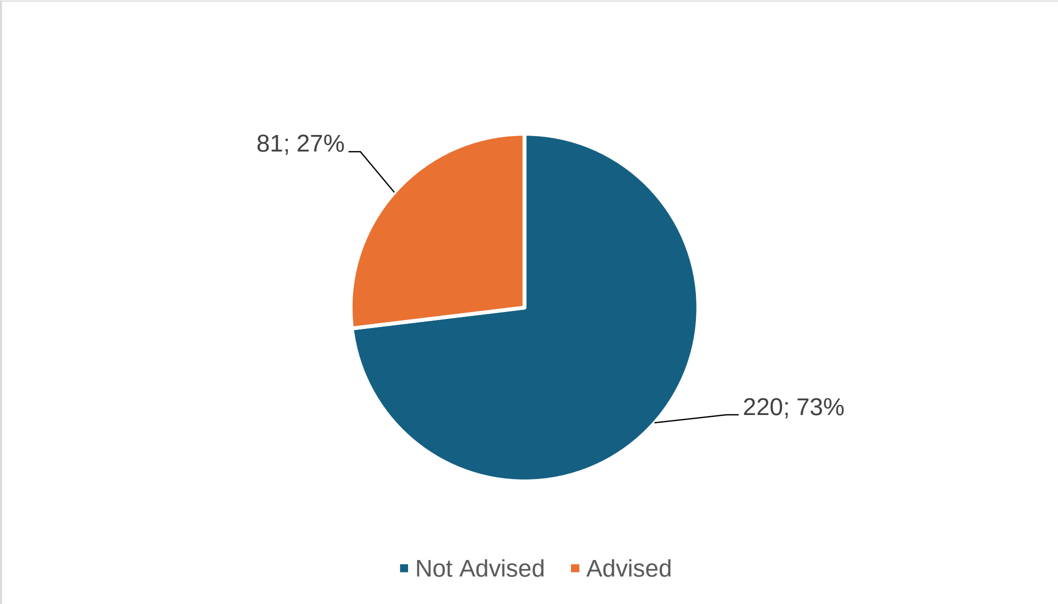

Figure 3.4. Percentage of Participants Consulting Other Farmers or Professionals

Figure 3.5. includes participants' answers for whether they burn stubble in their fields. The frequency analysis showed that 97% of the farmers do not burn stubble and the remaining 3% burn stubble. This may indicate that most farmers are practicing a more sustainable agricultural production without using stubble burning.

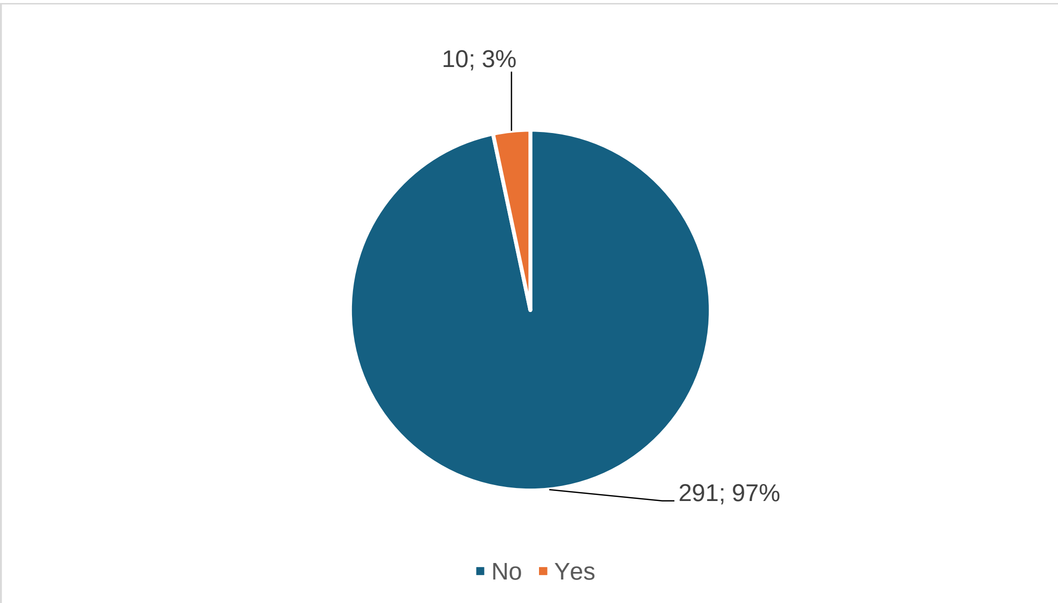

Figure 3.5. The Rate of Crop Residue Burning on Participants' Fields

Figure 3.6. demonstrates the information obtained about whether the participants irrigate their fields or not. The frequency analysis revealed that 71% of the farmers irrigate their fields and 29% do not irrigate their fields. The results hold premises for the significance of water use for the majority of agricultural production areas in the Konya region.

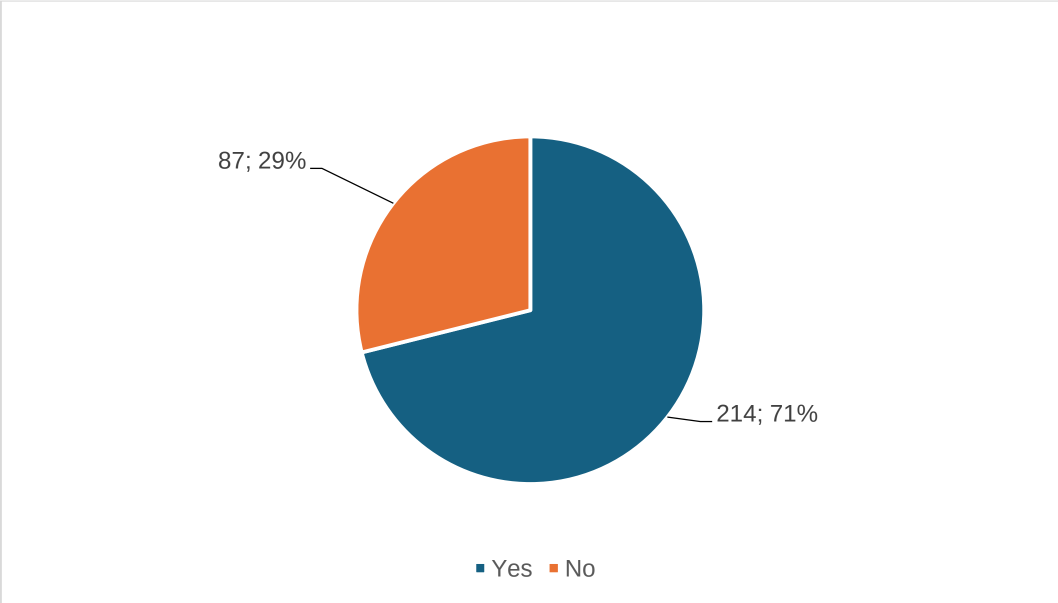

Figure 3.6. Participants' Irrigation Practices

Figure 3.7. provides information on whether the participants use sprinkler irrigation systems when irrigating their fields. The frequency analysis revealed that 69% of the farmers use sprinkler irrigation systems while the remaining 31% use other irrigation methods. In addition, it was observed that 98% of the irrigating farmers used sprinkler irrigation systems, while 2% did not. The 2% that do not use sprinkler systems comes to 5 participants. Two of these 5 participants stated that they irrigate their crops using a keel irrigation system.

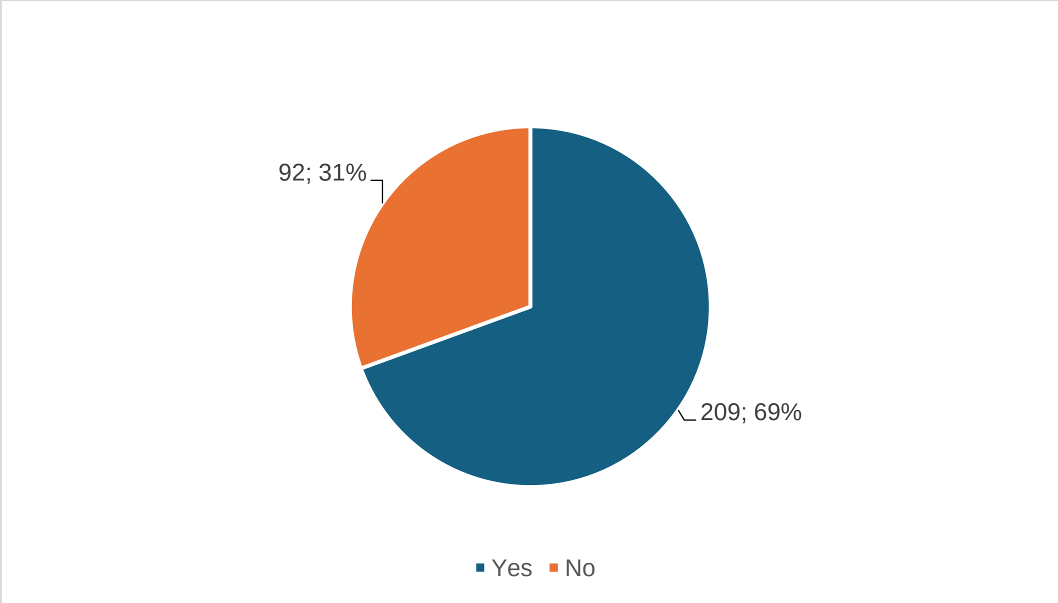

Figure 3.7. The Rate of Participants Using Sprinkler Irrigation Systems

Figure 3.8. shows whether the participants' crops have been damaged by any natural disaster in recent years during agricultural production. According to the data obtained, 29% of the participants stated that their yields were affected by any of the natural disasters during agricultural production and the remaining 71% stated that they did not experience any yield loss due to any natural disaster.

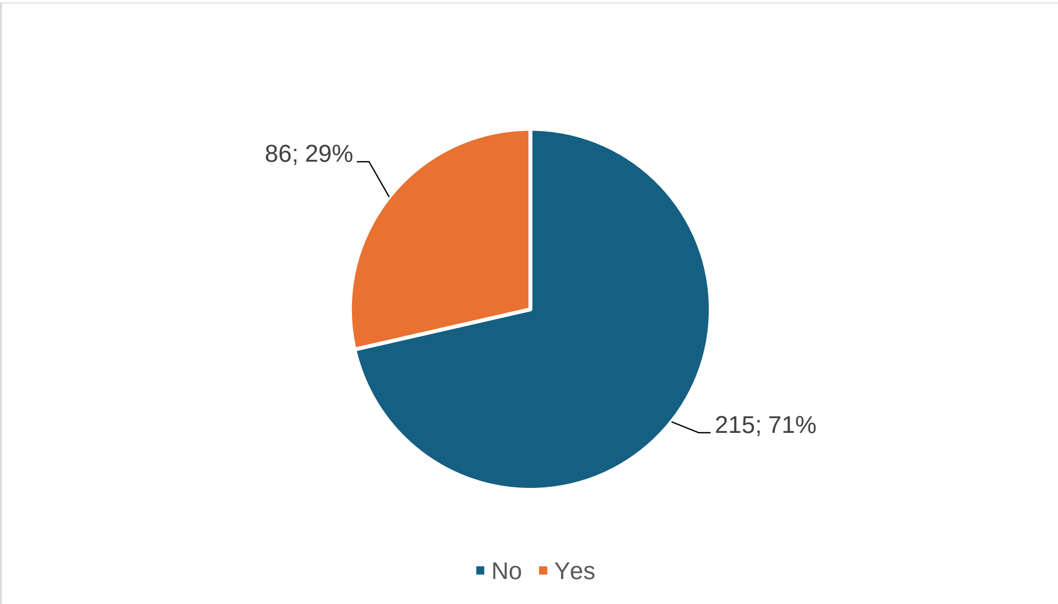

Figure 3.8. The Rate of Participants Affected by Natural Disasters in Recent Years

The results of whether the participants have computer and internet access at home are given in Figure 3.9. Frequency and percentage analysis demonstrated that 54.16% of the participants do not have access to computers and the internet. According to the results, 36.88% of the participants have both a computer and an internet connection.

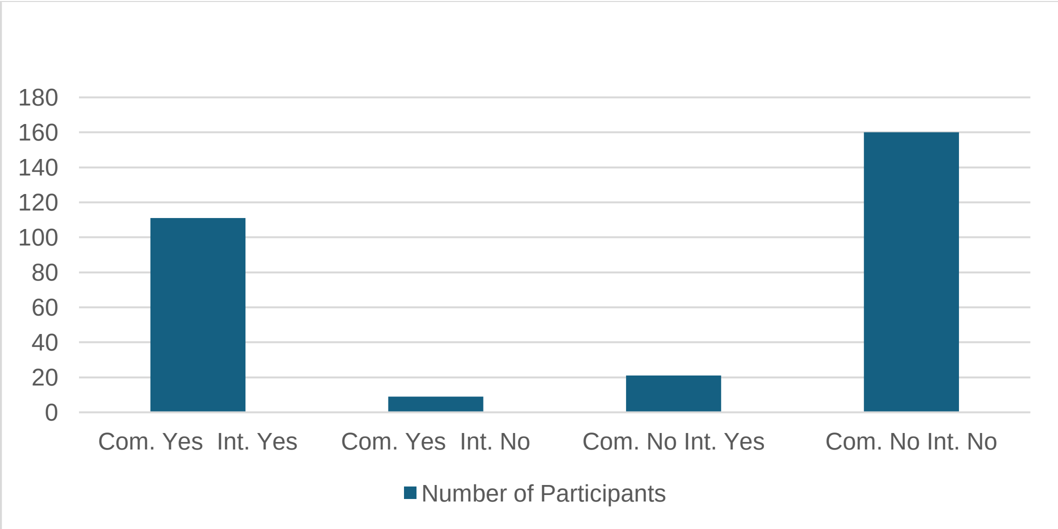

Figure 3.9. Participants' Access to Computers and Internet at Home

Participants were asked whether they have social media accounts and whether they use smartphones, and the responses are shown in Figure 3.10. Frequency and percentage analysis pointed out that 41% of the participants did not have a smartphone and social media account, 19% had only a smartphone, 4% did not have a smartphone but only a social media account, and 36% had both a social media account and a smartphone. This may hint at that even in today's world, digitalization and access to information in agriculture is still low among farmers with a rate of 41%.

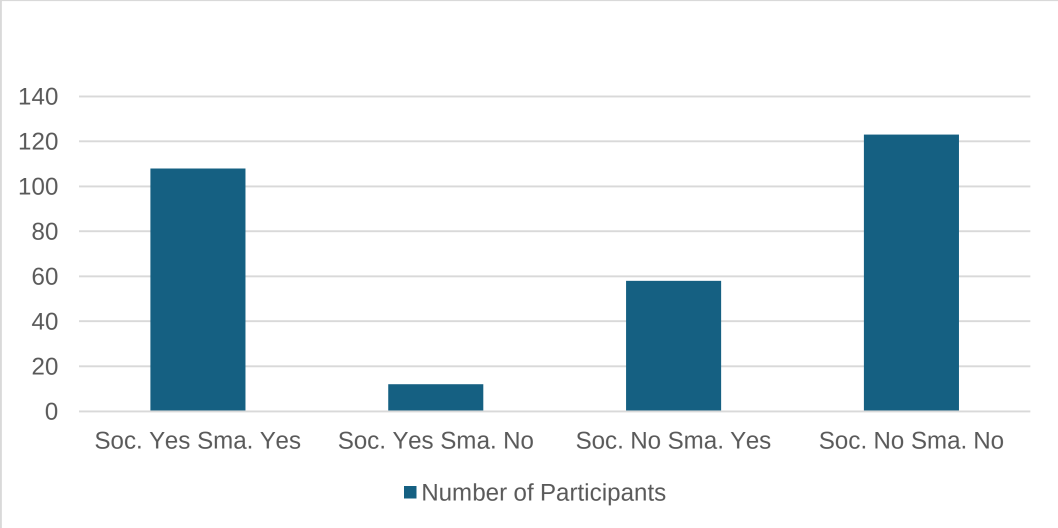

Figure 3.10. Participants' Use of Smartphones and Social Media

The number of people living in the same household as the participants is given in Figure 3.11. The results showed that 44% of the participants had between 5-9 people, 30% had between 3-5 people, 20% had between 2-3 people, 6% had 10 or more people, and 1% had only one person living in their household. This data points to the fact that the majority of the participants live in extended families, and that the number of large families can be beneficial in agricultural production but can also have a negative impact on training and costs.

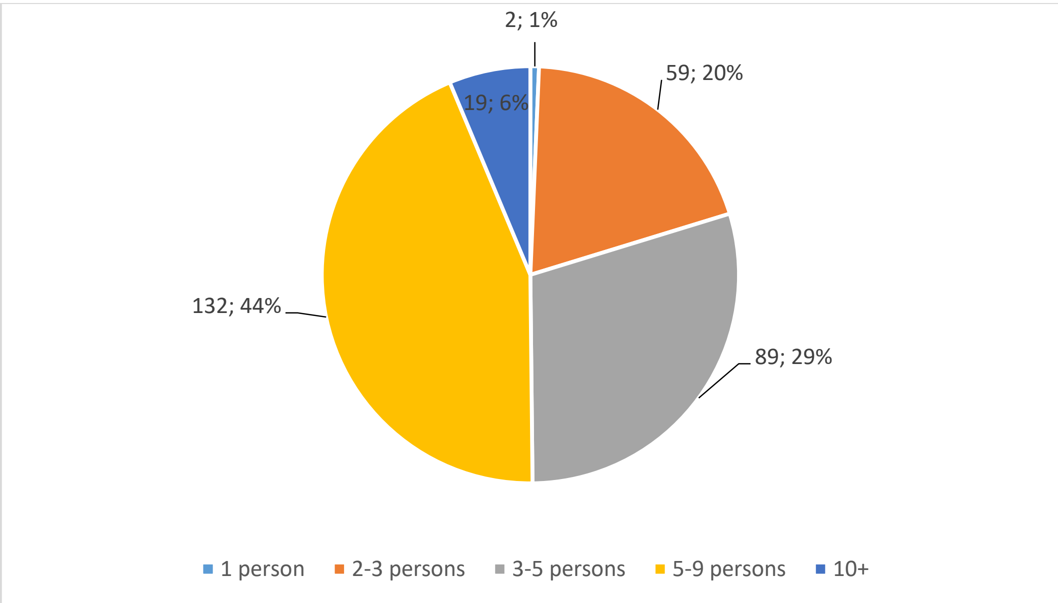

Figure 3.11. Number of Household Members

The annual income amounts of the participants from agricultural production are given in Table 3.1. The results showed that 24% of the participants had 0-100,000 TL, 19% had 100,000 TL - 250,000 TL, 15% had 250,000 - 500,000 TL, 13% had 500,000 - 750,000 TL, 2% had 750,000 - 1,000,000 TL, 10% had 1,000,000 - 1,500,000 TL, 4% had 1,500,000 - 2,000,000 TL and 13% had over 2,000,000 TL. The average income of the farmers was calculated as 716,740.86 TL. The income level of the majority of the participants, 57%, came to the surface as 500,000 and below. Low-income farmers may be very sensitive to drought because they have financial difficulties under drought stress.

Table 3.1. Annual Agricultural Income

Income Level (Turkish Liras – TL)	Number of Farmers	Percentage (%)
0-100,000 TL	72	23.92%
100,000-250,000 TL	56	18.60%
250,000-500,000 TL	45	14.95%
500,000-750,000 TL	40	14.29%
750,000-1,000.000 TL	7	2.33%
1,000.000-1,500.000 TL	32	10.63%
1,500.000-2,000.000 TL	11	3.65%
2,000.000+ TL	38	12.62%
Average Annual Agricultural Income: 716,740.86 TL		

Table 3.2. illustrates the non-agricultural monthly income of the participants. While 23% of the participants earned 5,000 TL and below, 16% earned 5,000-10,000 TL, 11% earned 10,000-15,000 TL, 2% earned 15,000-20,000 TL, 1% earned 30,000-40,000 TL, 15% earned 40,000 TL and above, 32% of the participants did not earn non-agricultural income. The average monthly non-agricultural income of the participants was calculated as 22,271.03 TL. The lack or low monthly non-agricultural income of farmers during drought periods may cause farmers to have financial difficulties and drought perceptions to be low.

Table 3.2. Monthly Non-Agricultural Income

Monthly Non-Agricultural Income (Turkish Liras – TL)	Number of Farmers	Percentage (%)
0	97	32.23%
1.000-5.000 TL	70	24.26%
5.000-10.000 TL	49	16.28%
10.000-20.000 TL	32	10.63%
20.000-30.000 TL	5	1.66%
30.000-40.000 TL	4	1.33%
40.000+ TL	44	14.62%
Average Monthly Non-Agricultural Income: 22,271.03 TL		

The responses of the participants on whether they are engaged in any innovative and remedial activities in the agricultural sector are shown in Figure 3.12. The results portrayed that 52% of the participants are prone to innovative and improvement activities and 48% of them have not adopted any innovative and improvement activities.

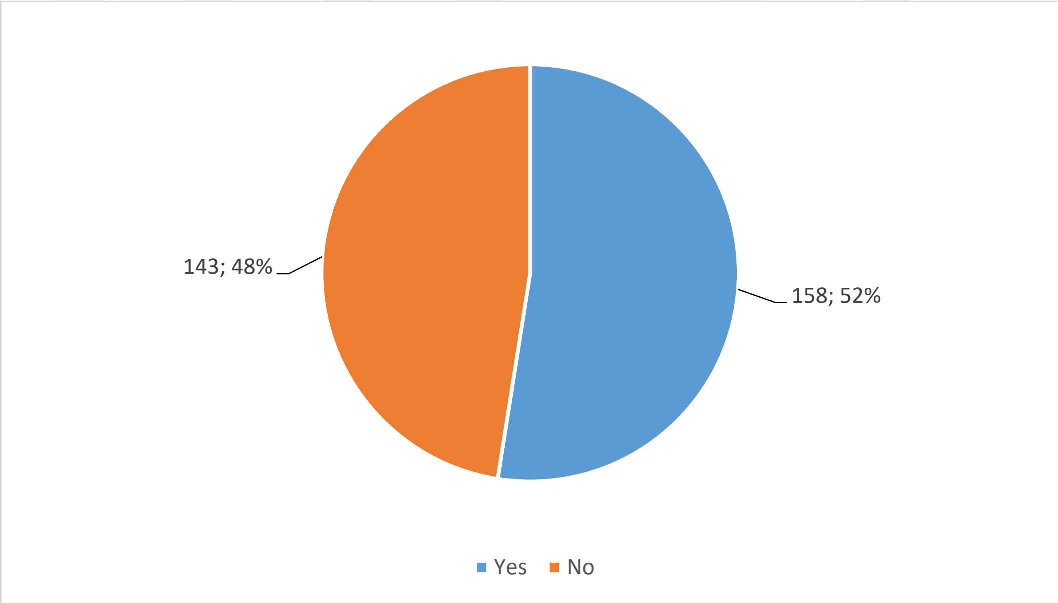

Figure 3.12. Engagement in Innovative and Improvement Agricultural Practices

Figure 3.13. shows whether the participants have engaged in an innovative agricultural activity in the last 5 years. 52% of the participants had innovative agricultural activities

in the last 5 years, indicating that more than half of the farmers follow and implement agricultural innovations. On the other hand, 48% of the participants indicated that they did not have any innovative agricultural activities, which may indicate that some farmers are still practicing traditional methods and have less access to innovations.

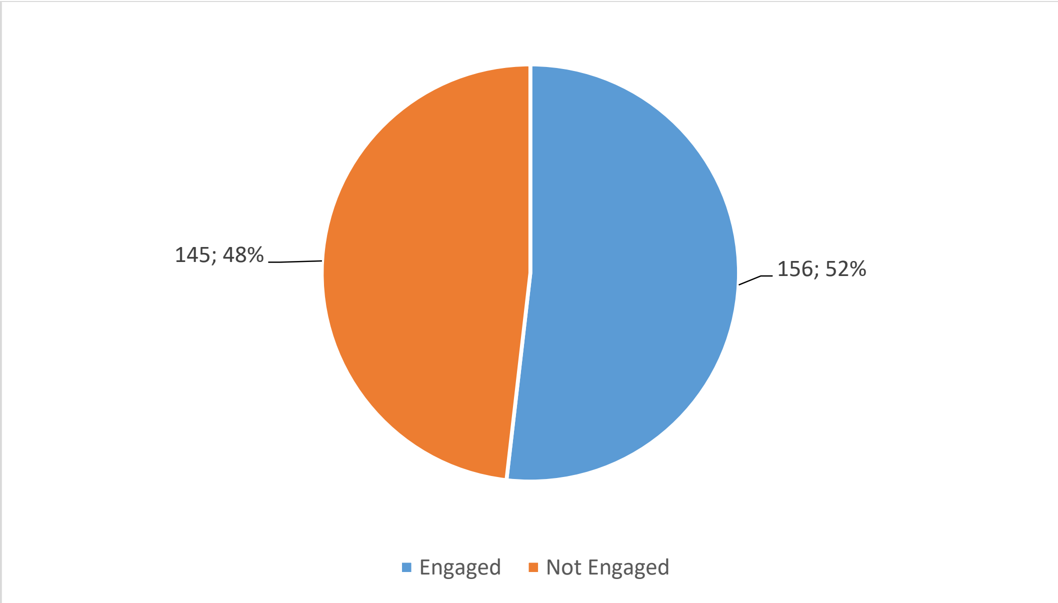

Figure 3.13. Innovative Initiatives Affecting Agriculture in the Past 5 Years

The participants' level of satisfaction with the farming profession was obtained using a 5-point Likert scale and the results are presented in Figure 3.14. 47% of the participants were completely satisfied with the farming profession, 20% were partially satisfied, 17% were undecided, 8% partially disagreed and 10% were not satisfied with the farming profession at all. The average level of satisfaction of the participants with the farming profession was 3.86.

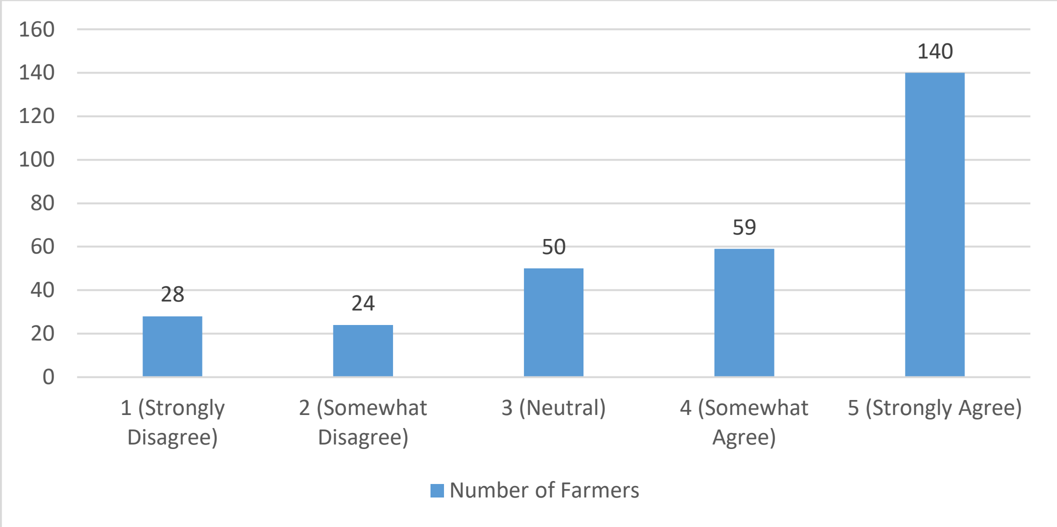

Figure 3.14. Job Satisfaction Level

3.2.1. Descriptive Statistics by Drought Perception

Figure 3.15. addresses whether the participants think that they will face drought in the future. 91% of the participants thought that there is a possibility of facing drought in the future. On the other hand, 9% of the participants stated that they will not face drought in the future. The results may potentially demonstrate that the majority of the participants are concerned about the future of drought.

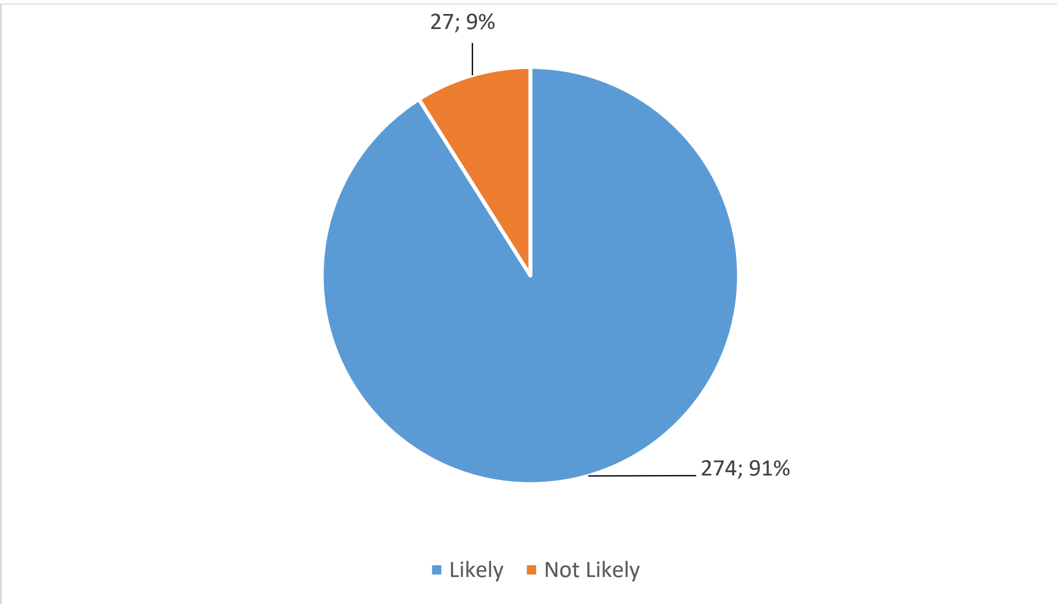

Figure 3.15. Participants' Views on Future Drought

Table 3.3. presents the answers of the participants who answered yes to the question regarding whether they are prepared for future drought. 54% of the participants stated that they use drip irrigation water systems in agricultural production against drought. The drip irrigation method applied directly to the root zone of the plant can reduce water consumption by providing effective water use. 15% of the participants prefer to plant crops that consume less water. This strategy leads to an effective use of water to maintain productivity in case of water scarcity during drought periods. It is seen that 13% of the participants said that they use conscious irrigation while practicing agricultural production. Conscious irrigation methods can prevent drought by using water more efficiently, such as the amount and schedule of water. It was observed that 9% of the participants stated that they drilled underground water wells, which they characterized as a measure against drought. It is erroneous to characterize the use of groundwater by the participants as a measure to prevent drought. It has been observed that the participants use groundwater to increase production yields and overcome surface water shortages. 7% of the participants stated that they use sprinkler irrigation systems for agricultural irrigation.

The reason for this is that water falls equally on each region like raindrops and consumes less water than keel irrigation. 4% of the participants stated that they do not use wild irrigation. In this way, it prevents water waste by preventing unnecessary expenditure of water. 4% of the participants stated that they take precautions against drought by insuring their crops. The reason for this is that they want to protect themselves financially against natural disasters. 3% stated that they practiced fallow. This practice is a method of resting the area to be planted by not planting for a while and increasing the water holding capacity. Another 3% stated that they are making financial preparations against drought. This strategy is a precautionary measure to minimize financial losses during drought. Another 3% stated that they planted in accordance with the soil and climate conditions of the region. In this way, they aim to increase yields by planting more resistant plants that consume less water during drought. 2% of the participants stated that they irrigate by storing water during periods of high rainfall against drought. This method meets a small portion of the amount of water required by a field. Another 2% of the participants stated that praying to God is a solution against drought. Participants who adopted praying as a solution to drought generally believe that drought is a punishment sent by God and that only God can provide a solution. Another 1% of the participants stated that planting only in wetlands, another 1% installed solar panels, another 1% changed the sector, another 1% conscious about irrigation, and another 1% stocked their crops in warehouses and selling them for a long time were the measures they took against drought.

Table 3.3. Measures Taken by Farmers Anticipating Drought

Preparations for Drought	Number of Farmers	Percentage (%)
Drip Irrigation	48	53.93%
Crops with Low Water Consumption	13	14.61%
Conscious Irrigation	11	12.36%
Drilling a Well	8	8.99%
Sprinkler Irrigation	6	6.74%
Insurance	4	4.49%
Avoiding Wild Irrigation	4	4.49%
Fallowing	3	3.37%
Financial Preparation	3	3.37%
Suitable Planting for the Region	3	3.37%
Water Tank	2	2.25%
Praying	2	2.25%
Planting in Wetlands	1	1.12%
Solar Panel	1	1.12%
Conscious Pest Control	1	1.12%
Storage Facility	1	1.12%

The reason for this is that water falls equally on each region like raindrops and consumes less water than keel irrigation. 4% of the participants stated that they do not use wild irrigation. In this way, it prevents water waste by preventing unnecessary expenditure of water. 4% of the participants stated that they take precautions against drought by insuring their crops. The reason for this is that they want to protect themselves financially against natural disasters. 3% stated that they practiced fallow. This practice is a method of resting the area to be planted by not planting for a while and increasing the water holding capacity. Another 3% stated that they are making financial preparations against drought. This strategy is a precautionary measure to minimize financial losses during drought. Another 3% stated that they planted in accordance with the soil and climate conditions of the region. In this way, they aim to increase yields by planting more resistant plants that consume less water during drought. 2% of the participants stated that they irrigate by storing water during periods of high rainfall against drought. This method meets a small portion of the amount of water required by a field. Another 2% of the participants stated that praying to God is a solution against drought. Participants who adopted praying as a solution to drought generally believe that drought is a punishment sent by God and that only God can provide a solution. Another 1% of the participants stated that planting only in wetlands, another 1% installed solar panels, another 1% changed the sector, another 1% conscious about irrigation, and another 1% stocked their crops in warehouses and selling them for a long time were the measures they took against drought.

Table 3.4. provides information about the participants who stated that they did not take any precautions against a possible drought in the future. 25% of the participants stated that they do not have any precautions they can take against drought. Another 25% stated that they could not take precautions due to lack of financial means, another 25% claimed that they had insurance, and the remaining 25% stated that they prayed to God.

Table 3.4. Key Terms from Participants Not Expecting Future Drought

Responses from Participants Not Predicting Future Drought	Number of Farmers	Percentage (%)
Financial Constraints	1	25.00%
Insurance	1	25.00%
Praying	1	25.00%
No Preventive Measures Available	1	25.00%

Table 3.5. give insights into whether the people who think that they will face drought in the future have received advice or information from anyone during agricultural production. 73% of the people who think that they will face drought in the future stated that they received advice and information from someone while making agricultural production. On the other hand, 27% of the participants stated that they did not receive

advice and information from anyone. It can be said that people who think that they will face drought in the future seek information and support at a high rate.

Table 3.5. further shows the results of the comparative descriptive statistical analysis of the question of whether people who do not think that they will face drought in the future receive advice and information from anyone during agricultural production. 70% of the people who think that they will not face drought in the future stated that they received advice and information from someone else. On the other hand, 30% of the participants stated that they did not receive information and advice. It has been observed that the rate of receiving advice and information from others is high for those who think or do not think that they will face drought in the future. This shows that participants engaged in agricultural production receive advice and information while engaged in agricultural production, whether they are concerned about drought risk or not.

Table 3.5. Participants' Advice-Seeking Behavior and Their Drought Predictions

Perception of Drought	Seeking Advice	Percentage (%)
Participants Expecting Drought	Receiving Advice	72.63%
	Not Receiving Advice	27.37%
Participants Not Expecting Drought	Receiving Advice	70.37%
	Not Receiving Advice	29.63%

Table 3.6. includes the results of the comparative descriptive statistical analysis of whether people who think that they will face drought in the future burn stubble in their fields or not. 98% of the participants stated that they do not burn stubble in order to protect the top layer of the soil, organic matter and increase the water holding capacity. 2% of the participants stated that they burned stubble because they were concerned about facing drought in the future.

The same table (Table 3.6.) illustrates whether people who do not think that they will face drought in the future burn stubble in their fields. 95% of the participants stated that they do not burn stubble to protect the top layer of the soil, organic matter and to increase the water holding capacity. 5% of the participants asserted that they burned stubble because they thought that they would face drought in the future. It can be said that the rate of stubble burning is low among those who think that they will face drought in the future and those who do not.

Table 3.6. Participants' Stubble Burning Activity

Perception of Drought	Burning stubble	Percentage (%)
Participants Expecting Drought	Burning	2.19%
	Not Burning	97.81%
Participants Not Expecting Drought	Burning	4.94%
	Not Burning	95.06%

Table 3.7. displays whether people who think that they will face drought in the future irrigate their fields or not. 78% of the participants highlighted that they irrigate their fields during agricultural production. 22% of the participants stated that they do not irrigate their fields while producing agricultural production.

Table 3.7. also elucidates the results of the comparative descriptive statistical analysis of the question of whether people who do not think that they will face drought in the future irrigate their fields or not. While 89% of the participants addressed, they irrigate their fields during agricultural production, 11% of them asserted that they do not irrigate their fields while producing agricultural production. What emerges as a result of the analysis is that the amount of irrigation is higher for people with drought perception compared to people without drought perception.

Table 3.7. Irrigation Activities in Participants' Fields

Perception of Drought	Irrigation Status	Percentage (%)
Participants Expecting Drought	Irrigating	78.10%
	Not Irrigating	21.90%
Participants Not Expecting Drought	Irrigating	88.89%
	Not Irrigating	11.11%

The comparative descriptive statistical analysis revealed whether people who think that they will face drought in the future use keel irrigation while agricultural production (Table 3.8.). 88% of the participants expressed that they do not use keel irrigation while agricultural production whereas 12% of the participants stated that they use keel irrigation.

This table (Table 3.8.) also demonstrates whether people who do not think that they will face drought in the future use keel irrigation during agricultural production. 78% of the participants indicated that they do not use keel irrigation during agricultural production. 22% of the participants stated that they use keel irrigation. This result points out that people with drought perception make agricultural production with the keel irrigation system more than people without drought perception. The keel irrigation system may increase agricultural yield, but since it is not a sustainable solution, it may result in dangerous drying and destruction of water resources.

Table 3.8. Keel Irrigation Activities in Participants' Fields

Perception of Drought	Keel Irrigation Status	Percentage (%)
Participants Expecting Drought	Keel Irrigating	12.41%
	Not Keel Irrigating	87.59%
Participants Not Expecting Drought	Keel Irrigating	22.22%
	Not Keel Irrigating	77.78%

Table 3.9. presents whether the participants who think that they will face drought in the future are affected by any natural disasters during agricultural production. 59% of the participants asserted that their agricultural production was affected by natural disasters such as frost, hail, drought, etc. during the agricultural period of the survey while 41% of the participants underscored that they were not affected in any way.

Table 3.9. also shows whether people who do not think that they will face drought in the future are affected by any natural disasters while producing agricultural production. 44% of the participants indicated that their agricultural production was affected by natural disasters such as frost, hail, drought, etc. during the agricultural period of the survey. 56% of the participants stated that they were not affected in any way. This rate gives insights into disaster perception of the participants who encountered any natural disaster is higher.

Table 3.9. Participants' Experience with Natural Disasters in Agricultural Production

Perception of Drought	**Recent Experience with Natural Disasters**	**Percentage (%)**
Participants Expecting Drought	Experienced	59.12%
	Not Experienced	40.88%
Participants Not Expecting Drought	Experienced	44.44%
	Not Experienced	55.56%

In Figure 3.16., descriptive statistics are analyzed according to the age groups of the people asserting that they will possibly face drought in the future. It was seen that 92% of the participants aged 18-25 were concerned and aware of drought in the future. 95% of participants aged 26-35 were highly concerned and aware of drought. 90% of participants aged 36-45 think that they will face drought in the future. Like the previous group, 90% of the participants aged 46-55 were highly concerned and aware of drought. This age group's long years of experience may make them more aware of the existence of environmental risks. Participants aged 56-65 have the highest perception of drought after the younger age group. 90% of the participants aged 56-65 years have long years of experience in the face of the impact of drought on their agricultural activities and their approaching retirement may explain the high perception of drought in this age group. 88% of participants aged 66-75 think that they will face drought in the future. The drought experiences of this retired generation may be the reason for the high awareness. However, the decrease compared to other age groups may be due to the fact that people are gradually moving away from agricultural production. Drought perception of people aged 75+ is 75%. The reason why the rate is the lowest among other groups may be that they are not actively engaged in agricultural production alone as before. In general, 91% of the participants in our study perceived drought in the future. It shows that most of the society in this region is aware of climate change and its environmental impacts.

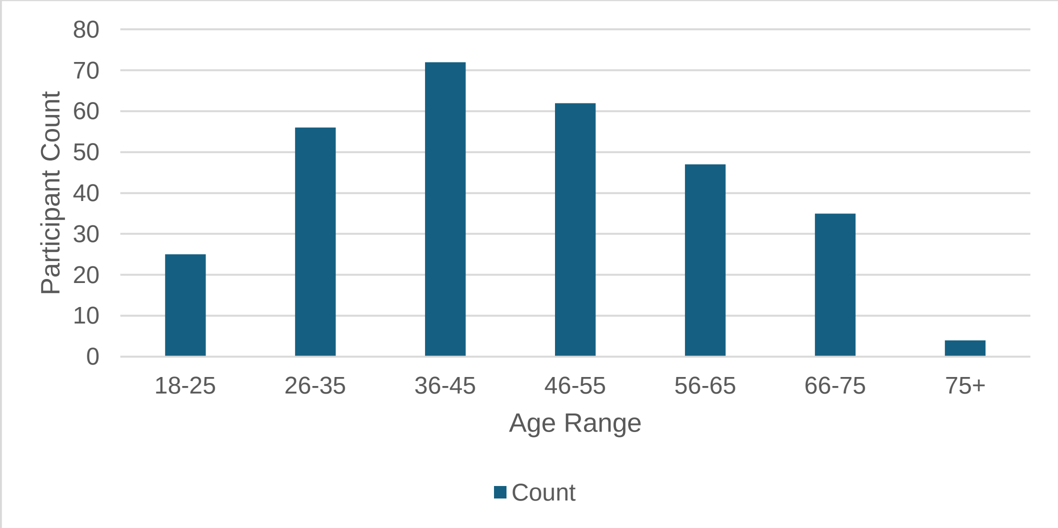

Figure 3.16. Descriptive Statistics Analysis by Age Groups of Individuals Considering Facing Drought in the Future

In Figure 3.17., descriptive statistical analysis was conducted according to the marital status of the people anticipating drought in the future. The analysis revealed that 96% of the single participants perceive drought and environmental risks as high because they are young and single and are worried about the future. Likewise, 90% of the married participants perceived drought and environmental risks as high because they mostly support their families with income from agricultural production. Even though accurate results cannot be obtained due to the low number of widowed participants, 83% of the widowed participants think that drought will occur in the future.

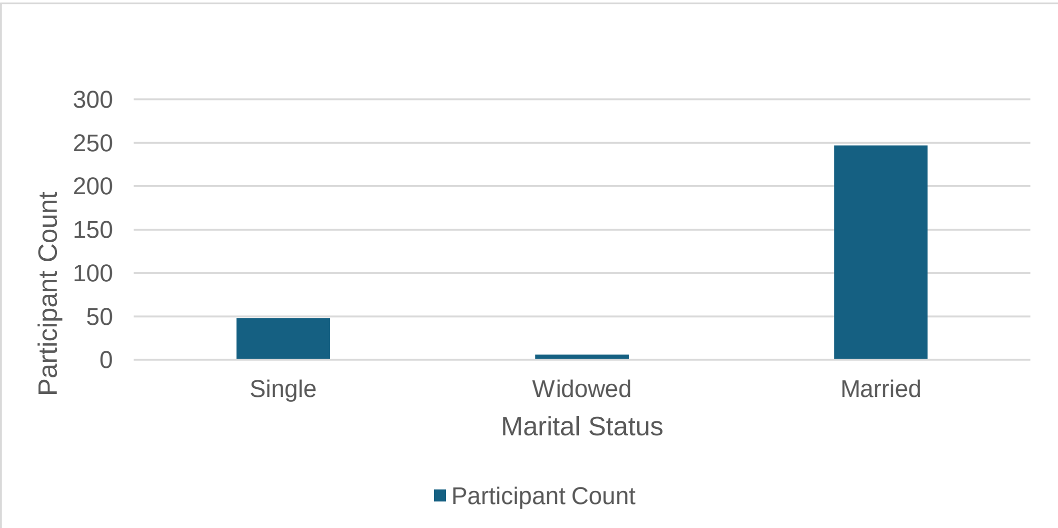

Figure 3.17. Descriptive Statistics Analysis by Marital Status of Individuals Considering Facing Drought in the Future

Figure 3.18. displays the educational status of the participants who think that there will be drought in the future by using descriptive statistical analysis. Among the participants who can read and write but have not completed school, 75% think that there will be drought in the future. 87.5% of primary school graduates, 96% of secondary school graduates, 91% of high school graduates, and 95% of university graduates and above stated that they thought that they would face drought in the future.

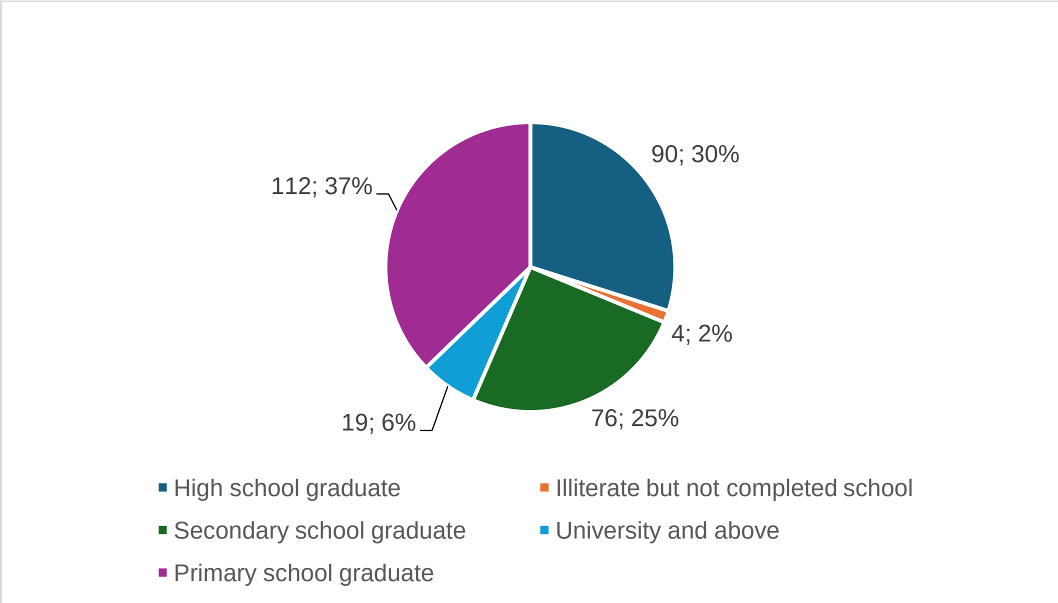

Figure 3.18. Descriptive Statistics Analysis by Educational Status of Individuals Considering Facing Drought in the Future

Figure 3.19. presents the cross tabulation and percentage analysis of the question whether the people who think that they will face drought in the future have any preparation against drought. Only 32% of the people who think that they will face drought in the future have any preparation against drought. The remaining 68% stated that they do not have any preparation against drought.

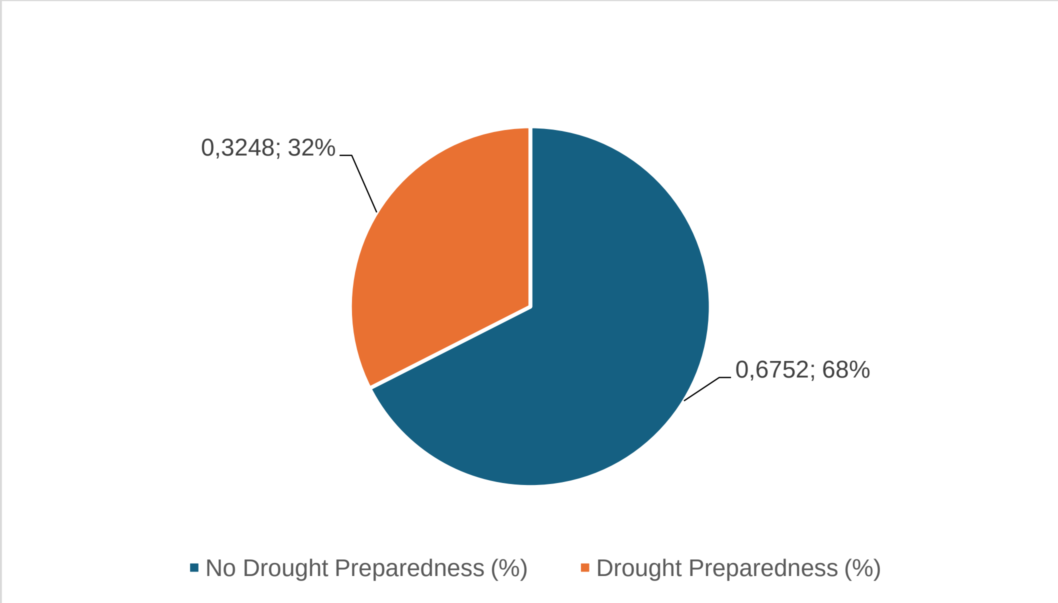

Figure 3.19. Preparedness of Individuals Anticipating Future Drought

Table 3.10. The Challenges of Agricultural Production for Participants Unprepared for Future Drought

Category	Number of Participants
Input Costs	140
Irrigation shortages	45
Equipment Cost	24
Climate / Drought	21
Crop Selling Price	17
Worker Problems	12
Land Problems	10
Problems of State Agricultural Policies	8
Agricultural Animal Damages	2
Crop Uncertainty	2
Family Dissent	1

Table 3.10. given above presents the results of the word frequency analysis of the problems suffered by the participants who did not have any preparation for the problem of whether they have any preparation against drought in the future or not. 49% of the participants stated that they suffered from input costs. Input costs are the products used in agricultural production such as electricity, fertilizer, fuel, seeds and pesticides. 18% of the participants stated that they had irrigation problems during agricultural production. 8% of the participants stated that they suffered from equipment costs, 7% suffered from climate and drought, 6% suffered from uncertainty in the sales prices of

their products, 4% suffered from the difficulty of the work and the inability to find workers, 3% suffered from land problems, 3% suffered from the state's agricultural policies, and 1% and less than 1% suffered from disease, animal losses, uncertainty of the crop to be planted, family disagreement and theft.

Figure 3.20. shows the results of the frequency analysis of the educational status of the participants who have no preparation for the question of whether they have any preparation against drought in the future. It was seen that 60% of the participants who had no preparation were primary or secondary school graduates. 32% of the participants were high school graduates, 7% were university graduates and 1% of the participants were literate but did not finish school. There is a significant relationship between education level and drought preparedness. It was observed that participants with lower levels of education were less inclined to prepare for drought.

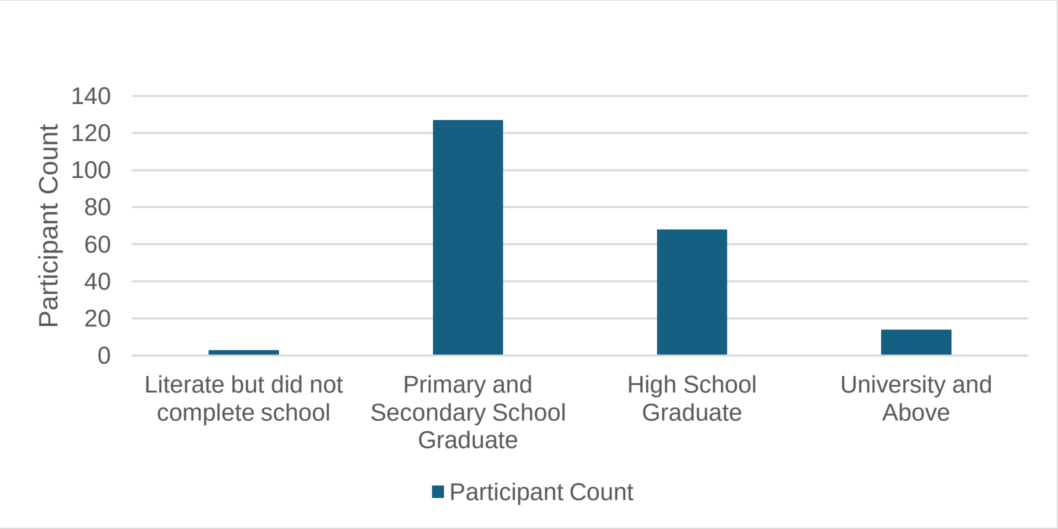

Figure 3.20. Educational Background of Participants Anticipating Future Drought but Unprepared

Figure 3.21. shows the average age of the participants who are not prepared for the question of whether they have any preparations against drought in the future as a result of frequency analysis. It is seen that 55% of the participants who have no preparation are between the ages of 31-55. It is seen that the perception of drought by farmers in the middle age group is the lowest age range due to reasons such as economic difficulties and lack of information. It was seen that 29% of the participants were over 55 years old. It was seen that 15% of the participants were between the ages of 18-30.

It was seen that 55% of the participants who were not prepared for drought were in the 31-55 age group and 30% were over 55 years of age. This result shows that farmers, especially in the middle age group, are more vulnerable to environmental threats such as drought.

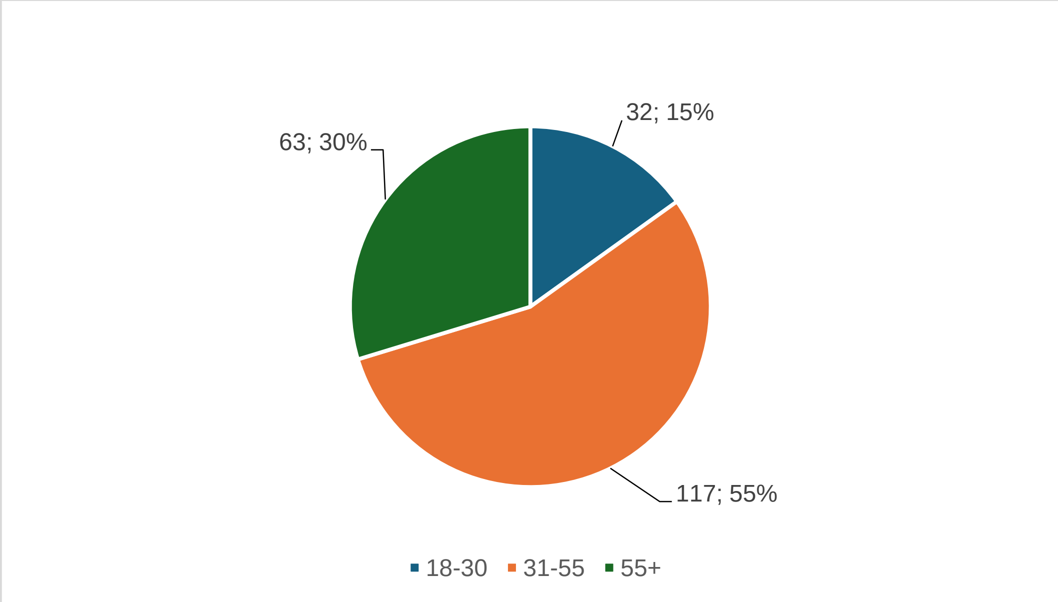

Figure 3.21. Age Range of Individuals Anticipating Future Drought but Unprepared

Figure 3.22. provides the results of the frequency analysis of the experience ranges of farmers who are unprepared for drought in the future. According to these results, when the distribution of farmers who are unprepared for drought according to their experience ranges is analyzed, the highest rate is 31-50 years of experience with 31%, 27% have 21-30 years of experience, 18% have 10-20 years of experience, and 14% have less than 10 years of experience. The lowest rate is 8% with 51 years of experience and above. These results show that even farmers with many years of experience are not prepared for environmental threats such as drought.

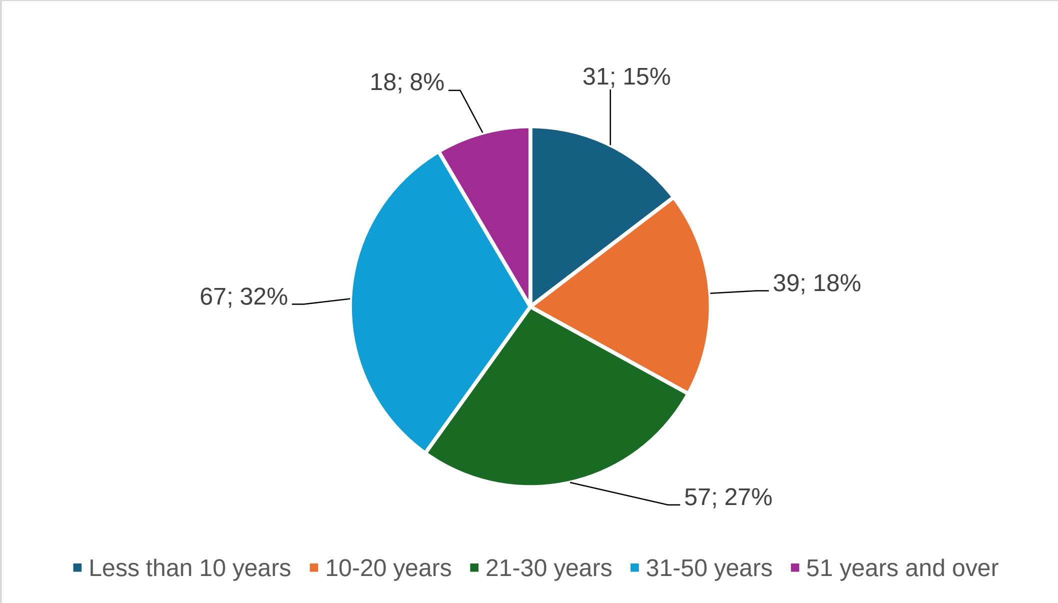

Figure 3.22. Farm Experience Range of Individuals Anticipating Future Drought but Unprepared

In Figure 3.23, the frequency analysis of the presence of smart phones and social media of farmers who are unprepared for drought is given. It was determined that 53% of the farmers who were unprepared for drought did not use social media and 29% did not have smart phones. Since the use of social media facilitates access to information and resources, it can improve people's perception of drought, and it can be useful for people to take precautions against drought by knowing how precautions should be taken or what kind of precautions other farmers take.

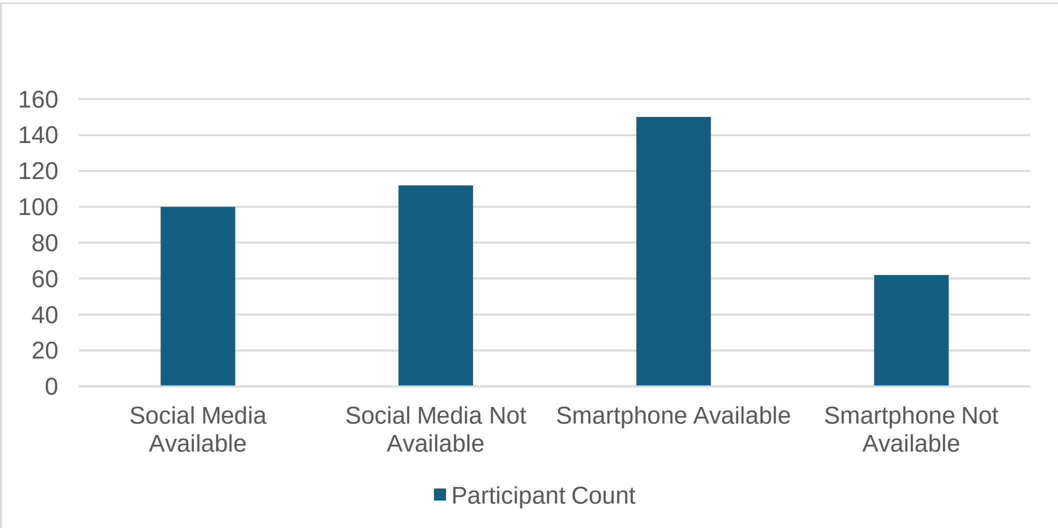

Figure 3.23. Smartphone and Social Media Ownership Among Farmers Unprepared for Future Drought

Figure 3.24. shows the results of the cross-tabulation of agricultural activities of farmers who are unprepared for drought and whether they follow innovative and remedial agricultural activities. 62% of the participants stated that they do not follow innovative and remedial agricultural activities. The remaining 38% of the participants stated that they follow innovative and remedial agricultural activities. It can be said that 62% of the participants, which covers the majority of the participants, do not follow agricultural innovations, incentives and activities and do not participate. Participation in these activities and events may be important to prepare for drought and to create awareness of drought perception.

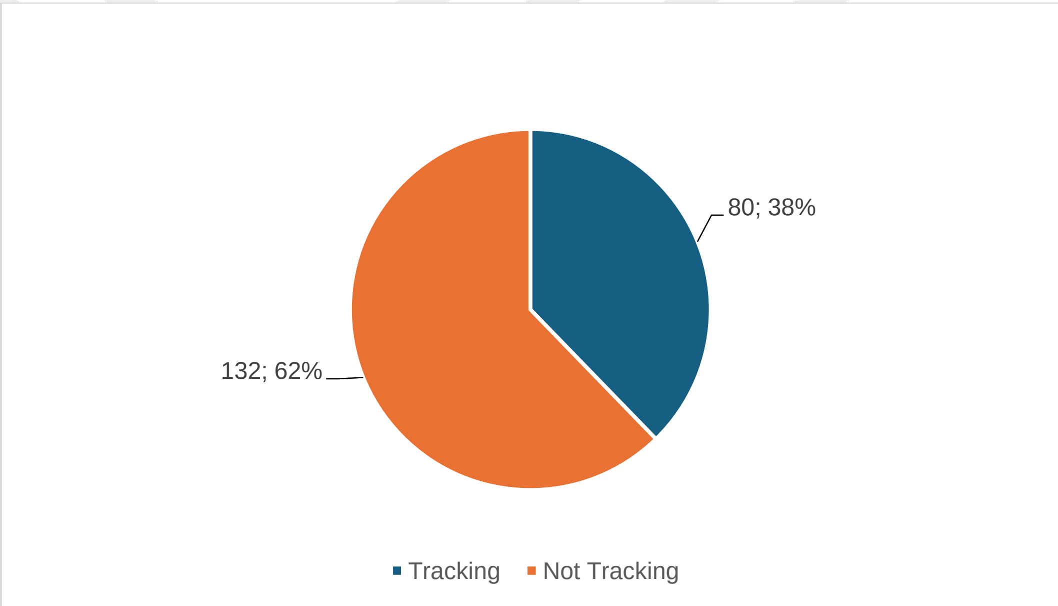

Figure 3.24. Tracking the Innovative and Improvement Agricultural Activities by Farmers Unprepared for Drought

Taken together, this chapter offered an understanding of the setting, participants, and data collection procedures to depict the contextual framework of the study. To further uncover the details about the participants, their demographic information, their perception of the drought, and cross-tabulation of drought perception and independent variables were presented. In the next chapter, methodological stance taken regarding the data analysis will be provided, and the findings of the study will also be illustrated.

4. METHODOLOGY AND RESEARCH FINDINGS

This chapter expounds the research methodology and findings of the present study. The first section entails the details about the methodological stance and in alignment with this, data analysis procedures deployed to demonstrate descriptive statistics and the relationship between dependent and independent variables by using the probit model. The second section illustrates the hypotheses along with the dependent and independent variables, which is followed by the findings of the study.

4.1. Methodology

In the data analysis process, a questionnaire survey method was applied to reveal farmers' perceptions of drought and their ideas on possible solutions to drought. The collected data were analyzed using Frequency Analysis, Word Frequency Analysis, Percentage Frequency Analysis, Descriptive Statistical Analysis, Cross Table Analysis, Cross Table and Percentage Calculation Analysis and Descriptive Statistical Analysis. The analyses were further elucidated by employing the probit model to examine the interplay between binary dependent variable and independent variables. This section explains the details of the data analysis process.

Descriptive Statistical Analysis, Cross Tabulation Analysis, Cross Tabulation and Percentage Calculation Analysis and Descriptive Statistical Analysis were used to portray participants' demographic information obtained from the questionnaire. Frequency analysis, as a statistical method, provides a clear description of the distribution and commonality of responses by counting the number of times each response is repeated or mentioned in the data set. Especially questions with Yes/No answers and Likert scale answers were analyzed with this method. In addition, by analyzing the responses of farmers to open-ended questions, word frequency analysis was used to calculate how often certain words and expressions were used and frequency percentage analysis was used to calculate the results of frequency analysis with percentages. Descriptive statistical analysis was used to calculate mean, standard deviation, and minimum and maximum values to describe the general characteristics of the data set, elucidating farmers' agricultural practices and daily lives.

While analyzing the survey data, the data were meticulously prepared and organized. Closed-ended responses were categorized and numerically coded. Open-ended questions were grouped and coded into relevant themes, along with quantifying the emerging information. This preparatory step ensured that the data were cleaner and better organized for statistical analysis and that the analysis was more accurate. Statistical software programs such as STATA were used during the analysis. The analyses were converted into visuals and tables and designed for better understanding by the reader.

To reveal the relationship between binary dependent variables and independent variables, a probability model is employed. Probit method is used to explore the impact of different factors on farmers' drought perception. The probit model aims to estimate how independent variables affect the probability that a binary dependent variable has a particular value (typically 1). In this model, the likelihood of emerging the binary dependent variable as 1 is identified as follows:

$$P(Y = 1|X) = \Phi(X\beta) \quad (1)$$

In equation 1, Y refers to the binary dependent variable while X denotes independent variables. Φ pertains to the cumulative distribution function of the standard normal distribution and β is the vector representing the coefficients of independent variables. As the present study delves into the farmers' drought perception (coded as 0 and 1), this model was utilized to examine the statistical relationship between the binary dependent variables and the independent variables.

$$y = \alpha + \sum \beta_i v_i + \varepsilon_i \quad (2)$$

Equation 2 focuses on the outcome y, the dependent variable identified as the farmers' drought perception. The independent variables (such as education and age) are signified with v_i, representing the factors affecting the perceived drought. β_i represents the coefficients of the independent variables. A positive coefficient indicates that the variable augments the likelihood of perceiving drought, whereas a negative coefficient points out that it decreases the likelihood. ε_i, represents the error term, while α represents the constant.

Following variables are used in the estimations:

Dependent variable (q):

Farmers' ownership of drought perceptions

Independent variables (x):

Seeking Advice (x_1) indicates whether the participant received advice from any person or organization while producing wheat (1 if the participant did, 0 otherwise).

Agricultural Equipment Rental/Ownership (x_2) focuses on whether the participant rented/owned the equipment while producing wheat (1 if the participant did, 0 if the participant did not).

Fallow (x_3) signifies whether the participants left the land fallow while producing wheat (1 if the participant left the land fallow, 0 if the participant did not).

Stubble Burning (x_4) displays whether the participants burned stubble on their land while producing wheat (1 if the participant burned stubble, 0 if the participant did not burn stubble).

Alternation (x_5) refers to whether the participants practiced rotation on their land while producing wheat (If the participant practiced rotation, it takes a value of 1, if not, it takes a value of 0).

Irrigation **(x_6)** denotes whether the participant irrigated while producing wheat (1 if the participant irrigated, 0 if the participant did not irrigate).

Keel Irrigation (x_7) indicates whether the participant used the keel irrigation method while producing wheat (1 if the participant used keel irrigation, 0 if the participant did not).

Exposure to Natural Disasters **(x_8)** points to whether the participant has been exposed to disasters in previous years while producing wheat (1 if the participant has been exposed, 0 if not).

Age (x_9) demonstrates the age of participants planting wheat. From the year 2024, the farmers' date of birth is subtracted.

Marital Status (x_{10}) alludes to the marital status of the farmers (1 if the participant is married and 0 if the participant is single).

Education (x_{11}) shows the education level of the participants planting wheat. It takes a value of 0 for farmers who have not completed any school, 1 for primary school, 2 for secondary school, 3 for high school, 4 for university, and 5 for master's and doctorate.

Social Media (x_{12}) relates to whether the wheat planters use social media or not. (If the participant uses social media, it takes a value of 1, if not, it takes a value of 0).

Computer (x_{13}) pertains to the effect of having computers on drought perception. Participants planting wheat are shown to have a computer (1 if the participant has a computer, 0 if the participant does not have a computer).

Smartphone (x_{14}) refers to the effect of having a smartphone on drought perception. The presence of a smartphone is shown for participants who planted wheat (1 if the participant has a smartphone, 0 if the participant does not have a smartphone),

Internet (x_{15}) indicates the internet access of wheat planters. (It takes a value of 1 if the participants have access to the internet and 0 if they do not).

Number of Household Members (x_{16}) denotes the number of living and dependent persons in the household of participants who cultivated wheat (%).

Non-farm Income (x_{17}) refers to the non-farm income of participants who cultivated wheat is shown (%).

Innovation (x_{18}) is related to whether the participants who cultivate wheat follow innovative agricultural production methods or not. (It takes a value of 1 if the participants follow and 0 if they do not.)

Job Satisfaction (x_{19}) indicates whether the wheat sowing participants are happy with their work (indicated by very unhappy 1, unhappy 2, undecided 3, happy 4, very happy 5).

Children who would continue farming (x_{20}) relates to the farmers' the number of children who would continue farming in the future and the number of children they would have.

Preferring their child to be a farmer (x_{21}) points to whether the participants who plant wheat want their children to be farmers or not. (If the participants want their children to be farmers, it takes the value 1, if not, it takes the value 0).

Region Dummies Variables (x_{22-33}) indicate region dummies to control for participants' disaster perceptions in climatic conditions, social and cultural background or cultivation culture in different regions of Konya region. The districts analyzed in Region Dummies are Akören, Cihanbeyli, Çumra, Derbent, Güneysınır, Ilgın, Kadınhanı, Karatay, Seydişehir, Yalıhüyük.

In this study, robust standard errors model is used to increase the reliability of the probit model is employed to analyze farmers' drought perception. Robust standard errors model helps to prevent problems such as heteroskedasticity and autocorrelation in the data set used in the research from negatively affecting the estimation results and helps to obtain the parameter estimates of the model without bias and consistently. Due to the high correlation of disaster perception with individuals and environmental factors, the use of robust standard errors in such studies increases the sensitivity of the models to possible variability and helps to preserve the statistical significance of the results. This approach contributes to an accurate assessment of farmers' disaster perception by increasing the generalizability and reliability of the findings.

During the analysis of the relationship between the dependent variables and the independent variables given above, the probit model was used. In order to test the overall significance of the probit model used in this study, the likelihood ratio test was applied and the probability value obtained (Prob>chi2) was found to be 0.0117. This value indicates that the coefficients of all independent variables in the analysis model are zero at the same time and the null hypothesis should be rejected. Because the probability value of 0.0117 is below the significance level of 5% (0.05). Since the value of 0.0117 is below the 5% level, it shows that the research model is statistically significant. As a result, it can be said that the effects of the selected independent variables on disaster perception can be explained in a meaningful way.

4.2. Hypotheses

Farmers' drought perceptions, the underlying reasons behind this, and measures taken have been reported in the scholarly examination conducted by the researchers and documented in the literature review of the current thesis. Drought has a significant impact on farming practices; therefore, farmers' drought perceptions and the measures they take play a prominent role in agricultural sustainability and economy. Aligning with this, the H_0 hypothesis corresponding to the study objectives is as follows:

H_0: The farmers in Konya have drought perception.

Based on the H_0 hypothesis, the questions addressed in the questionnaire were prepared to further investigate the topic. Regarding the questionnaire, the following hypotheses were proposed and are presented:

H_1: Farmers receiving advice in the agricultural production process have a perception of drought.

H_2: Farmers owning/renting the necessary agricultural tools have a perception of drought.

H_3: Farmers leaving their agricultural production areas fallow have a perception of drought.

H_4: Farmers who do not burn stubble have a perception of drought.

H_5: Farmers practicing crop rotation have a perception of drought.

H_6: Farmers using irrigation practices have a perception of drought.

H_7: Farmers practicing keel irrigation do not have a perception of drought.

H_8: Farmers having experienced natural disasters before have a perception of drought.

H_9: As the age of farmers grows, their perception of drought also increases.

H_{10}: Married farmers have higher perceptions of drought compared to single farmers.

H_{11}: Farmers' education level affects their perception of drought.

H_{12}: Farmers using social media have a perception of drought.

H_{13}: Farmers with access to an internet connection have a perception of drought.

H_{14}: Farmers with computers have a perception of drought.

H_{15}: Farmers using smartphones have a drought perception.

H_{16}: As the number of people in the household increases, the perception of drought among farmers rises.

H_{17}: Farmers' perception of drought increases as non-agricultural income increases.

H_{18}: Farmers using innovative farming methods have a higher perception of drought compared to farmers who do not use innovative farming methods.

H_{19}: Farmers with high job satisfaction have a perception of drought.

H_{20}: Farmers having children who would continue agricultural production in the future increase the perception of drought.

H_{21}: Farmers preferring their children to become farmers in the future have a perception of drought.

Consistent with the hypotheses given above, the factors affecting farmers' drought perception were revealed through the probit model as a robust tool employed for the analysis.

4.3. Findings

The principal objective of this study is to conduct a comprehensive examination of the drought perception of farmers in Konya province, and the factors affecting their awareness of drought. In this context, the probit model employed in the study provides insight into the factors that shape farmers' perceptions of drought and the manner in which these perceptions are formed. The objective of this analysis was to ascertain the impact of different independent variables on drought perception.

As evidenced in Table 4.1., the probit model reveals that the irrigation variable exerts a statistically significant and positive influence at the 1% level ($p < 0.01$). This finding suggests that irrigated farmers are more likely to perceive drought than non-irrigated farmers. A multifaceted analysis of this situation may facilitate a more comprehensive understanding of the impact of irrigation on drought perception.

Table 4.1. The Results of the Probit Model

Variables	Probit Model
Advice	0.392
	(0.332)
Agricultural Equipment Rental/Ownership	-0.461
	(0.409)
Fallow	0.377
	(0.278)
Stubble Burning	-0.721
	(0.527)
Alternation	-0.107
	(0.261)
Irrigation	0.907***
	(0.318)
Keel Irrigation	-1.853*
	(1.078)
Exposure to Natural Disasters	0.937
	(0.620)
Age	0.0132
	(0.0110)
Marital Status	-0.240
	(0.412)
Education	0.245**
	(0.114)
Social Media	0.571*
	(0.326)
Internet	-0.150
	(0.312)
Computer	0.00914
	(0.289)
Smartphone	-0.564
	(0.518)
Number of Household Members	-0.0950**
	(0.0387)
Non-farm Income	0.0429
	(0.0288)
Innovation	-0.191
	(0.272)
Job Satisfaction	-0.288**
	(0.134)
Children who would continue farming	-0.0712
	(0.128)
Preferring their child to be a farmer	-0.0739
	(0.0726)
Number of the District- Dummy	1.094
	(0.835)
Region dummies controlled	
Constant	1.129
	(1.171)
Observations	295
Wald chi2	50.24
Prob>chi2	0.0117
Pseudo R2	0.249

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

It is established that irrigation has a direct impact on agricultural productivity. In the context of agriculture, water is a critical element for the growth and development of plants. Irrigation plays a crucial role in maintaining soil moisture levels by ensuring a regular supply of water to plants, which is vital for their healthy growth. In this context, irrigated farmers can enhance the productivity of their crops and achieve a higher and more stable production level even during drought periods. Irrigation systems ensure the efficient use of water, especially in hot and dry climates, which supports the continuity of agricultural productivity. Consequently, irrigated farmers can observe positive changes in crop productivity by optimizing water management under drought conditions. As a result, irrigating farmers may perceive drought effects more acutely, which may increase their drought perception.

To gain a more nuanced understanding of the influence of irrigation on perceptions of drought, it would be beneficial to consider comparisons with farmers who do not employ irrigation techniques. Farmers lacking irrigation facilities may encounter significant challenges in their agricultural production due to inadequate water resources. Such circumstances may result in a reduction in agricultural productivity and an increase in costs. Furthermore, non-irrigated farmers may frequently employ more constrained strategies to cope with water scarcity. Consequently, farmers lacking irrigation facilities may adopt a more fatalistic outlook with regard to water scarcity and drought conditions. Such an outlook may lead to the conclusion that the impact of drought is unavoidable and challenging to navigate. This fatalistic approach may indicate that non-irrigated farmers are less concerned about drought conditions or take fewer precautions against them. In this context, it is hypothesized that drought perception may be lower in non-irrigated regions.

However, the impact of irrigation on drought perception is not limited to the physical availability of water. The agricultural security and productivity provided by irrigation systems also affect farmers' perceptions and risk assessments of drought. Farmers who are able to irrigate their crops are more confident in the continuity of their agricultural production, which can reduce stress levels during drought periods. Furthermore, farmers who are able to manage water more effectively with irrigation systems are better equipped to develop more effective and informed strategies in drought situations. This may lead to a more pronounced drought perception.

In this context, the impact of irrigation on drought perception is closely linked to the agricultural productivity and security provided by irrigation, as well as the strategies and perceptions developed by farmers lacking irrigation facilities in response to water scarcity. The increasing effect of irrigation on drought perception can be explained by the improved management of water resources and the enhanced productivity of irrigated farmers. Conversely, the fatalistic approach of non-irrigated farmers may result in a reduction in drought perception. In this context, an increase in irrigation opportunities and improvements in water management strategies may have a positive impact on agricultural production and drought perception. These findings highlight the necessity of incorporating these elements into the development of agricultural policies and drought management strategies.

The results of the model indicate that the education variable has a statistically significant results regarding farmers' drought perception at the 5% level ($p < 0.05$). It can be observed that an increase in the level of education has a positive effect on the drought perception of farmers. This finding indicates as farmers are getting educated, their level of drought perception also increases. Hence, the perceptions and behaviors of educated farmers with regard to drought are directly related to the level of education. An increase in the level of education may facilitate the development of more conscious and effective strategies among farmers to mitigate the impact of natural disasters such as drought.

Education provides individuals with the capacity to make more informed decisions across a range of domains, enhancing their knowledge and abilities. In the context of the agricultural sector, educated farmers are typically able to access more up-to-date and comprehensive information. Education can facilitate the development of a more profound comprehension of water management, agricultural practices and drought management among farmers. Those with higher levels of education are better equipped to analyze the impact of drought conditions on agricultural productivity and to develop more effective strategies to cope.

In particular, educated farmers demonstrate a heightened awareness of agricultural practices, which is of significant consequence for the stewardship of water resources and the advancement of agricultural techniques. Training provides farmers with information on contemporary irrigation methodologies, soil management practices, and techniques for the conservation of water.

The application of this knowledge enables farmers to develop more effective solutions to drought conditions. For instance, those with a higher level of education are able to adopt techniques that enable the more efficient use of water, thereby enhancing their resilience during periods of drought by increasing crop yields.,

Furthermore, training facilitates a more comprehensive comprehension of the risks and consequences associated with drought conditions. Those with a higher level of education are better placed to identify the early symptoms of drought and to take the appropriate action in response. By familiarizing farmers with an array of drought management strategies, training equips them with the capacity to implement these strategies with greater efficacy. This equips educated farmers with the capacity to anticipate and mitigate the effects of drought conditions.

Nevertheless, it is essential that the knowledge and skills acquired by farmers in training are not only applied in a theoretical manner, but also in a practical one. While training can facilitate access to knowledge, the effective application of this knowledge is also a critical factor. The integration of the knowledge gained through training into agricultural activities enables trained farmers to develop more effective and appropriate strategies for the mitigation of natural disasters such as drought. This may result in a favorable alteration to their perception of drought.

Conversely, an increase in the level of education can also lead to an enhancement of the general level of knowledge and awareness within the agricultural sector. By enhancing the level of knowledge not only of individual farmers but also of the farming community in general, education can facilitate the development of a collective preparedness and response capacity to natural disasters such as drought. This can be an important step towards the maintenance of agricultural productivity and the ability to cope with challenging conditions such as drought.

In conclusion, the positive effect of the educational variable on drought perception is directly related to the ability of educated farmers to develop more informed and effective drought management strategies. Education provides farmers with information on improved water management and agricultural practices, thereby enabling them to gain a more nuanced understanding of drought risks and to implement appropriate measures to cope with these risks. This positive shift in drought perception among educated farmers has the potential to enhance the sustainability of agricultural productivity and facilitate effective drought management across the agricultural sector. It was found that the use of social media had a statistically significant effect ($p < 0.10$) on drought perception. The findings pointed out that the drought perception of farmers using social media is higher than farmers not employing. This reveals that social media played a role in increasing the drought perception of farmers and that these platforms functioned as an important tool for the acquisition of information. The impact of social media has become increasingly pronounced in the context of the digitalization of information access and sharing.

In the contemporary era, characterized by the rapid dissemination of information and communication, social media is widely acknowledged as a pivotal source of data, particularly within the agricultural domain. The agricultural sector must adapt rapidly to changing climatic conditions and environmental factors. Social media provides farmers with up-to-date information and innovations, thus supporting this adaptation. Social media platforms offer farmers a plethora of information, including agricultural news, drought warnings, water management techniques, and other pertinent agricultural data. The aforementioned information flow enables farmers to be more aware of disasters such as droughts and to develop appropriate strategies for these situations.

The role of social media in facilitating the sharing of information is pivotal in enhancing farmers' awareness and perceptions about drought. The information obtained through social media facilitates a more nuanced understanding of drought conditions among farmers. To illustrate, the dissemination of experiences, success stories and expert opinions via social media can augment farmers' understanding of drought and facilitate the formulation of more efficacious strategies. Furthermore, social media offers expedient access to novelties in agricultural practices and drought management, thus enabling farmers to remain apprised of the latest developments and integrate them into their agricultural practices.

The provision of information and the facilitation of interaction by social media encourages farmers to adopt a more proactive approach to drought. The information shared on social media platforms provides farmers with the opportunity to learn and implement a variety of drought management strategies. Moreover, participation in online discussions pertaining to drought management affords farmers the opportunity to gain insight from a diverse array of perspectives and experiences. This may serve to further enhance their perception of drought and facilitate more informed decision-making.

Conversely, the dissemination of information by social media platforms can assist farmers in more accurately assessing the risks and opportunities associated with drought conditions. It is crucial for farmers to exercise discernment when evaluating information obtained from social media, as it may not always be accurate or reliable. Nevertheless, the utilization of information from reliable sources and expert opinions enables farmers to formulate more efficacious and well-informed strategies to cope with drought conditions.

The influence of social media extends beyond the mere dissemination of information. Furthermore, social media platforms facilitate the exchange of knowledge and experience among farmers. The networks and communities established through these platforms facilitate the exchange of information and the sharing of experiences among farmers. Such social interaction can assist farmers in establishing a collective repository of knowledge regarding natural disasters such as drought, thereby enabling more effective utilization of this knowledge in their practices.

It can therefore be concluded that the beneficial impact of social media on drought perception is contingent upon the timely and multifaceted information disseminated via these platforms, which facilitates the acquisition of knowledge. The deployment of social media affords farmers the opportunity to disseminate information regarding drought conditions, thereby facilitating the integration of this knowledge into their agricultural practices. The function of social media platforms in facilitating the sharing of information serves to enhance farmers' awareness of drought conditions, thereby enabling them to develop more effective and informed strategies for dealing with such

circumstances. The dissemination of information via social media can assist farmers in maintaining agricultural productivity and mitigating the effects of drought.
In contrast, the findings of our investigation indicate that keel irrigation has a negative impact on drought perception ($p < 0.10$). Such a result highlights that farmers' employing keel irrigation has lower drought perception. It provides important insights into how this situation affects farmers' perception of drought. This finding may assist in developing a more profound comprehension of the manner in which irrigation practice, specifically limited or inefficient irrigation methods, influences farmers' perceptions of and concerns regarding drought.

Keel irrigation denotes circumstances wherein water resources are not employed in an optimal manner. Such irrigation methods are frequently linked with reduced productivity, water wastage and inadequate water distribution. In circumstances where irrigation systems are constrained or not effectively deployed, farmers may indicate that they perceive the impact of drought to be less pronounced or that they have a reduced level of concern. This may be attributed to a number of factors. In the case of keel irrigation practices, the inefficient deployment of water has a direct impact on agricultural productivity. Such practices have the potential to reduce crop yields due to a lack of irrigation, thereby limiting agricultural productivity under conditions of drought.

When farmers consider the impact of irrigation deficiencies on productivity, they may believe that they will experience the effects of drought to a lesser extent. Consequently, the perception of drought among farmers in regions utilizing keel irrigation may be less pronounced. Additionally, in regions where keel irrigation is prevalent, farmers may tend to adopt a more fatalistic outlook. This may indicate that the occurrence of irrigation deficiencies is an unavoidable consequence, thereby limiting the potential measures that can be taken to mitigate the impact of drought conditions. A fatalistic outlook may result in farmers exhibiting reduced concern about drought conditions and a corresponding decrease in their prioritization of these issues. This may result in a diminished perception of the severity of drought conditions. Conversely, in regions where keel irrigation is prevalent, farmers may be deficient in knowledge regarding the ineffectiveness of these techniques and the means of enhancing irrigation efficiency.

A lack of education and knowledge may result in a diminished understanding of the impacts of drought among farmers. This lack of knowledge may result in farmers underestimating the impacts of drought conditions, which could contribute to a continued low perception of drought. In the context of keel irrigation practices, farmers frequently evaluate the most effective strategies for utilizing available water resources. Nevertheless, in instances where this is inadequate, farmers may have acquiesced to the prevailing circumstances rather than formulating strategies to address these deficiencies. Such an approach can influence the way in which farmers perceive the impact of droughts and their level of concern.

In light of the aforementioned considerations, the influence of irrigation practices on drought perception represents a factor that directly impacts the efficacy of irrigation methodologies, the knowledge base of farmers, and their adaptation strategies. The implementation of constrained irrigation practices, such as keel irrigation, may result in a reduction in agricultural productivity during periods of drought, which could subsequently influence the perception of drought among farmers. The consequences of constrained irrigation methods may result in a lessening of the perceived severity of drought conditions among farmers, or alternatively, a reduction in their concern about such circumstances. In this context, it is crucial to gain insight into the impact of keel irrigation on farmers' perception of drought in order to enhance irrigation methods and drought coping strategies.

In addition, our research considers the impact of other variables, such as household size and job satisfaction, on drought perception. A comprehensive understanding of the effects of these variables can provide valuable insights into agricultural production and drought coping strategies.

The model revealed that the number of household members has a statistically significant effect on farmers' drought perception ($p < 0.05$). The positive effect of this variable is significant in terms of understanding the impact of household size on drought perception. In alignment with this, as the number of household members increases, farmers tend to exhibit greater awareness of drought conditions. An increase in the number of household members may necessitate greater labor and resources in agricultural production. This may indicate that farmers are more susceptible to adverse conditions such as drought or may implement more robust strategies to cope with such circumstances.

In particular, an increase in the number of individuals within a household is likely to result in a greater demand for labor and a more complex division of labor within agricultural activities. This may have an impact on agricultural productivity and potentially increase the vulnerability of the household to natural disasters such as drought. Furthermore, it may be beneficial to examine whether an extended family structure is a contributing factor in how farmers perceive drought conditions, and whether social dynamics and support systems within the household also play a role. An increase in the number of individuals within a household may influence the formation and maintenance of social support networks, as well as the division of labor and the distribution of resources within the family unit. This may result in discrepancies in the manner in which farmers perceive and cope with drought periods. To illustrate, farmers with a large family structure may offer greater solidarity and labor sharing during periods of drought, whereas smaller families may be less able to provide such assistance.

The model revealed a significant effect of the job satisfaction variable on drought perception. The effect of job satisfaction on drought perception was found to be statistically significant ($p < 0.05$). The findings revealed that a positive correlation exists between job satisfaction and farmers’ drought perception, that is, farmers are more inclined to display greater drought perception with an increase in job satisfaction. A high level of job satisfaction may result in farmers adopting a more positive perspective on their agricultural activities and general living conditions. It can be posited that an increase in job satisfaction may lead to an enhancement in farmers' commitment and motivation to their agricultural work, which may subsequently impact their capacity to cope with challenging conditions such as drought.

A high level of job satisfaction may facilitate a more optimistic outlook among farmers during periods of drought, enabling them to develop more effective coping strategies. Moreover, high job satisfaction may enhance farmers' dedication to their profession, prompting them to exhibit less concern about the continuity of their agricultural operations even in the face of adversity, such as drought. Furthermore, job satisfaction is associated with farmers' overall quality of life and satisfaction with their work environment. This may affect their agricultural productivity and resilience to disasters such as drought.

The overall fit of the model was found to be statistically significant according to the Wald chi-squared test ($p < 0.01$), with a pseudo R2 value of 0.249. The results indicate that the model is, to some extent, successful in explaining drought perception. Nevertheless, the intricate web of relationships between variables indicates that the impact of factors such as irrigation and education on drought perception necessitates further investigation. In light of these findings, the study emphasizes the necessity of considering factors such as education and access to information when developing drought coping strategies. It can be concluded that further research is required in order to gain a deeper understanding of the complex interactions between the various factors that influence drought perception, with a view to developing more effective measures. This analysis reveals the effects of household size and job satisfaction on drought perception, thereby identifying factors that should be considered in farmers' drought coping strategies. While an increase in the number of people in a household may necessitate greater input of labor and resources in agricultural production, job satisfaction may encourage farmers to adopt a more positive approach during periods of drought. These findings indicate that intra-household dynamics and farmers' job satisfaction should be considered in the development of drought coping strategies.

5. DISCUSSION, CONCLUSION AND IMPLICATIONS

5.1. Discussion

5.1.1. Drought Perception

Water is one of the basic resources of life and has played a central role in the development of civilizations since human history. The management of water resources is of critical importance, especially for agricultural production and economic sustainability. Accordingly, water crises such as droughts have economic consequences both at the national and global level (Konikow & Kendy., 2005). In this paper, the effects of water scarcity and drought on the economic structures of Türkiye and the world at large were analyzed in detail. Türkiye is a country known for its large agricultural sector and vast agricultural lands. Agriculture plays a central role in the country's economic structure and provides large-scale employment in rural areas. However, Türkiye's water resources are under great pressure due to climate change and increasing water demand.

Drought perception is a concept related to how individuals or communities understand and evaluate drought events. This perception is shaped under the influence of various factors and can be influenced by factors such as drought-related experiences, level of information, media influence, cultural beliefs, and personal or social observations. In the current study, the drought perception of farmers in Konya was attempted to portray, and the results indicated that education, seeking advice, social media, job satisfaction, keel irrigation, and household size.

The perception of drought depends on the knowledge and awareness that individuals or communities have about drought. Several studies have also emphasized that the educational level factor is very important in the acquisition of drought perception by farmers (Alam, 2015; Deressa et al., 2010, Keshavarz et al., 2013; Khan et al., 2017; Zarafshani et al., 2012). These researchers have stated that as the level of education increases, the perception of disaster increases in parallel. In our study, 75% of illiterate participants, 87% of primary school graduates, 96% of secondary school graduates, 91% of high school graduates, and 95% of university graduates and above said that they believed that there would be drought in the future. The results hinted that education and awareness-raising campaigns can influence the extent to which the public knows about drought and its potential impacts.

Social media plays an important role in the dissemination of drought-related information. Drought news, reports and expert commentary in the media can shape public perception and inform the public about the seriousness of drought. In many studies in the literature, equivalent results have been found and it has been reported that the perception of disaster can improve as the development of infrastructure solutions, media dissemination and people's access to technological devices become stronger (Manandhar et al., 2010; Wachinger et al., 2012; Zarafsha et al., 2012).

Farmers' job satisfaction has become a focal point in some research studies (Maican et al., 2021; Papadopoulou, 2019). However, the relationship between job satisfaction and drought perception has remained underexplored. Therefore, this study proffers valuable insights into the interplay between them. The results showed that there is a positive correlation between drought perception and job satisfaction. Such a result can contribute to the understanding of the importance of farmers' job satisfaction not only for their daily lives but also their perception of drought, hence their conceptualization of the measures they have to take for drought.

There are many reasons why the high number of people in the household has a high impact on individuals' perceptions of drought. First and foremost, the characteristic of a large family structure is of great benefit to high coordination, information sharing, labor distribution and planning strategies in terms of effective use of limited water resources. Solidarity is one of the situations where people living in households have an advantage over small households. For example, when a farmer faces drought, if the number of households is high, livelihoods and crop productivity are at risk. A higher number of people in the household leads to increased awareness of this situation, efficient use of water to balance the water consumption of family members in agricultural production and can help to carry out more active policies against drought. Studies in the literature indicate that agricultural production is almost the only source of livelihood for most farmers in the world (Roy et al., 2022; Ashraf & Routray, 2013; Deressa et al., 2010; Sikka et al., 2020). A high household size may lead to increased economic stress for the farmer. This may lead the farmer to become a conscious water consumer in favor of more efficient irrigation management, higher yields, and reduced water stress.

Drought perception is critical for drought management and emergency planning. Individuals' and communities' perceptions of drought can influence how they adopt drought management strategies, what measures they take and how they behave in crisis situations. Effective drought management and preparations beforehand require accurately addressing communities' perception of drought and developing appropriate strategies based on this perception. Understanding drought perception can help provide more effective and targeted solutions in areas such as government policies, local government strategies, and agricultural practices. Therefore, understanding drought perception and determining how this perception is influenced by various social, economic, and cultural factors is important for successful drought management.

This study examined in detail the drought perceptions, awareness, and precautions taken by farmers in Konya province of Türkiye. It attempted to examine in depth the drought perceptions of farmers in Konya province, their level of awareness about the reduction of water resources, and the measures they take during drought periods. Konya stands out as one of the centers of Türkiye's agricultural production, highlighting its importance in maintaining agricultural sustainability and productivity in the face of climatic challenges such as drought. The study collected data through face-to-face surveys with farmers growing crops such as barley, sunflower, wheat, carrot and sugar beet for one year, and these data were processed by frequency analysis. The findings provide important information on farmers' drought perceptions, awareness levels and the measures they implement.

It was found that farmers' perceptions about drought were generally high, but the measures they implemented differed in terms of effectiveness. The findings of the study reveal the level of awareness of farmers about the reduction of water resources in case of drought and the effect of this level of awareness on the measures they take. In particular, the tendency towards modern irrigation techniques such as drip irrigation and reduction of water consumption reflects farmers' strategies to cope with drought and provides important clues about the applicability of these strategies. However, further training and strengthening of support mechanisms are needed for effective implementation of these measures.

5.1.2. The Significance of Raising Drought Perception: An Economic Aspect

The present study also attempted to provide insights into the economic impacts of drought by analyzing the perceptions, awareness, and precautions taken by farmers in Konya province. Drought directly affects agricultural productivity and thus regional economic performance by reducing water resources. In agriculture-oriented regions such as Konya, the economic impacts of drought are manifested in the reduction of both agricultural production and farmers' incomes. In this context, the findings of the study reveal the economic consequences, positive and negative impacts of drought in detail.

Agricultural activities in Konya province play a central role in the economic structure of the region. The cultivation of crops such as barley, sunflower, wheat, carrots and sugar beet both supports local economic growth and provides employment. However, the decline in water resources due to drought has severely affected agricultural productivity. Water shortages reduce the productivity of agricultural land and lead to crop losses. This leads to a decrease in farmers' incomes and causes economic imbalances in the agricultural sector. The need for farmers to use water resources more carefully during drought periods increases production costs and the economic impact of this situation is increasing. Drought also affects the market prices of agricultural products. Decline in production reduces the supply of products, which leads to an increase in market prices. High product prices have unfavorable consequences for consumers, which can disrupt regional economic balances. Such results indicate the reciprocal relationship between drought and economy, that is, the drought affects economic growth and is affected by the economic factors. Udmale et al. (2014), in a study conducted in Madakashar region of India, indicated that one of the most important measures taken in the field of combating drought is to provide the necessary financial support to farmers to switch to drip irrigation systems and to save water. Similar practices have been implemented by other countries (Candela et al., 2012; Gómez Gómez & Pérez Blanco, 2012; Madramootoo, 2012; Roy et al., 2022; Sikka et al., 2020).

On the other hand, measures and strategic approaches taken to combat drought can have some positive economic results. The transition of farmers to modern irrigation techniques such as drip irrigation and water conservation leads to more efficient use of water resources. Adoption of such techniques can help maintain agricultural productivity and reduce costs. In addition, water conservation training and awareness programs enable farmers to adopt more effective water management practices. Similar suggestions have been made in studies in the literature that emphasize the importance of government subsidies and incentives for farmers around the world and that government subsidies and incentives will allow people to be more aware of drought (Ashraf & Routray, 2013; Famiglietti, 2014; Langridge, & Daniels, 2017; Konikow, 2015; Manandhar et al., 2010; Sikka et al., 2015).

In regions with high drought risk, such as Konya, agricultural productivity is directly affected by water scarcity. Although Konya is known as the wheat granary of Türkiye, the productivity of wheat and other agricultural crops is decreasing due to insufficient water resources. Water scarcity reduces farmers' incomes and increases the costs of agricultural products. This situation leads to rising food prices and consumer inflation, disrupting the general economic balance.

Drought hits not only agricultural productivity but also industrial sectors that directly affect water resources. Water is a key component in industrial production and energy generation. During periods of drought, restrictions on water use can hamper industrial production and energy generation. This can lead to large-scale production losses in the national economy and a slowdown in economic growth rates. Moreover, water crises can have long-term economic impacts by damaging the economic infrastructure that supports agricultural activities in rural areas. A similar result was obtained by Jenkins (2013), reporting that drought-induced water scarcity threatens agricultural production as well as energy production, industrial production and heavy industry production, putting the drought-stricken country at serious economic risk.

On a global scale, water scarcity and drought have major impacts on various areas of the world economy. The growing world population and industrialization increase the demand for water resources, leading to water crises. Global water scarcity affects agricultural production, threatening food security worldwide and increasing food prices. Water crises create difficulties in food supply, especially in developing countries, which increases poverty and deepens economic inequality. Kiem and Austin's study (2013) conducted in Australia found that drought threatened the international commodity market and made it more challenging for the external market and people to access food than the country's domestic problems.

Drought and water scarcity directly affect agricultural productivity, leading to disruptions in global food chains. Agriculture is an important sector in the world economy and water crises reduce agricultural productivity, creating imbalances in food supply. This can lead to higher food prices worldwide and make food access more difficult in low-income countries. The existing literature revealed that drought does not only affect a single country but also disrupts the supply chain around the world and leads to a global crisis (Kiem & Austin, 2013). Water scarcity also has major economic impacts on the industrial and energy sectors. Water is used as a key component in energy production; hydroelectric power plants and cooling systems depend on water. Drought can limit energy production capacity, increasing energy prices and hampering industrial production. This can cause fluctuations in global economic growth rates and production losses in industrial sectors.

Various strategies and measures should be developed to mitigate the economic impacts of drought and ensure the sustainability of water resources. Both in Türkiye and globally, water management policies need to be strengthened and made more effective. Promotion of modern water-saving irrigation techniques is of great importance for the efficient use of water. The dissemination of technologies such as drip irrigation can be effective in maintaining agricultural productivity and reducing water consumption. As indicated in the existing literature, sustainable water use, such as the widespread use of drip irrigation and conscious water consumption, emerge as prominent factors in reducing drought (Alam, 2015; Candela et al., 2015; Konikow & Kendy, 2005; Xiao-jun et al., 2012).

5.2. Conclusion and Implications

The prominent aim of this study was to depict the farmers’ drought perception and their measures, hence shedding on light the agricultural activities regarding drought in Konya. The results of the probit model demonstrated that education, accessing social media, job satisfaction, keel irrigation, and household size have a statistically significance in identifying farmers’ drought perception. The findings of the study show that the awareness of farmers in Konya on drought is generally high, but the measures they implement are limited and often restricted to traditional methods. Most of the farmers stated that they apply modern irrigation techniques such as drip irrigation, but significant differences were observed in the level of prevalence and effectiveness of these methods. In addition, practices such as reducing water consumption and water conservation were also found to be prominent. These findings reveal the importance of both training and incentives for effective implementation of drought coping strategies.

The findings pointed out that the awareness of farmers in Konya on drought is generally high, but the measures they implement are limited and often restricted to traditional methods. Most of the farmers stated that they apply modern irrigation techniques such as drip irrigation, but significant differences were observed in the level of prevalence and effectiveness of these methods. In addition, practices such as reducing water consumption and water conservation were also found to be prominent. These findings reveal the importance of both training and incentives for effective implementation of drought coping strategies.

Farmers' perceptions and awareness of drought in Konya are critical for maintaining agricultural productivity and mitigating drought impacts. The results emphasized the need to increase farmers' knowledge and skills on drought. Training programs and awareness-raising campaigns can improve farmers' ability to cope with drought and protect agricultural productivity. In addition, support mechanisms for farmers need to be strengthened and drought management strategies need to be implemented more effectively. In Türkiye, many activities are carried out on agricultural productivity, water resources and financial literacy (see Literature Review Section 2.3.). However, it can be said that the fact that most farmers cannot participate in the activities of these institutions and organizations, cannot be a partner in their activities, and do not receive training is among the factors that negatively affect the drought perception of farmers in Konya region. In our study, some farmers stated that they could not take any measures against drought with fatalistic beliefs, while some farmers stated that their economic situation was challenging, and they could not take measures for this reason. As a result, the state and non-governmental organizations in the region should conduct a comprehensive demographic structure analysis, determine the different needs of the regions according to this analysis and make policies in this regard, and provide financial grants and loans with affordable interest rates not only for the education of people but also for them to participate in the activities after this education can positively affect the perception of drought in the region.

In a global context, conservation and effective management of water resources is a common challenge for many countries. Water resource depletion is recognized as a major problem threatening agricultural productivity and ecosystem health. Türkiye's approaches to water management and drought management strategies have several advantages and limitations compared to international best practices. For example, the promotion of modern irrigation techniques and water conservation practices are among the successful examples at the global level. However, Türkiye needs to disseminate these practices more widely and support them with technological innovations to reach farmers. As social media and education surfaced as eminent factors affecting drought perception, these dissemination activities should be fortified to deliver farmers information about the possible results of drought and its economic impact on both individuals and governments.

Drought management is a problem faced by many countries on a global scale. Drought can result in inadequate water resources, increased water consumption and reduced agricultural productivity. The most successful strategies used worldwide to combat drought include the integration of early warning systems, comprehensive drought management plans and water conservation techniques. If Türkiye invests more in these strategies and updates its existing policies accordingly, it can contribute to achieving more successful results in mitigating the impacts of drought, potentially resulting in economic growth.

Adopting international best practices in water management and drought management will enable Türkiye to protect water resources more effectively and contribute to a sustainable future. The integration of digital technologies and data analytics can provide more effective solutions in water management. Türkiye's increased investment in these technologies and strengthening its existing policies in this direction can be part of successful water management and drought management strategies at the global level.

As a result, water scarcity and drought have widespread economic impacts both in Türkiye and globally. In many sectors, from agricultural productivity to industrial production, the economic consequences of water crises are deeply felt. In this context, sustainable management of water resources and development of effective drought management strategies are critical for maintaining economic balance and preventing future crises. The implementation of these strategies will both support economic stability and contribute to the conservation of water resources.

This study, which analyses in detail the drought perceptions of farmers in Konya province of Türkiye and the measures they implement, provides important findings at both national and global levels to ensure agricultural sustainability and mitigate the impacts of drought. Reviewing Türkiye's current strategies, harmonizing them with international standards, and developing innovative solutions can contribute to achieving more effective results in water management and combating drought. In this context, the importance of raising awareness about drought among farmers and strengthening appropriate support mechanisms is one of the most important findings of the study. These findings will provide a valuable basis for the development and implementation of regional and national policies. This study further analyzed the economic impacts of drought and farmers' coping strategies in Konya province. It was found that farmers' perceptions and awareness of drought are high, but the measures they implement are limited in terms of effectiveness. In this context, more comprehensive strategies for drought management and increasing agricultural productivity should be developed and disseminated.

In alignment with these conclusions, recommendations include the organization of more training and awareness-raising programs for farmers. These programs can encourage the effective implementation of modern irrigation techniques and water saving methods. It is also important to increase financial support to farmers during drought periods and to develop more incentive schemes to ensure continuity of agricultural production. Drought management strategies at regional and national level need to be strengthened and more comprehensive and effective policies and programs need to be established to protect water resources and increase agricultural productivity. These strategies can support economic stability and increase regional economic prosperity by maintaining agricultural productivity. At the global level, drought is causing water resources to dwindle and food production to be jeopardized worldwide. Water scarcity has varying degrees of impact in different parts of the continent, leading to food security crises and social unrest in some regions. Global warming and climate change are increasing the frequency and severity of drought events, necessitating a reshaping of international water and food security policies. International co-operation and technology transfer are important in the fight against drought. Developed countries are developing advanced technologies in drought management and water conservation, and the transfer of this knowledge and technologies to developing countries can provide an effective response to the global water crisis. In addition, sustainable water management and agricultural production policies should be promoted at the global level.

In Türkiye, drought has significant impacts on energy production, water supply and ecosystem health as well as agricultural production. The decrease in the average annual rainfall across the country and the decrease in water resources directly affect the productivity of agricultural products and energy production. In the energy sector, water-based energy resources such as hydroelectric power generation are decreasing, which increases energy costs and leads to economic imbalances. Also, in agriculture, water resources need to be managed more carefully with the impact of drought. Türkiye's agricultural sector is in an environment that requires effective implementation of water management and drought mitigation policies.

Drought mitigation policies in Türkiye and globally need to be updated and effectively implemented. Supporting water management and agricultural support policies with innovative solutions can ensure economic and environmental sustainability. International co-operation and technology transfer should be encouraged for an effective response to the global water crisis. The transfer of knowledge and technology on drought management by developed countries to developing countries can contribute to global water security. In conclusion, drought has significant economic and environmental impacts both in Türkiye and worldwide. Integrated and innovative strategies are needed to manage and mitigate these impacts. Improvements in water management, agricultural practices and education can contribute to a sustainable future by reducing the economic impacts of drought.

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