

Situation Assessment on Drought in District Dadu

The effect of drought on crops, livestock, food, water and health.

Half of households (52%) depend on farming, and communities had no formal drought plan.

Written by Nasrullah Naich for the Welthungerhilfe drought project.

April 1, 2024

In partnership with



Contents

1.	Background	3
2.	Methodology.....	3
3.	Demographic Information	4
4.	Drought Impact on Agriculture	6
5.	Drought Affects Livestock Sector.....	10
6.	Socioeconomic Impact	12
7.	Food Security	15
8.	Health and Nutrition.....	16
9.	Livelihood.....	17
9.1	Drought awareness and knowledge.....	19
10.	Climate change & Water Security	20
10.1	Perception of Climate Change	20
10.2	Perception on Water Security	21
11.	Preparedness & Response.....	23
12.	Conclusion	23
13.	Recommendations.....	24
14.	References	25
15.	Annexes	26

1. Background

Nestled in the southern province of Sindh, Pakistan, District Dadu's lifeblood is the monsoon season, spanning from July to September. These months are not just a temporal marker but a pivotal climatic event that replenishes the land and feeds its rivers, sustaining agriculture and the communities' way of life. Historically, these rains account for the lion's share of the annual precipitation, nurturing crops, and filling aquifers.

Yet, recent times have seen a worrying shift in this pattern. Meteorological data has laid bare a stark reality – a significant shortfall in the expected monsoon deluge. August 2023 stands out in the annals of Pakistan's weather records as the second driest month witnessed in over six decades. A month that should have brought life-giving rain instead deepened the thirst of the earth and the concerns of the people.

In Sindh, where nearly four-fifths of the year's rain is delivered by the monsoon, the absence of expected rainfall has been acutely felt. The shortfall is not just a statistic but a harbinger of challenging times ahead. Fields lie parched, and wells, once brimming, reflect the sky with deceptive calm. The cumulative effect of this deficit is a creeping dry spell, a mild drought that has clasped Dadu district in its arid embrace.

This climatic anomaly has unsettled the natural order and rhythm of agricultural cycles, with cascading effects on food security, livelihoods, and the socio-economic fabric of Dadu. The community, resilient as it is, finds itself at a crossroads, facing the environmental consequences of changing global weather patterns. The urgent need for adaptive strategies and robust contingency planning has never been more apparent as Dadu district confronts the realities of a drier future.

2. Methodology

The study conducted in Tehsil Johi of District Dadu, Sindh province, employed a qualitative approach to assess the impacts of drought on various sectors such as agriculture, livestock, and socioeconomic aspects of life. The methodology comprised focus group discussions (FGDs) utilizing a well-structured tool designed to elicit detailed information from the community about their experiences with and responses to drought conditions.

The methodology was characterized by a participatory approach, with discussions held in 15 villages across 5 union councils. The selection of 15 villages from 5 union councils for this study was not arbitrary. These specific locales have been recognized as disaster-prone zones by the District Government of Dadu, underscoring the critical need for targeted research in these areas. The acknowledgement of these zones as vulnerable to calamity was the guiding criterion for their inclusion in the assessment.

A team of 4 data collectors was deployed, ensuring that a wide range of perspectives was captured. Participants were selected conveniently to represent the diverse impacts of drought, including those on male-headed, female-headed, and child-headed households. Attention was

paid to include individuals from various demographic segments, such as the elderly, persons with disabilities, and government employees, to obtain a comprehensive understanding of the drought's effects.

3. Demographic Information

The study conducted a comprehensive assessment through focus group discussions in the Sindh province. Specifically, the research covered District Dadu, focusing on Tehsil Johi. Within this Tehsil, the assessment spanned 5 Union Councils, ultimately reaching out to 15 different villages. This geographical scope indicates a detailed, ground-level approach to data collection, ensuring that a broad spectrum of local perspectives was incorporated into the study findings.

Table 1. Focus group discussions origins, Union Councils and villages

Province	District	Tehsil/ Taluka	Union Council	Village
Sindh	Dadu	Johi	Chinni	Chaker Khan Shahani
				Sijawal Alkhani
				Umar Bozdar
			Drigh Bala	Bazmal Khoso
				Nanger Dario
				Wali Muhammad Gopang
			Pat Gul Muhammad	Hero Khan
				Manjhi Lao
				Shahdan
			Sawro	Golo Faqeer
				Qasim Roadnani
				Shahak Roadnani
			Tando Raheem Khan	Ali Muhammad Shahani
				Khandani
				Toree

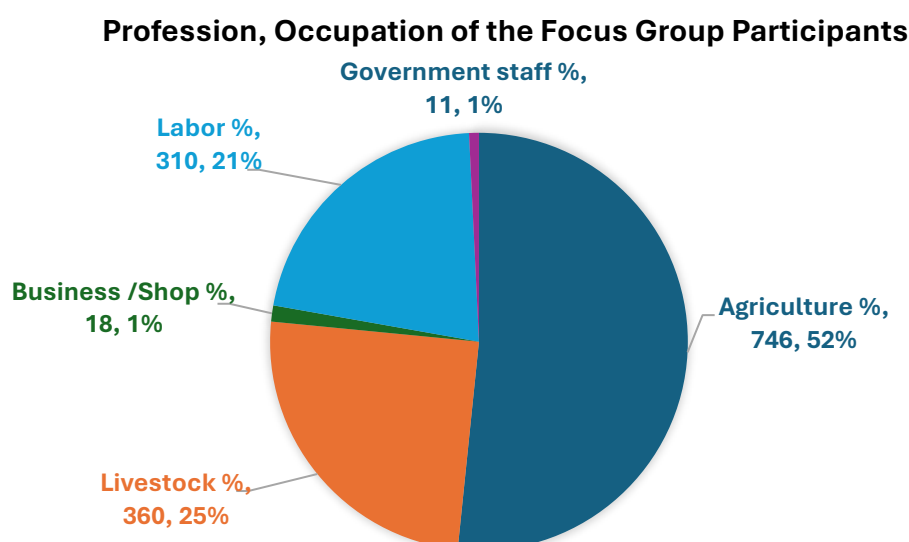
The study ensured equal inclusion of both genders to gather a wide range of perspectives, including those of the elderly, individuals with disabilities, and government employees. Among these 328 participants; 52% were male, while 48% female, 17% elderly, 7% individuals with some form of disability, and 1% were government employees.

Table 2. Focus group discussions participants

Indicator	Male	Female	Elderly	PWD	Government
Numbers	169	159	56	24	2
Percentage	52%	48%	17%	7%	1%

The findings from the focus group discussions (FGDs) reveal a diverse study population predominantly engaged in agriculture, which comprises 52% of the participants. Livestock-related professions form the second-largest group, accounting for 25% of the population. The study shows a significant 21% are involved in labour and a smaller segment of just 1% are shop or business owners, and an equivalent proportion of 1% includes individuals in formal employment sectors. This demographic distribution reflects the agrarian nature of the community and underscores the importance of agriculture and livestock in the local economy.

Graph 1. Profession, occupation of the focus group participants



The literacy rate among the surveyed population in Tehsil Johi, District Dadu, is a significant indicator of the community's educational status. The assessment of the surveyed population reveals a literacy rate of 55%. This percentage indicates that over half of the community possesses basic reading and writing skills. While this demonstrates a positive step towards educational achievement, there remains room for improvement to increase literacy levels further. The existing rate suggests that nearly half the population could still benefit from enhanced educational programs and initiatives designed to bolster literacy and educational attainment.

Table 3. Demographic distribution and household types in Johi Tehsil - Union Councils

Union Council	Village	Male Headed	Women Headed	Child Headed	Total HH	# Men	# Women	# Boys	Total	# PWDs
Sawro	Qasim Roadnani	550	150	95	795	2000	2500	2900	7400	5
	Shahak Roadnani	80	20	10	110	330	425	500	1255	5
	Golo Faqeer	260	20	7	287	520	630	950	2100	3
Chinni	Sijawal alkhani	160	40	15	215	450	530	1250	2230	5
	Umar Bozdar	60	45	0	105	350	400	700	1450	2

	Chaker khan shahani	47	3	0	50	200	250	320	770	0
Drigh Bala	Wali Muhammad Gopang	38	8	4	50	80	120	150	350	7
	Nanger Dario	265	20	15	300	300	380	450	1130	4
	Bazmal khoso	180	97	20	297	700	820	600	2120	5
Tando Raheem Khan	Ali muhammad shahani	150	35	13	198	390	450	550	1390	5
	Toree	200	60	21	281	600	900	450	1950	12
	Khandani	250	40	15	305	840	900	410	2150	8
Pat Gul Muhammad	Shahdan	150	50	32	232	580	750	300	1630	9
	Manjhi lao	170	15	9	194	320	490	549	1359	4
	Hero khan	220	15	7	242	420	550	795	1765	7
Total		2780	618	263	3661	8080	10095	10874	29049	81

The study presents a comprehensive demographic analysis, detailing household types and population distribution within Tehsil Johi and selected Union Councils. The findings indicate that there are a total of 3,661 households, with the majority being male-headed (76%), followed by women-headed (17%), and a smaller number being child-headed households (7%). The overall population across these households is 29,049 individuals, comprising 8,080 men, 10,095 women, and 10,874 boys. Additionally, the study identifies 81 persons with disabilities within this population, reflecting on the demographic and social diversity within the community. These insights are crucial for understanding the family structures, gender dynamics, and the distribution of vulnerable groups within the population, which can inform targeted social and developmental interventions.

4. Drought Impact on Agriculture

The "Focus Group Discussion" data reflects the significant challenges faced by the community in Tehsil Johi, District Dadu, due to drought impacts on agriculture. The lack of sufficiency in own-produced cereals for household consumption highlights the immediate food security issues. The detailed damages to agriculture and the expressed need for specific types of support such as drought-resistant seeds and water storage solutions underscore the community's vulnerability to drought conditions and the urgent need for tailored agricultural support and interventions.

The varied coping strategies, from a lack of drought preparedness to attempts at water conservation, suggest a gap in knowledge and resources that could be addressed through community training and infrastructure development. The mixed responses (60% own land and

40% do not own land) on land ownership further complicate the situation, as not owning land may limit individuals' ability to implement certain agricultural improvements.

Table 4. What are the crops which were most vulnerable to drought?

Vulnerability Ranking	Cotton	Wheat	Sarson / mustard leaves	Rice	Sugarcane	Bajra / type of millet	Maize	Vegetables	Guar / cluster beans	Juwar / sorghum
1 st	0	1	3	0	0	0	0	0	4	7
2 nd	0	0	5	1	0	1	0	2	4	2
3 rd	0	0	4	0	0	5	0	2	2	2
4 th	0	2	2	2	1	4	0	4	0	0
5 th	0	8	0	0	0	1	4	1	1	0

The table 4 presents findings from focus group discussions regarding the vulnerability of various crops to drought conditions in the study area. According to most respondents, juwar (sorghum) was identified as the first most vulnerable crop by seven communities. This was followed by guar (cluster beans), which four communities considered as the first most vulnerable and four as the third most vulnerable crop. Sarson (mustard) was frequently mentioned, with three communities identifying it as the first and four as the third most vulnerable crop. Wheat and bajra (pearl millet) were noted as well, with wheat being listed as the fourth most vulnerable by two communities and bajra as the second and fourth most vulnerable by one and five communities, respectively.

Interestingly, cotton, rice, sugarcane, and maize were mentioned less frequently or not at all by the communities, suggesting a perception that they are less susceptible to drought or perhaps not as central to the local agriculture as the others. Vegetables collectively were deemed moderately vulnerable, with a few mentions across the second, third, and fourth categories.

The focus group discussions reflected a consensus that juwar and guar are the crops most at risk during drought, indicating a potential focus for agricultural support and drought mitigation strategies in the region. The findings underscore the need for targeted interventions to support these crops growing, which are critical to the livelihoods of the local farming community.

Table 5. Preferred alternative crops

Name of the crop	Preferability ranking		
	1 st	2 nd	3 rd
Wheat	1	0	6
Guar	10	2	1
Juwar	3	7	0
Millet	2	0	0

Name of the crop	Preferability ranking		
	1 st	2 nd	3 rd
Sorghum	0	5	1
Maize	0	0	0
Chickpeas / gram	0	0	0
Mash bean	0	0	0
Sunflowers	0	1	4
Vegetables	1	0	3

The table 5 illustrates the preferences for alternative crops that are perceived to be more resilient to drought conditions by the study's respondents. The findings indicate that guar (cluster beans) is the most favoured alternative, with ten communities identifying it as their first choice. This suggests a strong confidence in guar's ability to withstand drought-related threats.

The second most preferred crop is Juwar (sorghum), which seven participants consider their second choice, highlighting its perceived reliability under adverse climatic conditions. Wheat emerges as a versatile crop, being the third preference for six participants, which may reflect its importance in local agriculture despite the challenges posed by drought.

Sunflower appears to be a notable alternative, with four communities placing it as their third preference, potentially due to its hardiness and economic value. Interestingly, crops like chickpeas (gram), millet, mash bean, and vegetables receive a modest number of mentions, indicating a moderate level of preference or potential as alternative crops.

Most respondents lean towards guar and juwar as their top alternative crop choices in response to drought threats, suggesting these crops are considered viable options for sustaining agricultural productivity amid water scarcity. The varied preferences for the third choice of crop indicate a diversity of options that farmers may consider based on local conditions and market opportunities.

Table 6. Reported impacts of drought over several years

Drought Year	2006	2007	2009	2011	2012	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Reduction in crop yields/ productivity	0	2	0	0	0	0	1	1	0	1	0	0	0	9	1
Reduction in irrigation/ water supply	1	0	7	0	0	0	0	1	0	0	1	0	1	0	0
Water table deepened (tube wells)	0	0	0	0	0	0	0	5	0	0	1	2	4	0	1
Tube well went deep	0	0	1	0	0	0	0	0	0	0	0	0	0	1	12
Tube well dried	0	2	4	1	5	0	1	0	0	0	0	0	0	0	0

Drought Year	2006	2007	2009	2011	2012	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Handpump dried	0	4	0	2	1	0	0	4	0	1	0	2	0	0	0
Rainfed/ Khushkaba/ Sailaba farming	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0
Unemployment	0	0	0	0	0	0	0	0	1	1	0	1	0	12	0
Seed banks depleted	0	0	0	0	0	4	0	0	0	0	0	0	3	8	0
Migration due to droughts	0	4	0	0	0	0	1	1	1	0	0	1	2	5	0
Displacement	0	4	0	0	0	0	1	1	1	0	0	1	1	6	0
Return after how many years	0	0	0	0	0	0	0	4	0	1	0	0	0	6	3
Recovered after how many years	0	0	0	0	0	0	0	0	0	0	0	1	4	5	2

The table 6 summarizes the reported impacts of drought over several years, highlighting the specific challenges faced by the local population in terms of agriculture, water supply, and socio-economic conditions.

In terms of agricultural impacts, the year 2022 stands out with the highest number of communities (9) reporting a reduction in crop yields/productivity due to drought. This is followed by the years 2007 and 2018, where two and one communities, respectively, noted reductions in crop yields. Orchard destruction or drying occurred in a single year, 2016, suggesting an episodic event affecting permanent plantings.

Regarding water-related issues, there was a significant report of wells going deeper in 2023, indicating a response to dropping water tables, with 12 instances recorded. This is a stark increase compared to previous years, where such instances were infrequent or not reported. Four communities in 2022 experienced their wells drying up, marking a worrying trend in water availability.

The data reveals socio-economic repercussions of drought, with unemployment peaking in 2022, as reported by 15 communities, which correlates with the agricultural hardships of that year. Seed banks were notably depleted in 2022, with 12 reports, indicating possible issues with future crop sustainability.

Migration due to droughts was most notable in 2022, with 8 instances, and displacement was reported by 5 communities in the same year. These figures suggest that 2022 was particularly challenging, causing more pronounced dislocation within the community.

In contrast, the 'Return after how many years' column shows that in 2023, individuals began to return to their original places of residence after previous displacements, with 3 communities noting their return after an absence of several years. Similarly, the 'Recovered after how many years' column shows that in 2023, 2 communities reported recovery from the drought impacts, indicating a delayed but positive turnaround following the interventions or changes in conditions.

The findings from this study underscore 2022 as a critical year with widespread drought impacts, while 2023 shows signs of recovery and adaptation efforts by the affected population.

5. Drought Affects Livestock Sector

During drought seasons, livestock owners face several challenges. The most pressing issue is the shortage of fodder, which is exacerbated by the lack of water. These conditions not only make it difficult to procure sufficient feed for the animals but lead to an increase in the price of fodder, making it more expensive and less accessible for the owners. Additionally, drought conditions contribute to an increased incidence of diseases in animals, which can affect human health. The scarcity of resources and the heightened cost of maintaining livestock compel many owners to sell their animals to manage home expenses.

To cope with these difficulties, livestock owners adopt various strategies. A common approach is to move animals temporarily or permanently to other areas where fodder and grass are more available. This is often coupled with purchasing fodder from other cities if financial resources allow. To manage limited resources and sustain the remaining livestock, owners sometimes opt to sell a portion of their animals. Support from the community and organizations play a vital role in helping livestock owners navigate the challenges posed by drought seasons, providing essential aid and resources to mitigate the impact on their livelihoods and animal health.

Table 7. Drought effects on livestock sector

Drought Year	2007	2008	2009	2014	2015	2016	2017	2019	2020	2021	2022	2023
Livestock mortality	3	0	0	0	0	0	0	0	3	0	6	3
Sheep /goat died	3	0	0	0	1	0	0	0	1	0	8	1
Hen/chicken died	3	0	0	0	0	0	0	0	1	0	9	1
Increase in animal diseases (specify)	3	0	0	0	0	0	0	0	1	0	6	4
Loss of fodder	3	0	0	0	0	0	0	0	0	0	12	0
Feed insecurity	0	3	0	0	0	0	0	0	0	0	12	0
Rangeland degradation	0	0	3	4	0	1	0	0	0	2	5	0

Drought Year	2007	2008	2009	2014	2015	2016	2017	2019	2020	2021	2022	2023
Abnormal migration	0	0	3	0	1	0	1	2	1	1	6	0
Loss in weight	3	0	0	0	0	0	0	0	0	1	11	0
Malnutrition	0	3	0	0	0	0	0	0	0	0	12	0
Forced to sale livestock at minimal prices	0	0	3	0	0	0	0	0	0	0	11	1
Decrease in milk yield	0	0	3	0	0	0	0	0	1	0	10	1
Decrease in meat	0	3	0	0	0	0	0	0	0	0	10	2

The table 7 presents a detailed record of the effects of drought across several years, focusing on its impact on the livestock sector.

The years 2007, 2020, and 2022 emerge as particularly challenging, with various drought-related effects reported. In 2007, livestock mortality, sheep/goat death, hen/chicken death, increased animal diseases, loss of fodder, and feed insecurity were reported, indicating a significant strain on livestock health and feed availability.

The year 2020 saw a similar pattern, albeit with fewer reports of sheep/goat and hen/chicken deaths, but a notable increase in cases of loss in weight and decrease in milk yield and meat production, each reported three times. This suggests that while fewer animals may have died, the productivity and health of the livestock population were severely compromised.

The most affected year appears to be 2022, showing the highest numbers across several indicators. Livestock mortality, sheep/goat death, and increased animal diseases were reported six, eight, and nine times, respectively. There was a significant loss of fodder (12 instances) and a corresponding number of reports of feed insecurity, rangeland degradation, and forced sale of livestock at minimal prices. The same year recorded high instances of abnormal migration (5 times), loss in weight (11 times), malnutrition (11 times), and a decline in milk yield and meat production (11 and 10 times, respectively).

In 2023, there was a reduction in the number of reports for most indicators, with livestock mortality, sheep/goat death, and hen/chicken death reported three, one, and one times, respectively. However, an increase in animal diseases remained a concern, reported four times.

The findings indicate that the years 2007, 2020, and especially 2022 were marked by severe drought effects on the livestock sector, with multiple indicators of animal health and productivity being affected. This suggests the need for robust drought management strategies to mitigate the impacts on livestock, which is vital for the livelihoods of the affected communities.

6. Socioeconomic Impact

Table 8. Socioeconomic impact

Intensity Level	Very High	High	Medium	Less	Very Low
Drought threatened household food security	12	3	0	0	0
Drought caused malnutrition	4	10	1	0	0
Drought increased health issues	9	6	0	0	0
Drought caused unemployment	6	9	0	0	0
Drought caused reduction in household income	11	4	0	0	0
Decreased access to financial resources	8	7	0	0	0
Drought caused reduction in spending on festivals	12	3	0	0	0
Drought caused population migration	3	3	9	0	0
Drought affected schooling of children	10	2	3	0	0
Drought caused hopelessness and sense of loss	4	11	0	0	0
Drought caused conflict for water in society	5	3	6	1	0
Drought caused delay in repayment of loans	9	3	3	0	0
What is the total loss incurred by your household when last faced with drought?	14	1	0	0	0

The table 8 appears to document the various socio-economic impacts of drought in communities, categorized by the intensity of each impact.

The most acute impact recorded is on household food security, where 12 instances of "very high" incidence were reported, suggesting that drought poses a significant threat to the availability and stability of food resources. Malnutrition, which often correlates with food insecurity, shows a "very high" incidence in 4 cases and a "high" incidence in 10 cases, indicating a serious health concern.

Drought-related health issues and unemployment are concerning, with "very high" incidences reported 9 and 6 times, respectively. The economic consequences of drought are evident in the "very high" incidence of income reduction (11 times) and "high" incidence (4 times), reflecting substantial financial distress within the community.

Access to financial resources and the ability to participate in cultural festivities are likewise affected, with reduced access to financial resources and decreased spending on festivals both reported 8 and 12 times, respectively, at a "very high" incidence level.

Drought seems to affect social dynamics and education, as indicated by the "very high" incidence of population migration (3 cases), schooling of children (10 cases), and the sense of hopelessness and loss (4 cases). The social fabric is further strained by conflicts over water, reported 5 times with a "very high" incidence and 11 times with a "high" incidence, signifying competition and tensions arising from scarcity.

Lastly, the financial burden of drought is highlighted by delayed repayment of loans, with "very high" incidences reported 9 times. The "total loss incurred by your household when last faced with drought?" is most frequently reported at a "very high" incidence level (14 times), underscoring the profound and lasting economic impact of drought on households.

The table illustrates that drought has a pervasive impact on the community, disrupting food security, health, employment, financial stability, education, social cohesion, and cultural practices, with significant losses incurred by households as a result.

Table 9. Community and organizational support during drought conditions

Answer	In period of last drought, how often did your relatives, friends and neighbours help someone in your household?				Did your household receive help from any of the following agencies during drought conditions/			
	Always	Most of the times	Sometimes	Never	Local or national government	Non-governmental organizations	Cooperatives	Community based organizations
Yes	0	0	4	11	0	7	8	0
No	15	15	11	4	15	8	7	15

The table 9 provides insight into the support systems available to households during periods of drought, including assistance from personal networks and various organizations.

Regarding personal support, most respondents (15) reported that they "Always" receive help from relatives, friends, and neighbours in times of drought, which underscores the strong communal bonds and mutual aid prevalent in the community. An equal number (15) stated that they receive help "Most of the times," further indicating a reliable support system. Fewer respondents (11) mentioned receiving help "Sometimes," while a notable number (11) indicated that they "Never" receive help, pointing to a segment of the population that might be isolated or lacking in social support during such crises.

When it comes to institutional support, a significant proportion of households reported not receiving any help from local or national government, as indicated by 11 responses in the "Never" category. This may highlight gaps in governmental disaster response or resource allocation. Conversely, non-governmental organizations seem to play a pivotal role in

providing support, with 15 instances of households receiving assistance "Always," which signifies the effectiveness and presence of these organizations during drought conditions.

Cooperatives and community-based organizations contribute to aid, as reported by 7 and 15 respondents respectively in the "Always" category. This shows a strong community-led initiative and resilience in dealing with drought.

The data reflects a reliance on a combination of personal networks and non-governmental entities for support during droughts, with community-based efforts being particularly prominent. However, the lack of consistent government support is a concern and may require attention to ensure that all households have access to necessary resources during such challenging times.

Table 10. Impact of drought on gender vulnerability

Intensity Level	Very High	High	Medium	Less	Very Low
Affected productive roles of men (farming, job, business)	8	7	0	0	0
Affected productive roles of women (farming, job, business)	7	4	4	0	0
Decreased vegetable production	9	6	0	0	0
Increased difficulty in availability of drinking water	15	0	0	0	0
Increased difficulty in fetching water	14	1	0	0	0
Caused difficulty in commuting	2	13	0	0	0
Increased incidence of diseases in women	5	8	2	0	0
Increased incidence of diseases in men	2	10	3	0	0
Increased incidence of diseases in children	10	5	0	0	0
Reduced access to sanitation facilities	12	3	0	0	0

The table 10 illustrates the various impacts of drought on a community, highlighting the heightened vulnerabilities across different sectors and demographic groups.

For men, the drought has significantly disrupted their ability to engage in productive activities such as farming, jobs, or business, with "Very High" and "High" impact levels reported. This disruption affects 8 men at the "Very High" level and 7 at the "High" level, reflecting the economic strain placed on the primary earners in many households.

Women are similarly affected in their productive roles, with "Very High" impacts noted for 7 women, and "High" impacts for 4 women. This indicates that drought conditions have a

profound effect on the economic empowerment and stability of women, who may be engaged in farming or local businesses.

The production of vegetables, a critical food source and income for many families, shows a "Very High" decrease (9 instances). This can lead to nutritional deficits and economic hardship due to the loss of a vital dietary component and a source of income.

Drought has also made drinking water less accessible, as evidenced by 15 "Very High" instances. This scarcity poses serious health risks and burdens women and children who traditionally fetch water.

The challenge of commuting, with 13 "High" instances reported, suggests that drought has made transportation more difficult, possibly due to degraded roads or the increased distance to water sources or markets.

The health of the community has been affected, with women and children particularly vulnerable. The "Very High" increase in disease incidence (5 for women and 10 for children) can be a result of drought-related factors like malnutrition, poor sanitation, and lack of clean water.

Finally, the "Very High" decrease in access to sanitation facilities (12 instances) further compounds the community's vulnerability, with direct implications for public health, well-being, and dignity.

The drought in these communities has led to significant reductions in productivity, increased health problems, and exacerbated difficulties in accessing basic needs like clean water and sanitation. These findings underscore the critical need for comprehensive drought response strategies that address the multifaceted nature of the community's vulnerabilities, particularly for the most affected groups such as women and children.

7. Food Security

The study reveals community responses to the challenges of drought on food availability and affordability, as well as their strategies for securing food during these difficult times.

In terms of food availability and affordability, drought significantly exacerbates food scarcity while driving up prices, making it difficult for community members to afford even two meals a day. Respondents indicate that during drought, the availability of food diminishes as water scarcity impacts agricultural production, leading to a decrease in the market supply of food and subsequent price increases. This pattern results in reduced food intake, as community members often must cut down on the number of meals they eat. Additionally, drought affects income sources like agriculture and livestock, contributing to the economic strain and making food purchases costlier.

Regarding the coping strategies employed, community members proactively prepare by storing food for several months ahead of the drought season. Some mention having no formal strategy but endeavour to store food for some months regardless. Others utilize only storages that are safe from flood or rain impact. The prevalent theme across responses is the reliance on food storage, sometimes lasting for a part of the year but not typically extending to a full year, highlighting the community's adaptive measures to ensure food security. However, this is a stopgap measure, not a complete and enduring solution, as the stored food may not last through extended drought periods.

Drought presents a dual challenge of reducing food supply and increasing food prices, which hampers the community's ability to maintain regular and nutritious meals. In response, community members employ a common strategy of storing food to mitigate the impact, but this method has its limitations in duration and effectiveness, signalling a need for more sustainable solutions to address food insecurity during drought.

8. Health and Nutrition

The responses gathered from the community regarding health and nutrition issues during the drought season indicate a significant increase in health-related problems. A common thread throughout the feedback is the heightened vulnerability of infants, pregnant and lactating women to health and nutrition issues exacerbated by drought conditions.

Many in the community have observed an increase in weakness across all demographics, particularly in men, women, and children, due to food shortages and a reduction in meal frequency. The scarcity of food contributes to nutritional deficits, leading to a spectrum of health concerns. Pregnant women face considerable challenges, with numerous reports of nutritional deficiencies and general weakness, which can have adverse effects on both the maternal and the new-born health.

Infants and elderly individuals, as well as persons with disabilities, are knowingly affected by these changes, experiencing increased weakness and susceptibility to diseases. The reduction in meal quantity and quality during drought periods directly impacts these groups, who require consistent and adequate nutrition.

Additionally, malnutrition has been a recurring concern, with reports indicating that children and adults alike have suffered weight loss during drought periods, pointing to the long-term impacts on community health and well-being.

The community experiences a marked increase in health and nutrition issues during drought seasons, with acute impacts on vulnerable populations such as infants, pregnant and lactating women, the elderly, and persons with disabilities. The reduction in food availability and the resulting decrease in nutritional intake emerge as critical factors contributing to the community's health challenges in times of drought

9. Livelihood

For the question on how drought affects food availability and affordability in the community, the study found that drought significantly impacts food security. Many respondents cited a shortage of food and an increase in food prices, making it unaffordable for most. The drought leads to a reduction in agricultural productivity and labour opportunities, compelling community members to travel to other cities for work or engage in less profitable activities like embroidery or stitching to sustain their livelihoods. This shift in work patterns affects not only the men who typically rely on farming and labour work but also the women and elderly who must adapt to new roles to support their households.

As for the coping strategies adopted during the drought period, there was a common tendency among the participants to store food for several months, although not exceeding a year. Some households prepared for drought seasons by securing food for a few months in advance, while others depended on agriculture and thus were more vulnerable to the impacts of drought. In these cases, they had to sellout animals and shift to non-agricultural work, which indicates a degree of resilience and adaptation but also a departure from traditional livelihoods.

In response to whether the sources of livelihoods have changed due to the drought, the summary of the findings indicates that for many in the community, there has indeed been a significant shift. The table shows a consensus among respondents that during drought seasons, traditional sources of income such as agriculture and livestock become less viable due to the scarcity of water and the subsequent decrease in crop production and animal fodder.

This scarcity forces individuals to seek alternative means of sustenance. Some community members have had to sell livestock or travel to other areas for labour work that is not dependent on agriculture, such as in-city jobs or home-based work like stitching and embroidery. Additionally, the data suggests an increase in unemployment and a reliance on community support and occasional labour work in neighbouring areas.

The pivot away from traditional farming and livestock rearing toward other forms of income generation reflects a substantial change in livelihood strategies due to drought conditions. It's a change that signifies adaptation to the challenging circumstances imposed by environmental changes.

These responses illustrate the substantial challenges faced by the community in securing both food and employment during drought periods, and the various strategies they employ to cope with these adversities.

Based on the responses in the study regarding alternate sources of livelihood during drought periods, several strategies have emerged from the community. It appears that taking loans and selling animals are common approaches to coping with the economic challenges brought on by drought.

Some respondents have taken microfinance loans, which suggests that there is a reliance on external financial assistance to either sustain their current living standards or invest in alternate livelihood options. Additionally, there is a mention of "drought-registered varieties," which could indicate a shift to more drought-resistant crops or techniques to maintain agricultural productivity.

Kitchen gardening is also listed as an alternative source of livelihood, illustrating an adaptive strategy to grow food for personal consumption and possibly for local markets, thus diversifying and increasing resilience against the impact of drought.

The variety of strategies employed indicates that community members are resourceful and proactive in finding ways to sustain themselves when traditional means of livelihood are compromised by environmental factors. These adaptive measures reflect a combination of immediate and short-term coping mechanisms, such as selling livestock, and longer-term adaptations like microfinance loans for business and agriculture, indicating a multifaceted approach to livelihood sustainability during challenging times.

Table 11. Indicate the significance of the following drought impacts in your life

Intensity Level	Very High	High	Medium	Less	Very Low
Decline in crop yields/food insecurity	2	13	0	0	0
Livestock losses	7	8	0	0	0
Forced sale of household assets	2	2	11	0	0
Forced sale of land	0	0	1	5	9
Depletion in water for agricultural use	11	1	3	0	0
Depletion in water for human use (drinking, cleaning, and cooking)	10	3	2	0	0
Decline in health (malnutrition or lack of safe drinking water and epidemic diseases)	5	10	0	0	0

The study findings, as depicted in the table 11, reveal the multifaceted impact of drought on the lives of the affected communities. The most significant impact recorded is the depletion of water for agricultural use, with most respondents indicating 'medium' intensity, followed closely by 'very high' intensity. This suggests a critical challenge in maintaining agricultural activities during drought periods, which can lead to a ripple effect on food security and livelihoods.

Livestock losses and the decline in crop yields/food insecurity are other significant impacts that are mostly felt with 'high' intensity. This further underscores the vulnerability of agricultural livelihoods and the immediate threat to food availability and income for the population.

Forced sale of household assets and land are less frequently reported but still present concerns, indicating that some households are pushed to take drastic measures to cope with the economic hardships brought by the drought.

Depletion in water for human use, including drinking, cleaning, and cooking, is also a critical issue, with some respondents experiencing this at 'very high' intensity, demonstrating the dire consequences of drought on basic human needs and health.

Decline in health due to malnutrition, lack of safe drinking water, and epidemic diseases is noted as a concern of 'high' intensity by several respondents. This highlights the health risks associated with the scarcity of food and water and the increased exposure to diseases in the wake of a drought.

The findings articulate the severity of drought impacts on both the livelihoods and the well-being of individuals, necessitating comprehensive and sustained responses to mitigate these adverse effects.

9.1 Drought awareness and knowledge

The answers suggest a varied frequency in which government agencies or NGOs share drought awareness and knowledge with the community. The responses indicate a commonality with a significant number of respondents receiving information once a month, reflecting a consistent level of engagement from certain organizations in disseminating drought-related information. This regular monthly update could potentially indicate a proactive approach in keeping the community informed and prepared for drought conditions.

On the other hand, some respondents indicate that they receive this information once in six months, which suggests a less frequent level of communication. This biannual update might point to a more periodic review, or a strategic dissemination of information aligned with certain seasons or agricultural cycles.

An additional set of respondents' report receiving information twice a year, which may correspond with the pre- and post-monsoon seasons, critical times for agricultural and water resource planning in drought-prone areas.

The presence of a specified category where respondents can provide details not covered by the other options indicates the survey's flexibility in capturing data that does not fit a predefined frequency. However, there seems to be no input under this category, suggesting that the provided options sufficiently cover the respondents' experiences.

There is a consistent effort by agencies to inform the community about drought conditions, the frequency of this communication varies. Regular monthly updates could be critical for ongoing drought management, whereas biannual updates might focus on seasonal preparedness and response.

10. Climate change & Water Security

For the question on climate change awareness, out of the 15 FGD respondents, a slight majority are not aware of climate change issues, with 9 indicating 'No' compared to 6 who are aware. This demonstrates a need for increased awareness-raising initiatives within the community.

When it comes to the sources of information on climate change, mobile phones emerge as the most prevalent medium, with all 15 FGD respondents marking it as a source. Newspapers and TV are significant sources, with 8 and 4 affirmative responses respectively. Interestingly, no one has marked radio or government departments as information sources, which might indicate either a lack of access to these channels or a lack of climate change communication from these entities. Fellow farmers are somewhat informative, with 2 respondents acknowledging them as a source. For the 'Other' category, a majority of 13 respondents indicated alternative sources of information, which may warrant further investigation to identify what these are.

Regarding the experience of climate impact, a majority, with 10 affirmatives, have felt the effects of climate change in their area, while 5 have not, which underlines that the phenomenon is a real and present issue for most in the community.

Concerning changes in temperature and rainfall, the majority of respondents feel that the temperature is increasing (12 affirmative responses), and that rainfall is decreasing (14 affirmative responses). These perceptions are aligned with the general scientific consensus on climate change impacts.

When asked if climate change is responsible for water scarcity, 12 respondents agree that it is, suggesting that the community is experiencing and attributing water scarcity to it.

Whether climate change is a man-made problem yields a striking result with all 15 FGD respondents indicating 'No', which suggests a gap in understanding the anthropogenic causes of climate change. This points to a need for education on the human activities that contribute to climate change to inform mitigation strategies.

The responses gathered paint a picture of a community that, while affected by climate change, lacks complete awareness and understanding of its causes, particularly the role of human activity. There is a recognized change in climate patterns, with increasing temperatures and decreasing rainfall, which are contributing to water scarcity issues. The reliance on mobile phones for information highlights the potential for mobile technology to play a significant role in climate change education and awareness campaigns.

10.1 Perception of Climate Change

Based on the response, the key impacts of climate change perceived by the community include a notable increase in temperature, as repeatedly mentioned across multiple

responses. The cutting of trees is another significant impact that is frequently noted, which suggests a loss of vegetation or deforestation as a concern within the area.

Water-related issues are another major theme, with references to no storage of water, water table decrease, water scarcity, and low rainfall. These responses point towards a growing challenge in water access, conservation, and management, likely exacerbated by changing rainfall patterns and possibly leading to agricultural deficiencies, as some respondents have pointed out.

Pollution is mentioned and this could imply an understanding that climate change is contributing to environmental degradation in general.

Unconditional rainfall is cited, suggesting irregular or unpredictable rainfall patterns that affect agriculture and water supply. This inconsistency in weather conditions can lead to difficulties in planning and securing water for agricultural and personal use.

The community's responses collectively underscore the pressing issues faced due to climate change, including environmental degradation, increased temperature, unpredictable rainfall, and water scarcity. These perceived impacts highlight the urgent need for climate adaptation strategies and sustainable practices to mitigate these effects.

10.2 Perception on Water Security

The study presents findings related to the perceptions of water security in the study area. According to the data, all respondents believe that the state of water resources and supply situation is deteriorating. This consensus underscores a significant concern regarding water availability and quality.

The primary reasons for the deterioration, as identified by the participants, include sources drying up and sources being polluted. Poor distribution and management by the government are also noted as contributing factors. A small number of respondents highlighted the lack of new sources being tapped as an issue, with some suggesting other unspecified reasons for the deteriorating conditions.

Regarding the causes of water sources drying up, all respondents point to low rainfall and high temperatures during summers as the predominant factors, which suggests the impact of climatic conditions on water availability. Climate change and an increase in population are equally perceived as reasons for the drying up of water sources, followed by poor maintenance or storage of water resources.

When asked whether the available dried-up water sources can be rehabilitated, all participants responded negatively, indicating a lack of optimism or practical solutions for improving the current water security situation. This suggests that the community may require external assistance or significant policy changes to address these challenges and restore their water resources.

Table 12. Water scarcity coping strategies

Intensity Level	Very High	High	Medium	Low	Very Low
Diversion from flood irrigation to controlled irrigation method	0	0	0	0	15
Cropping pattern changes (from high delta to low delta crops)	0	1	0	6	8
Installation of delivery pipes to supply water to orchards/crops	0	1	0	0	14
Changes in irrigation intervals	2	1	0	8	4
Changes in timing of irrigating the crops	0	3	0	4	8
Reduction in crop areas	2	3	0	0	10
Utilization of high efficiency irrigation system (i.e., bubbler, sprinkler, or drip)	0	0	0	0	15

The table 12 illustrates various coping strategies adopted by the community to combat water scarcity. A significant adaptation appears to be the shift in irrigation methods, where a very low intensity is noted for the transition from flood irrigation to controlled irrigation methods, such as bubbler, sprinkler, or drip systems. This indicates a reluctance or inability to shift to these methods, which are traditionally considered more efficient.

Changes in cropping patterns are recognized at different intensities, with low and very low categories being the most prominent. This may suggest that while there is some shift towards crops that require less water (from high delta to low delta crops), most of the community has not yet significantly adopted this strategy.

The installation of delivery pipes to supply water directly to orchards or crops is noted to be very low, indicating this is not a widely used method among the respondents. Additionally, while changes in the timing of irrigating crops are being adopted at a high intensity, changes in irrigation intervals are more varied, ranging from low to very low intensity, suggesting mixed adoption rates.

A considerable number of respondents are not reducing the area under crop cultivation, as indicated by the very low scores in this category. Conversely, the community has acknowledged a high to very low intensity of coping by changing the timing of irrigating the crops, reflecting a diverse approach to managing irrigation schedules.

The community has shown varying levels of engagement with different water scarcity coping strategies. The predominant strategies seem to focus on adjusting irrigation timings and intervals, while there is a noted hesitation or challenge in adopting controlled irrigation methods and infrastructure improvements like the installation of delivery pipes.

11. Preparedness & Response

This study captures the community's existing drought coping mechanisms, future preparedness, and prioritized interventions for vulnerable groups within an agricultural context.

Regarding coping mechanisms, the community has not widely adopted any specific strategies. There is a general theme of a lack of resources and support to adopt effective strategies during drought seasons. Some individuals attempt to store grains and fodder as a reactionary measure, but there is no cohesive strategy employed.

For future preparedness, the predominant sentiment is that there is no forward planning in place for future droughts. A few community members mention small-scale solutions like starting small businesses, drought-resistant seed grain banks, and kitchen gardening as potential methods to mitigate the impact of drought. The need for awareness about drought survival and the possibility of utilizing future small ponds and rainwater storage are mentioned as individual strategies that could be adopted if external support is provided.

When it comes to prioritized interventions for women, persons with disabilities (PWD), and the elderly, the responses are again centred around agriculture. However, there is no clear consensus or specific intervention plan detailed in the responses. The overarching need is for access to resources that can help these vulnerable groups adapt their agricultural practices to withstand the impacts of drought.

The responses suggest that while the community is aware of the drought problem and has some ideas for future preparedness, there is a significant gap in resources, planning, and institutional support required to effectively cope with and prepare for drought conditions.

12. Conclusion

The "Drought Contingency and Preparedness Plan for District Dadu, Sindh," aimed at mitigating the impacts of drought and enhancing community resilience, reflects a deep understanding of the multifaceted challenges posed by recurrent drought conditions. The focus group discussions underscore that the livelihood of the majority agricultural community is significantly compromised, revealing an urgent need for a robust response framework.

The community faces a considerable food security threat, with 52% of the study population engaged in agriculture, and experiences heightened vulnerability due to limited literacy at 55%, indicating a need for enhanced educational programs to improve adaptive capacities. The demographic distribution, predominantly male-headed households with a presence of vulnerable groups like PWDs, shapes the socio-economic fabric of the area and underscores the importance of targeted intervention.

The FGDs indicate that drought adversely affects crop yields, leading to food scarcity and exorbitant food prices, pushing the community into economic duress. Livestock, an essential

livelihood component, suffers from fodder shortages, increased diseases, and distress sales, aggravating the vulnerability of the pastoral community.

Communal bonds emerge as a vital support system, yet the lack of formal strategies for coping and future drought preparedness is apparent. Despite the absence of significant government support, the community exhibits resilience, relying on food storage, alternate income sources like microfinance loans, and adaptive agricultural practices.

The study's findings on water scarcity depict a critical concern, with the community unanimously perceiving the water situation as deteriorating. Climate change exacerbates this scenario, reflected in the population's perception of increasing temperatures and decreasing rainfall, implicating these as contributing factors to water scarcity and reduced agricultural productivity.

The impact on gender vulnerability is profound, with drought affecting the productive roles of both men and women, causing nutritional deficiencies, health issues, and restricted access to water and sanitation. Such disparities necessitate gender-sensitive approaches in drought management strategies.

Community-based responses to climate change and water security stress the need for education on the human contributors to climate change, emphasizing the potential for mobile technology in information dissemination and awareness campaigns.

The study reveals that District Dadu's communities are at a critical juncture, facing the tangible impacts of climate change manifested through drought. There is a clear call for comprehensive, sustainable, and inclusive drought management strategies that not only address immediate impacts but also bolster long-term community resilience. The project's focus on collaboration with relevant authorities, community engagement, and resource provision is poised to catalyse this change. However, the success of these initiatives hinges on the establishment of a participatory approach, ensuring equitable access to resources, and fortifying the adaptive capacities of the local communities to confront future climatic uncertainties.

13. Recommendations

The study highlights the profound socio-economic impacts of drought on households in District Dadu. Here are some recommendations that could be considered to mitigate these impacts:

1. Develop community seed banks to ensure the availability of drought-resistant seed varieties, which can help sustain agriculture during periods of low rainfall.
2. Establish community kitchens and nutrition programs, especially targeting vulnerable populations such as women, children, and the elderly, to address malnutrition caused by drought-related food shortages.

3. Introduce microfinance programs tailored to drought-affected communities, providing loans and financial assistance to help rebuild and sustain local businesses and agricultural activities.
4. Create employment programs that focus on water conservation projects, reforestation, and the construction of infrastructure that can help mitigate the effects of drought, thus providing jobs while building community resilience.
5. Invest in rainwater harvesting systems and the development of community ponds to enhance water availability. Promote the use of efficient irrigation systems like drip or sprinkler irrigation to maximize the use of limited water resources.
6. Launch education campaigns about sustainable farming practices and water conservation techniques. Provide special attention to schools to ensure that children's education is not interrupted due to drought.
7. Strengthen community-based organizations and cooperatives that can provide support during drought periods, including the sharing of resources and knowledge.
8. Develop and implement community engagement programs that address water-related conflicts, promoting equitable water distribution and use.
9. Allocate funds for the development of drought-resilient infrastructure, including deeper wells, to combat the deepening of the water table.
10. Encourage agricultural research in drought-resistant crops and promote the cultivation of crops like guar and juwar, which have been identified as preferred alternatives by the community.
11. Advocate for the formulation and implementation of comprehensive drought management policies at the district and provincial levels. This should include contingency planning and the establishment of an effective early warning system.

These recommendations are aimed at addressing the key challenges identified in the study, thereby strengthening the resilience of communities in District Dadu against the detrimental impacts of drought. The implementation of these recommendations requires collaborative efforts among community members, local authorities, non-governmental organizations, and external support agencies.

14. References

Focus group discussions (FGDs) conducted in 15 villages across 5 union councils of Tehsil Johi, District Dadu, Sindh, under the Welthungerhilfe drought project, 2024 (primary data).

District Government of Dadu. Designation of disaster-prone union councils in District Dadu [insert title, year and reference].

Drought Contingency and Preparedness Plan for District Dadu, Sindh [insert issuing authority and year].

15. Annexes

Annex 1: Focus group discussion guide and questionnaire [to be attached].

Annex 2: Villages and union councils covered by the assessment (see Table 1).

Annex 3: FGD attendance sheets and field photographs [to be attached].