

PREPARED BY
IAG Gujarat



unicef
for every child

LIVING ON THE EDGE

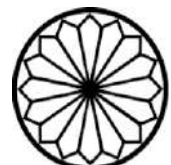


VULNERABILITY
ASSESSMENT OF
COASTAL
MARGINALISED
COMMUNITIES
THROUGH
PARTICIPATORY
PROCESS

April 2024



Joint Study by IAG Member Organisations



Acknowledgement

Living On the Edge- Vulnerability assessment of coastal marginalised community has been highly participative study with involvement of six IAG (Inter Agency Group- Gujarat) partners across eight blocks and three districts. All eight agencies pooled significant resources to make this study fruitful.

The study was led by Kirit Parmar, Chief of Programme Operations, UNNATI, under guidance of Mr. Binoy Acharya, Director, Unnati, and Mr. Nageshwar Patidar, WASH Specialist from UNICEF. and Prof. Ankur Sarin from IIM-A guided the research process and provided inputs to improve the tools. Ms. Kamini Katiyar State Consultant, DRR, UNICEF and Abhishek Fullonton, Emergency Officer (UNV), coordinated the study and provided their inputs form time to time to collate and analyse the insights gathered from field. Technical Support for designing research tools, data management, and documentation was provided by Mr. Tapan Patel from CFID, while social research was supported by Mr. Premesh Balan. Ms. Ankita Devi, Programme Officer, Unnati provided valuable support in collation of data and documentation in report form.

Special thanks to following members and coordinators from different agencies who contributed their time and expertise on field in the study.

Kutchh:

1. Yusuf Meharally Centre (YMC) Mundra Kutchh – Dharmendrabhai, Meet Kumar, Mahadevbhai, Mananbhai, Ranjit Koli, Rameshbhai
2. Setu Abhiyan, Bhuj Kutchh - Manish Acharya, Gela (Gopal) Satiya, Heena Yadav, Naina Siju, Manish Acharya
3. UNNATI, Bhachau, Kutchh - Jitendra Chauhan and Ramila Sondarva
4. Vivekanand Research and Training Institutes (VRTI) Mandvi Kutchh - Kamlendu Bhakat and Malay Joshi

Morbi:

ANANDI Morbi - Sumitraben Thaker, Ramesh Parmar, Manishaben Padvi, Abbasbhai Movar, Kalpanaben Bhura

Devbhumi Dwarka:

Gramya Vikas Trust (GVT) Dwarka - Hemangini Ker Manek, Shaluben Chauhan, Sunera Chauhan

Table of Contents

LIST OF FIGURES.....	5
ABBREVIATIONS AND ACRONYMS	6
EXECUTIVE SUMMARY.....	7
1. BACKGROUND	11
1.1 CLIMATE HAZARD IN COASTAL AREA	11
1.2 MARGINALISED COMMUNITIES	11
1.2.1 <i>Fisher community</i>	12
1.2.2 <i>Salt-Pan workers</i>	13
1.2.3 <i>Pastoralists</i>	14
2. ABOUT THE STUDY	16
2.1 RATIONALE.....	16
2.2 OBJECTIVES OF THE STUDY	16
2.3 STUDY AREA.....	16
2.4 APPROACH TO STUDY	16
2.5 METHODOLOGY	17
2.6 SAMPLING PROCESS.....	18
2.7 AUDIENCE TO THE STUDY	21
2.8 LIMITATIONS	21
3. RESPONDENT PROFILE.....	22
3.1 DEMOGRAPHIC PROFILE OF THE RESPONDENTS	22
3.1.1 <i>Age</i>	22
3.1.2 <i>Religion</i>	22
3.1.3 <i>Social Category</i>	23
3.1.4 <i>Occupation</i>	24
4. SECTORAL KEY FINDINGS.....	26
4.1 HOUSING	26
4.2 INFRASTRUCTURE	31
4.2.1 <i>Road Connectivity</i>	31
4.2.2 <i>Mobile connectivity</i>	31
4.2.3 <i>Power supply</i>	31
4.3 WATER	33
4.3.1 <i>Water Supply Sources and access:</i>	33
4.4 SANITATION	35
4.4.1 <i>Access to safe sanitation (%)</i>	35
4.5 HEALTH FACILITY AND MATERNAL CARE	37
4.5.1 <i>Accessibility of Health Facilities:</i>	37
4.5.2 <i>Awareness of Healthcare Workers:</i>	37
4.5.3 <i>Maternal and Child Healthcare Services:</i>	37

4.5.4 <i>Impact of Cyclone on Health Infrastructure:</i>	38
4.5.5 <i>Emergency Healthcare Services:</i>	38
4.6 NUTRITION AND FOOD SECURITY	40
4.6.1 <i>Access to Anganwadi</i>	40
4.6.2 <i>ICDS Services</i>	40
4.6.3 <i>Effect of Cyclone</i>	40
4.6.1 <i>Food Security during emergency</i>	40
4.7 SCHOOL AND EDUCATION	42
4.7.1 <i>Literacy in Adults</i>	42
4.7.2 <i>Distance to School and enrolment</i>	43
4.7.3 <i>Effects of cyclone on school and education</i>	43
4.8 SOCIAL SECURITY	46
4.8.1 <i>Insurance</i>	46
5. HAZARD, VULNERABILITY AND EMERGENCY SUPPORT	47
5.1 EARLY WARNING AND EVACUATION	47
5.2 COMMUNITY SPECIFIC VULNERABILITIES	48
5.2.1 <i>Cattle rearers/ Pastoralites</i>	48
5.2.3 <i>Fishing community</i>	49
5.2.4 <i>Salt Pan Workers</i>	51
5.3 RESILIENCE	52
6. THE WAY FORWARD	54
ANNEXURE	56
ANNEXURE1: LIST OF HABITATIONS	56
REFERENCES	58

List of Tables

Figure 1 Fisherfolks	12
Figure 2 Saltpans and workers.....	14
Figure 4 districts of gujarat covered in the study	16
Figure 5 Age of respondents.....	22
Figure 6 Gender of respondents	22
Figure 7 Religion of respondents	23
Figure 8 Social category of respondents.....	23
Figure 9 Main source of income across blocks	24
Figure 10 vulnerable communities across blocks	25
Figure 11 Occupation wise Poverty Status.....	25
Figure 12 sectors covered in the study.....	26
Figure 13 housing typology.....	26
Figure 14 housing typology across blocks.....	27
Figure 15 type of damage to shelters across blocks	27
Figure 16 house improvement after cyclone.....	29
Figure 17 Ability to guide mason for safe housing.....	29
Figure 18 Access to Sanitation.....	35
Figure 19 Maternal Services	37
Figure 20 Child Immunisation.....	38
Figure 21 Maternal and child healthcare services during emergency	39
Figure 22 Food Availability during emergency.....	40
Figure 24 Education level across blocks.....	43
Figure 25 Occupation wise education status.....	43
Figure 26 Insurance coverage.....	46
Figure 27 Impact of cyclone on pastoralists	48
Figure 28 Impact of cyclone on fisherfolks.....	50
Figure 29 Impact of cyclone on salt pan workers	52
Figure 30 source of income during emergencies.....	52
Figure 31 time required to restore normalcy.....	53

List of Figures

Table 1 participating IAG members.....	17
Table 2 sampling method.....	18
Table 3 study area coverage	19
Table 4 habitation covered under qualitative study	20
Table 5 Amount spend on repairs of house.....	28
Table 6 Knowledge of safe housing techniques	28
Table 7 Water management scenario across blocks	34
Table 8 Services at health centres	39
Table 9 ICDS services	41
Table 10 Education services in habitations	44

Abbreviations and Acronyms

ANM	Auxiliary Nurse and Midwife
ASHA	Accredited Social Health Activist
AWC	Anganwadi Centre
AWW	Anganwadi Worker
CAPI	Computer Aided Personal Interview
CFID	Centre for Integrated Development
ECCE	Early Childhood Children Education
FGD	Focussed Group Discussion
GES	Gujarat Ecological Society
GIS	Geographic Information System
GVT	Gramya Vikas Trust
HH	Household
IAG	Inter Agency Group
ICAR	Indian Council of Agricultural Research
ICDS	Integrated Child Development Services
ICMR	Indian Council of Medical Research
IIM	Indian Institute of Management
IOC	Indian Oil Corporation
MS	Microsoft
NGO	Non-Governmental Organisation
OBC	Other Backward Caste
PHC	Primary Health Centre
UNICEF	United Nations Children's Fund
VRTI	Vivekanand Research and training Institute
WASH	Water Sanitation and Hygiene
WASMO	Water and Sanitation Management Organisation
YMC	Yusuf Meharally Centre

EXECUTIVE SUMMARY

With India's longest coastline spanning 1,663 km and a substantial population residing in coastal areas, Gujarat faces heightened vulnerability to sea-level rise, cyclonic events, and salinity ingress. Coastal communities are more vulnerable to natural hazards than others because of sociological, demographic, or economic factors. The situation is particularly concerning for the region's salt pan workers, fishing communities, and pastoralists of Kutch and Saurashtra. All three communities are considered to be vulnerable because of the remoteness of the habitations they live in and lack of support from the government and within and external communities. Traditionally they are marginalised in terms of lack of access to economic and social support.

This study aims to identify the most marginalized clusters and assess effectiveness and adequacy of existing emergency interventions, as well as accessibility of basic services and social security schemes for marginalised communities in normal times. Approach to study was highly participative, with inputs from 6 organisations across 8 blocks of three coastal districts – Kutch, Morbi and Devbhoomi Dwarka. The study adopted mix method by including both qualitative and quantitative tools in research. Study covered a total of 520 families in CAPI based household survey as part of quantitative survey and nearly 30 community level interactions and FGDs to get qualitative insights.

Study focussed on data and insights from sectors of Housing, Infrastructure, Water, Sanitation and Waste Management, Nutrition and Food Security, health Facility, Education and Social Security. Some of the key findings are explained below:

- a) Housing: Block wise housing typologies differ a lot. It was observed that Semi Pucca houses are dominant category across all the blocks except Anjar and Bhachau. While Pucca houses were seen in over 50% of HHs in Anjar, in rest of the blocks, it varied from 3% to 18%. In Bhachau, nearly 64% HHs lived in Kutch houses. During Biparjoy, the majority of the population have witnessed minor damage to their shelters. In Okhamandal 19% of the respondent reported for major damage to houses for which it had to be demolished. Structural damage was seen more in Bhachau and Mundra. In Gandhidham, all the houses spent upto Rs. 10000, while in Mundra and Okhamandal, 33-50% HH spent in between Rs. 10000-20000. However, people do know about the safe housing techniques which is evident from HH survey.
- b) Infrastructure: More than 50% of the habitation are connected with pucca road, while 1/3rd of habitations are connected with kutch fair weather roads. Habitations of Okhamandal, Bhachau and Lakhpat have more kuccha roads compared to other blocks. Only 15% habitations have public transport facility like bus. In cyclone Biporjoy, road connectivity to most of the habitations across the blocks was disrupted due to inundation. More than 50% of habitations across the blocks have 100% households with mobile phones. Mobile connectivity was disrupted in most of the habitations during cyclone for 2-7 days, mainly due to power supply disruption. Almost all habitations have power supply except very remote of habitations in Bhachau and Mundra. In more than 50% habitations, power supply is available to all houses, while in 25% habitations, the coverage of household connection is 50-75%. However, more than 90% of habitation were hit by power disruption during cyclone. While power supply was restored in most of them within 15 days, in some places of Okhamandal and Mundra, it took more than a month due to uprooting of electric poles in large numbers

- c) **Water:** Piped water supply was prevalent in Lakhpat and Abdasa, while tanker water supply is relied upon in Mundra, Gandhidham, Anjar, Bhachau. Water supply in habitations of Okhamandal is available once in every 15 days. Scarcity of water was reported in over 50% of habitations studied except Mundra. The water availability per person per day ranges from 50-250 litres. In the salt pans of Gandhidham and Anjar, where salt pan workers' families reside for eight months each year, employers have constructed water storage tanks to ensure access to clean water. During FGDs, it was observed that the local population have limited knowledge about the water quality testing process being done by the Government as most of them are busy with availability of water rather than quality of water. Over 15 Habitations reported purchasing water every week to meet their daily water needs. During events like the Biparjoy cyclone, water supply disruptions were widespread, notably in Bhachau and Lakhpat where full or partial damage to supplies occurred. Power failures during cyclones also affected water supply in Lakhpat and Maliya, with reported damages to water tanks in Lakhpat. The restoration of water supply post-cyclone varied from a few days to several months across different Habitations. Generally, water supply was restored within 15 days, except in Bhachau where it took over a month.
- d) **Sanitation and waste management:** None of the habitations have 100% toilet coverage. In fact, in few settlements of Mundra, Bhachau, Maliya and Okhamandal Mandal, none of the households have individual toilet. FGDs reveal that most of the HH practice open defecation, some of the HH do have Toilet blocks but they are not used by communities, they do have bathing space demarcated for the women by making a makeshift arrangement for the women to take bath and maintain privacy. Most of the habitations have reported that sanitation facilities get affected during cyclone. Only exception in this regard is Abdasa, where no damage was reported to toilets or sanitation facilities in Biparjoy. Domestic water disposal from washing of Kitchen utensils or clothes is left out in the open where swamps are created which become breeding ground for mosquitoes during some seasons. Safe disposal of Liquid waste as well as solid waste is not available in the Habitation due to which there are cleanliness and hygiene issues. In most of the habitations, solid waste management is either non-existent or rudimentarily managed by individuals. In many cases, waste is dumped in open or in pit, either within the habitation or nearby coast. There are no safai karmcharis (sanitation workers) deployed by any agency in these habitations. No dustbins were observed in any habitations.
- e) **Health facilities:** Sub centres or government health facilities are located more than 3 km away from most Habitations, posing significant challenges to access. Only a few habitations in Okhamandal, Maliya, and Abdasa have nearby facilities. Lakhpat and Maliya demonstrate better maternal services with regular care provided by ASHAs and ANMs, followed by Okhamandal and Bhachau. However, Bhachau faces irregular services for maternal healthcare. Immunization coverage varies, with Lakhpat and Maliya achieving complete immunization for all children, while Bhachau has partial coverage. During Cyclone Biporjoy, over 50% of sub centres were affected, with notable damage in Bhachau, Maliya, and Lakhpat. Access to sub centres was hindered in Bhachau due to inundation, exacerbating healthcare challenges.
- f) **Nutrition and Food Security:** All habitations of Maliya, Okhamandal and Abdasa have Anganwadi within habitation, while in Gandhidham and Anjar no habitations have Anganwadi. Also, more than 60% of habitations of Lakhpat, Mundra and Bhacahu do not have Anganwadi. In about 50% of habitations across the blocks, it has been reported that nutrition for children, pregnant and lactating mothers are availed from Anganwadi. Vaccination drives are also carried out regularly as reported in Okhamandal. However, in few habitations of Bhachau, none of these ICDS services are available as no ASHA/ ANM reaches here. Most of

the Anganwadis were damaged due to cyclone and services were disrupted for 1-2 weeks. The damage was more severe in Bhachau and Mundra where it took more than 4 weeks to restore the services. Lakhpat, roof of centre was blown away. Disparities in food security duration are evident across regions, with some communities having significantly shorter provisions than others. Bhachau stands out as particularly vulnerable, with a large portion of the population having access to food for only 1-2 days.

- g) School and Education: In more than 2/3rd of habitations, primary school is within habitation. However in Gandhidham, Anjar and Bhachau, schools are more than 3 Km away. Where accessibility is not a problem, most of the children attend government school. But in remote habitations of Bhachau and Anjar, less than 25% children attend government school, while others have been enrolled in NGO run school. Sagar shala schools are run by Yusuf Mehrauli Centre in Gandhidham and Anjar. Unnati also runs an informal school in one of the habitations of Bhachau. Few children also go to Madrasa in Okhamandal, Bhachau and Maliya. Children without schooling was reported in habitations of Mundra and Maliya. As many as 50% of schools across the blocks were affected in Biporjoy cyclone. Structural damage and non accessibility due to water logging were main issues raised by the people in different Okhamandal, Bhachau, Maliya and Mundra. In some schools, people were also sheltered during cyclone. 60% of adults in both fishing communities and saltpan workers, and 78% in pastoralists communities did not attend school.
- h) Social Security: The widespread lack of insurance poses significant financial risks across the study area. In Anjar, 100% of the population lacks insurance coverage. Similarly, in Gandhidham and Mundra, 98% of the population are uninsured. In Maliya, insurance coverage varies, with 24% having house insurance, 13% with livestock insurance, and 4% with family insurance. Lakhpat exhibits limited coverage, with only 2% having family insurance, 1% with livelihood insurance, and 18% with other forms of insurance. Bhachau also has limited coverage, with 1% having family insurance, 1% with house insurance, and 5% each with livelihood and other insurance. In Okhamandal, only 7% have family insurance, leaving 93% of the population uninsured.

The study also looked into the details of early warning and evacuation. It was found that almost all habitations got warning of cyclone beforehand. Around 70% of them got early warning from various sources well before 2 days, while 25% of habitation got early warning before 24 hours. Only one settlement in Maliya reported to get warning just few hours before the cyclone, and one habitation in Mundra did not get the warning at all. Evacuation was carried out in 75% of habitations, except in Maliya and few habitations of Bhachau and Mundra. In 2/3rd of the habitation, people were shifted to schools or other public buildings, while Cyclone shelters were used for sheltering vulnerable families from habitations of Okhamandal, Gandhidham, Mundra, Abdasa and Lakhpat. However, in 50% of habitations, people were reluctant to leave their homes due to livestock and fear of burglary. In many habitations, few men from community stayed back in habitation even during cyclone. Food, water, shelter (stay), sanitation facilities and first aid were provided in all shelters. It was reported in 2/3rd of the habitation that government response come only when there is emergency and there are no preparedness measures in the habitation. However, in more than 40% of the habitations, mainly in Bhachau, Maliya, Anjar and Mundra, NGOs have been providing disaster response support. Apda Mitra groups have been created and trained at Gram Panchayat level as well as habitation level in some habitations except in Lakhpat. Over 60% of habitations received immediate relief either from Government or NGO/ religious groups. Some families also acknowledge support from their employers in Okhamandal and Abdasa. People have reported to receive cashdoles and dry ration from government (mainly in Okhamandal) However, many families of Bhachau,

Maliya, Gandhaidham, and Okhamandal did not receive any support. It is worth noting that there is no source of income during emergency in most of the communities in Anjar, Lakhpat, Mundra and Maliya. In Bhachau, Gandhidham and Okhamandal, many families resort to labour work if and when available in times of any hazard or disaster. It is reported that the majority of the population require 2-3 months to return to normalcy after the emergency situation.

Community specific vulnerabilities

Pastoralists: During cyclone vet services were disrupted for 2-4 weeks due to inaccessibility to these habitations. Health of animals/ cattle has been a prominent issue for pastoralists. Diseases in goats and cattle are common across habitations. However, government veterinary services are hardly accessible to these communities. Most of the pastoralists manage veterinary service by their own by calling private doctor. Only in Okhamandal, people avail government vet hospital services. Most cattle owners say fodder availability has decreased, more so in Lakhpat and Abdasa. Main reasons reported include factors of draught and climatic conditions, as well as open grazing, encroachment of pastureland and non-conservation of grassland. Ground water depletion and increased salinity in water resources are also responsible for reduction in drinking water availability for cattle. The situation in summer is particularly concerning.

Fishing Community: In almost all the blocks, the majority of the fisher folks have witnessed damage to the nets and boat, which was highest in Gandhidham followed by Bhachau. Communities in Okhamandal Mundra and Abdasa have experienced that sea (coastline) is encroaching upon the open land, while communities in Maliya, Bhachau, Gandhidham and Lakhpat say that sea is receding. Reduction in mangroves have been prominently reported in Bhachau and Abdasa, and also in few habitations of Mundra, Lakhpat, Anjar and Maliya. In over 50% habitations people have said that marine biodiversity is on decline, mainly due to increased commercial activities. Fishing activities have reduced due to salinity. However, no activities of water recharge have been initiated in any areas.

Salt Pan Workers: Impact of the cyclone can be seen majorly in the dilution of the salt, which is highest in Gandhidham (94%), followed by Anjar at 65%. Secondly, the dilution of the brim also caused by the cyclonic event where 65% of the salt-pan workers have witnessed the dilution of brim in Anjar and 64% in Bhachau.

Considering the community specific vulnerabilities and sector specific challenges, the way forward can be defined on two tracks, consistent with the objectives of the study a) Reducing vulnerabilities of coastal marginalised communities, especially in emergencies, and b) using the data and insights to strengthen the governance and outreach of government and NGO works in normal times. This includes immediate measures like Creating and sharing database of coastal marginalised communities and documenting indigenous coping capacity, and also medium to long term measures such as strengthening local DRR institutions like Apda Mitra, and creating SOPs for livestock safety in emergencies.

1. BACKGROUND

1.1 Climate Hazard in Coastal Area

Gujarat's climate is shaped by a number of factors, each contributing to its unique weather patterns and vulnerabilities across regions. Situated in India's western region, Gujarat's geography, topography, monsoon winds, and ocean currents intricately influence its climatic conditions. The state experiences a tropical climate characterized by hot summers and mild winters. While certain regions witness heavy rainfall during the monsoon season, others face dry spells prone to droughts. Recent years have seen the discernible impact of climate change on Gujarat's weather, with heightened occurrences of extreme events such as soaring temperatures and cyclones.

With India's longest coastline spanning 1,663 km and a substantial population residing in coastal areas, Gujarat faces heightened vulnerability to sea-level rise, cyclonic events, and salinity ingress. Climate change projections indicate a rise in temperatures and an increase in the frequency of extreme weather events. Gujarat's vulnerability to climate induced natural hazards like droughts, floods, cyclones, heatwaves, contributes the critical need for robust climate adaptation and mitigation strategies. The Kutch region of Gujarat, with its vast coastline, arid climate, and unique ecosystems, is highly vulnerable to the impacts of climate change. Rising temperatures, sea level rise, erratic rainfall patterns, and extreme weather events are posing severe threats to the region's delicate ecological balance and the livelihoods of its inhabitants.

Differential vulnerability to natural hazards highlights that certain socioeconomic groups and communities, including coastal cities, face disproportionate risks and challenges due to pre-existing conditions and geographical factors.

Coastal communities are more vulnerable to natural hazards than others because of sociological, demographic, or economic factors. Examples of such locations are earthquake zones and floodplains.

Furthermore, the unique biodiversity of the Saurashtra and Kutch region, including its diverse marine ecosystems, mangrove forests, and desert habitats, are under threat from the impacts of climate change. Rising temperatures, changing precipitation patterns, and sea level rise are disrupting the delicate balance of these ecosystems, putting numerous species at risk of extinction.

Addressing the impacts of climate change in the Kutch region requires a multi-faceted approach that involves adapting to the changing climate, strengthening resilience, and implementing sustainable practices.

According to UNDRR, 'Vulnerability is the condition determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards'

1.2 Marginalised communities

One of the most significant impacts of climate change in Saurashtra and Kutch is the gradual erosion and inundation of coastal areas due to rising sea levels. This phenomenon is particularly concerning for the region's salt pan workers, who rely on the intricate network of salt marshes and evaporation ponds for their livelihood. As sea levels rise, these salt pans are at risk of being submerged, leading to the displacement of

workers and the disruption of a centuries-old industry. The fishing community, another vital part of Saurashtra's and Kutch's economy, is also facing mounting challenges due to climate change. Warmer ocean temperatures are altering the distribution and abundance of fish species, forcing fishers to venture further out into the sea, often at great risk to their safety. Moreover, the increasing frequency and intensity of cyclones and storms are endangering their lives and damaging their boats and equipment.

Climate change is also exacerbating water scarcity in the region, with prolonged droughts and erratic rainfall patterns severely impacting agriculture and pastoralism. The salinity of groundwater resources is increasing, rendering them unusable for irrigation and domestic purposes. This, in turn, is leading to decreased crop yields, livestock mortality, and food insecurity, particularly among the region's rural and marginalized communities.

Hence, for this study the focus is on three vulnerable communities residing near the coastline- a) Fisherfolks, b) Salt pan workers, and c) Pastoralists

All three communities are considered to be vulnerable because of the remoteness of the habitations they live in and lack of support from the government and within and external communities. Traditionally they are marginalised in terms of lack of access to economic and social support. A brief about their livelihoods and vulnerabilities is explained here.

1.2.1 Fisher community

Gujarat has a coastline of 1650 km dominating 22% of coastline in whole India. There are 1058 fishing villages in Gujarat, of which 280 are near the coast, 116 are inland, and 82 are near rivers.



FIGURE 1 FISHERFOLKS

A joint study by ICAR, ICMR and GES¹ in 2016 indicates that the changes in the environment are drastically impacting economy and livelihood capacity of fishing communities. The months following the monsoon was considered to be crucial as it was found to be the peak fish landing period and any aberrations in weather such as occurrence of high-speed winds or cyclonic weather during this season could adversely affect the income and job opportunities of fisherfolks. Furthermore, the deterioration of fishery environments is damaging the sensitive habitats like mangroves, seagrass beds and coral reefs.

Although there are various schemes for education, health, road, drinking water, government schemes and ration cards, the disaster events hamper the livelihood, housing and primary services of the fishing communities.

1.2.3 Salt-Pan workers

The Little Rann of Kutch, stretching across Kachchh, Patan, Surendranagar, and Morbi districts, hosts traditional salt farming practices across extensive small salt pans, involving approximately 67,000 families



and 10,000 salt pans, contributing to 70% of India's salt production. Various salt production techniques are employed, including independent and company-managed salt pans, yielding different types of salt like sea salt, inland salt, and mining salt, including varieties such as Vadaguru, Karkach, and Podu.

¹https://www.researchgate.net/publication/310448182_Vulnerability_of_Coastal_Fisher_Households_to_Climate_Change_A_Case_Study_from_Gujarat_India

However, challenges abound, including drinking water scarcity, eye-related health issues, skin diseases from salt exposure, inadequate amenities, land ownership disputes, forest and wildlife concerns, salt market pricing fluctuations, technological limitations, and standardization issues.

During emergencies, the area encounters infrastructure challenges, particularly in roads and communication, a lack of early warnings, insufficient assistance and resources, and economic setbacks. Emergencies, such as cyclones, earthquakes, rainy seasons, and floods, result in damages affecting human lives, salt quality, borewells, changes in land elevation, soil conditions, roads, and disruption of salt production. Preparedness measures include implementing disaster guidelines, ensuring resident safety, maintaining and securing solar pump sets, and stocking up on essential supplies to mitigate potential impacts.

1.2.4 Pastoralists

Pastoralism is more than 5,000 years old land-use strategy in India; it is practised by nomadic (their entire livelihood revolves around pastoralism), semi-nomadic herders (migrate to higher pastures with their cattle; may cultivate land during monsoon/seasonally, if they have any), long-distance or trans-human pastorals engaged with transhumance is a grazing strategy (Sharma et. al., 2003, p. 23) and in India. Each pastoral family rear a specific or more breed/s of animals (buffalo, camel, cow, goat and sheep); and they rear herd/cattle in large numbers².

The Banni is Gujarat's only semiarid natural grassland and India's largest remnant grassland ecosystems covering about 2,500 sq km and settled by 46 villages. The pastoral communities like Maldharis, Rabari and Bharwad are the principal inhabitants of Banni grassland. Pastoralism in Kachchh district is in a dryland, semi-arid region, hosts almost 60% of the total pastoral population, approximately 1.2 million, of Gujarat state³.



FIGURE 2 SALTPANS AND WORKERS

^{2, 2} <https://www.ifc.org/en/stories/2021/india-salt-farmers>

In last two decades, Pastoralism has undergone transition from nomadic to semi nomadic and now more into mainstream 'cattle rearers' with limited movement in terms of distance. However, pastoralism has its difficulties and is especially susceptible to risks and calamities caused by nature and human-induced. Vulnerabilities of pastoralists are aggravated with erratic rainfall, flash floods and diminishing open grass lands.



2. ABOUT THE STUDY

2.1 Rationale

The impact of climate change is increasingly evident across all 14 coastal districts of Gujarat, particularly in regions like Kutch where marginalized communities, traditionally reliant on natural resources such as the sea, flora, and fauna, face escalating marginalization. These communities reside in remote areas of the district, lacking essential services and infrastructure even in peaceful times. During emergencies like cyclones, floods, or heatwaves, ensuring their safety becomes even more challenging. Moreover, as these communities are not connected to safety nets such as livelihood, health, or education-related schemes, they are further entrenched in the nexus of development and disaster.

In response to this pressing issue, the district administration has emphasized the necessity of identifying marginalized populations residing in various clusters throughout the district, particularly those requiring targeted attention during and after disaster events.

2.2 Objectives of the Study

1. Identify the most marginalized clusters within the district that necessitate assistance during both immediate disaster response and subsequent recovery phases.
2. Evaluate the effectiveness and adequacy of existing emergency interventions within these marginalized clusters.
3. Analyze the accessibility of basic services and social security schemes for inhabitants of these marginalized areas.
4. Identify actions for short-, medium- and long-term interventions.

2.3 Study Area

The coastal districts, Kutch, Morbi and Devbhumi Dwarka are chosen for the study considering the varied socioeconomic, hazard profile and vulnerabilities. Out of these districts, 8 blocks were identified where IAG members had their presence. The study is focussed on community level insights from coastal habitations, many of which are part of revenue village and other out of revenue village which is called *Vandhs*, locally. The study covers 42 such habitations (including *vandhs*).

2.4 Approach to study

Approach to study was highly participative, with inputs from 6 organisations across 8 blocks of three coastal districts – Kutch, Morbi and Devbhoomi Dwarka. The method and tools for the study were designed in a participatory manner.

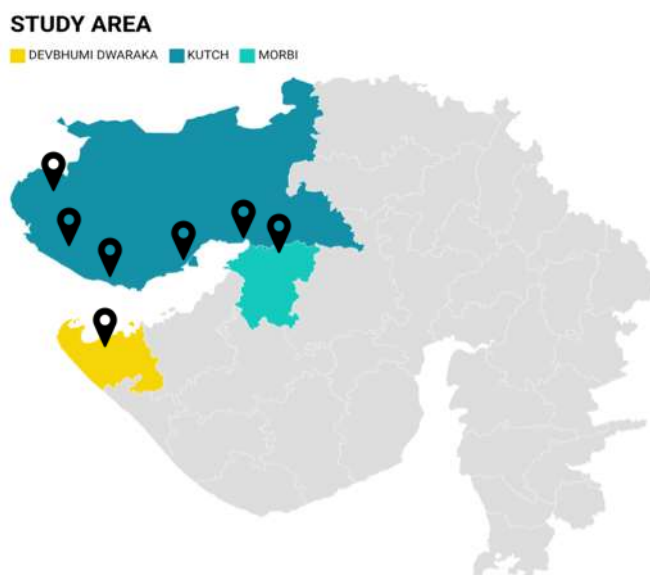


FIGURE 3 DISTRICTS OF GUJARAT COVERED IN THE STUDY

List of partners covering different blocks are given below:

S.N.	Area of study	Participating IAG partners
1	Anjar, Kutchh	Yusuf Meherally Centre (YMC)
2	Bhachau, Kutchh	UNNATI Organisation for Development Education
3	Gandhidham, Kutchh	Yusuf Meherally Centre (YMC)
4	Mandvi, Kutchh	Vivekanand Research and Training Institute (VRTI)
5	Mundra, Kutchh	Yusuf Meherally Centre (YMC)
6	Lakhpat, Kutchh	SETU Abhiyan
7	Maliya, Morbi	Anandi
8	Okhamandal, Morbi	Gramya Vikas Trust (GVT)

TABLE 1 PARTICIPATING IAG MEMBERS

The Study was approached with a simple method of developing the questionnaire along the hypothesis and objectives of the study. The study being done by IAG, inclusion of the partners to be able to complete the field work in stipulated time was of utmost importance; but more important was the ownership of the study which was brought about by calling a one day meeting with IAG partners in Bhuj, Kutch.

This meeting was helpful in making the objectives of the study clear to all the IAG partners, the deliberations and suggestions received during the meeting were incorporated in the questionnaire and also the data collection approach was discussed. This meeting was also helpful in planning the study and all the partners willingly took up responsibility of the taluka that they are working which increased the number of taluka to 6 which was earlier planned to be 3 taluka. The briefing on the Questionnaire and how Kobo tool would be used for data collection was done with the partners. Since most of the partners were familiar with Kobo Tool for data collection not much had to be explained in this subject, the questionnaire was discussed at length about how to approach the community/ households for the survey, inform about the confidentiality of the study, the objective of the study and how the findings would be shared with other stakeholders particularly the District Collector & other State Government officials.

The study area and sample villages were also identified by partners as per objectives of the study. The tools developed for the study were piloted in two areas in Jogninar vandh, Mundra and Tapal vandh in Bhachau block. An online training programme with the IAG partners and persons who were going to lead the study was done to orient about the use of technology especially Kobo tool and GIS location which was attended by more than 15 participants. During this training the timeline for the data collection, do's and don'ts were explained and experience shared with piloting the survey form. Suggestions were received from the participants were further incorporated in to the survey form.

2.5 Methodology

The study adopted mix method by including both qualitative and quantitative tools in research. CAPI based structured questionnaire was used for Household survey to for quantitative data. FGDs were conducted and

case studies were developed as part of qualitative insights. An in-depth desk research was carried out to outline the socio-economy, target groups and perceived vulnerability in the region. Kobocollect app and Kobotoolbox servers were used to design questionnaire, collect data, and collate it in MS excel sheets, proper training was provided to the investigators and also senior team member from the IAG partners were present during the collection of data as well as during most of the FGD's. Data was then analysed and represented in graphical forms using MS excel and other tools.

The study is designed to be carried out at two levels- a) Community/ Cluster level and b) Household level.

2.6 Sampling process

The universe for this study was the habitations identified by the partners in 8 blocks of three district as given in table below. For Household survey a statistically significant sample size of 520 was determined considering 95% confidence level and less than 5% margin of error.

The sampling process was initiated in the Bhuj meeting of IAG partners, where in partners identified the area/ village based on 1) being near to the coast line and 2) livelihood of the community- Fishing, Salt pan workers or Pastoralist.

For HH survey a random stratified sampling was adopted by selecting every 4th house within the habitation.

TABLE 2 SAMPLING METHOD

Level	Universe	Sample	Distribution	Criteria
District	8	3		Purposive sampling based on presence of partners in coastal area
Blocks		8		
Habitations (coastal and vulnerable areas)	80	42 (including HH survey, community interaction, and FGD)	2-5 habitations per block	Random stratified sampling considering diverse livelihood, accessibility, distance from block headquarter, nearness to coastline, hazard vulnerabilities, presence of partner, access to services
Households	8765	520	15-20 HH per habitation	Random sampling within habitation

TABLE 3 STUDY AREA COVERAGE

Blocks	Total number of habitations identified	Habitation covered under study	Total No. of Households	Households covered under the study
LAKHPAT	24	12	867	100
ABDASA	19	4	1043	-
MUNDRA	5	5	871	99
GANDHIDHAM	3	3	466	50
ANJAR	2	2	360	50
BHACHAU	10	7	415	79
MALIYA	10	5	1200	82
OKHAMANDAL	7	4	3543	60
TOTAL	80	42	8765	520

A total of 42 habitations were covered under the study, where in data collection through household survey was done in 29 Habitations and, FGD and community level information was collected in 30 habitations spread over 8 blocks of 3 districts with the support of IAG partners.

While Household questionnaire focussed on individual vulnerabilities and access basic amenities, community level information focussed on availability and accessibility of community level infrastructure and service. In FGDs, the focus was on deeper insights, enabling and disabling factors, contextual factors behind the vulnerability.

TABLE 4 HABITATION COVERED UNDER QUALITATIVE STUDY

S.N.	Habitation	Block	District	FGD/ Community Interaction
1	Dhraga Vandh	Lakhpat	Kutch	Community Interaction
2	Gunau	Lakhpat	Kutch	Community Interaction
3	Kaner	Lakhpat	Kutch	Community Interaction
4	Medi	Lakhpat	Kutch	FGD/ Community Interaction
5	Tahera	Lakhpat	Kutch	FGD/ Community Interaction
6	Jakhau village	Abdasa	Kutch	Community Interaction
7	Mohadi	Abdasa	Kutch	Community Interaction
8	Nimni Vandh	Abdasa	Kutch	Community Interaction
9	Sindhodi Moti	Abdasa	Kutch	Community Interaction
10	Bavadi Bandar	Mundra	Kutch	FGD/ Community Interaction
11	Luni Bandar	Mundra	Kutch	Community Interaction
12	Rundh Bandar	Mundra	Kutch	FGD/ Community Interaction
13	Jogninar Salt works	Anjar	Kutch	Community Interaction
14	Ambliyara Vandh	Bhachau	Kutch	Community Interaction
15	Godpar	Bhachau	Kutch	Community Interaction
16	Kanudiya	Bhachau	Kutch	Community Interaction
17	Surajbari	Bhachau	Kutch	FGD/ Community Interaction
18	Tapal Vandh	Bhachau	Kutch	Community Interaction
19	IOC Golai Salt Works	Gandhidham	Kutch	Community Interaction
20	Salt works Chudva	Gandhidham	Kutch	Community Interaction
21	Bagasra Pipariya vas	Maliya	Morbi	FGD/ Community Interaction
22	Bodki	Maliya	Morbi	FGD
23	Nava Anjasar	Maliya	Morbi	FGD
24	Salt works, Nava Hajiyasar	Maliya	Morbi	Community Interaction

25	Varshamedi, Farkni vistar	Maliya	Morbi	FGD/ Community Interaction
26	Venasar	Maliya	Morbi	FGD/ Community Interaction
27	Bhimrana Devipujak area	Okhamandal	Devbhoomi Dwarka	FGD/ Community Interaction
28	Rupen Bandar, Chhapru Vistar	Okhamandal	Devbhoomi Dwarka	FGD/ Community Interaction
29	Varvala	Okhamandal	Devbhoomi Dwarka	Community Interaction
30	Zavernagar	Okhamandal	Devbhoomi Dwarka	FGD/ Community Interaction

2.7 Audience to the study

The outcomes of the study will serve to inform and provide background information on marginalized clusters to the district administration, enabling them to formulate effective government responses. These responses can be categorized into immediate, short-term, and medium-term interventions. Furthermore, the findings will be disseminated among various sections of UNICEF, allowing them to tailor their program activities to address the needs of these clusters.

Additionally, the study findings will support Inter Agency Group (IAG) members in making more peace, the findings will assist in streamlining development interventions, including the provision of essential services such as safe drinking water, education and other such, to address the specific needs identified within these marginalized clusters.

2.8 Limitations

The limitations of the study are:

1. The study does not cover the entire villages/ habitations in the block. The same have been identified by IAG partners based on their experience and involvement during the Cyclone Biparjoy
2. The study was conducted in a participatory process with the locations selected based on presence of partner organization. The insights gathered from the field are highly contextual and relevant to the specific habitations, and hence not suitable to extrapolate and generalize across other geographies and communities.
3. The findings of study are habitation specific and cannot be generalized in other areas / villages/ communities



3. RESPONDENT PROFILE

3.1 Demographic profile of the respondents

As mentioned in methodology, the focus of the study was on three communities namely Fisherfolks, Saltpan workers and Pastorilites living in small habitations near the coastline of three districts – Kutch, Morbi and Devbhumi Dwarka in Gujarat. However, some of these habitations have been in existence since more than 100 years. Average family size is around 6.5 for all respondents combined.

3.1.1 Age

35% of respondents belong to 36-45 years, while 32% belong in age group above 45 years. 27% respondent are from 26-3 years, while remaining 6% are in 18-25 years bracket.

Gender of respondents: Male respondents were in majority in all blocks except Maliya and Lakhpat.

3.1.2 Religion

Hindus and Muslims are the two dominant communities of respondents. Majority of Hindu respondents were in blocks of Anjar, Gandhidham, Maliya and Okhamandal, while Muslim respondents were in majority in blocks of Bhachau, Lakhpat and Mundra.

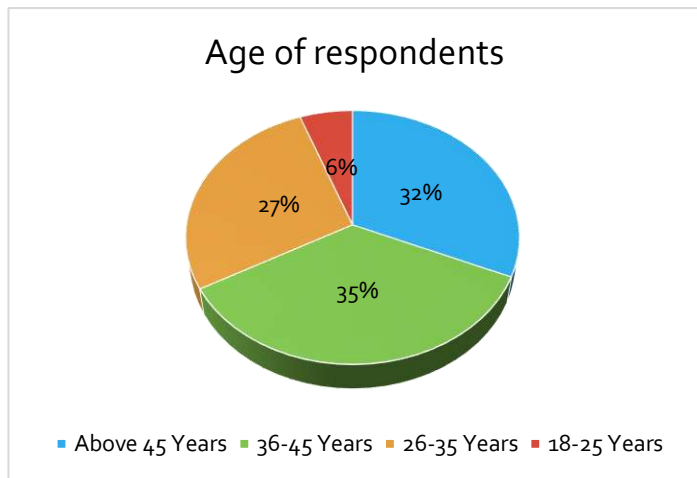


FIGURE 4 AGE OF RESPONDENTS

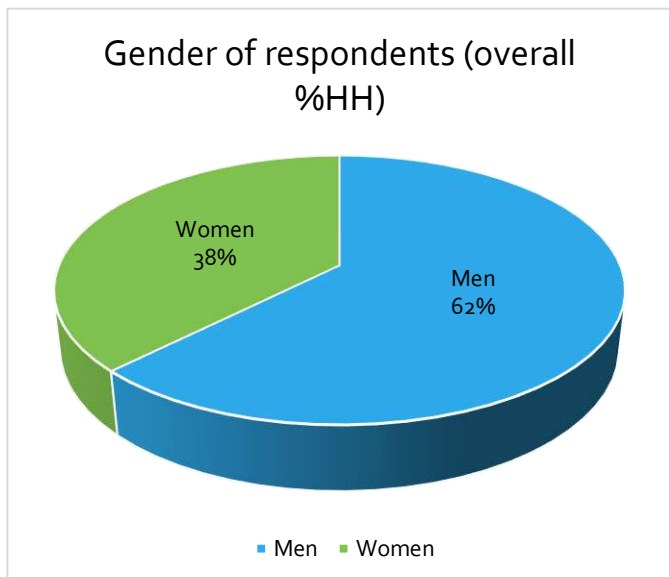


FIGURE 5 GENDER OF RESPONDENTS

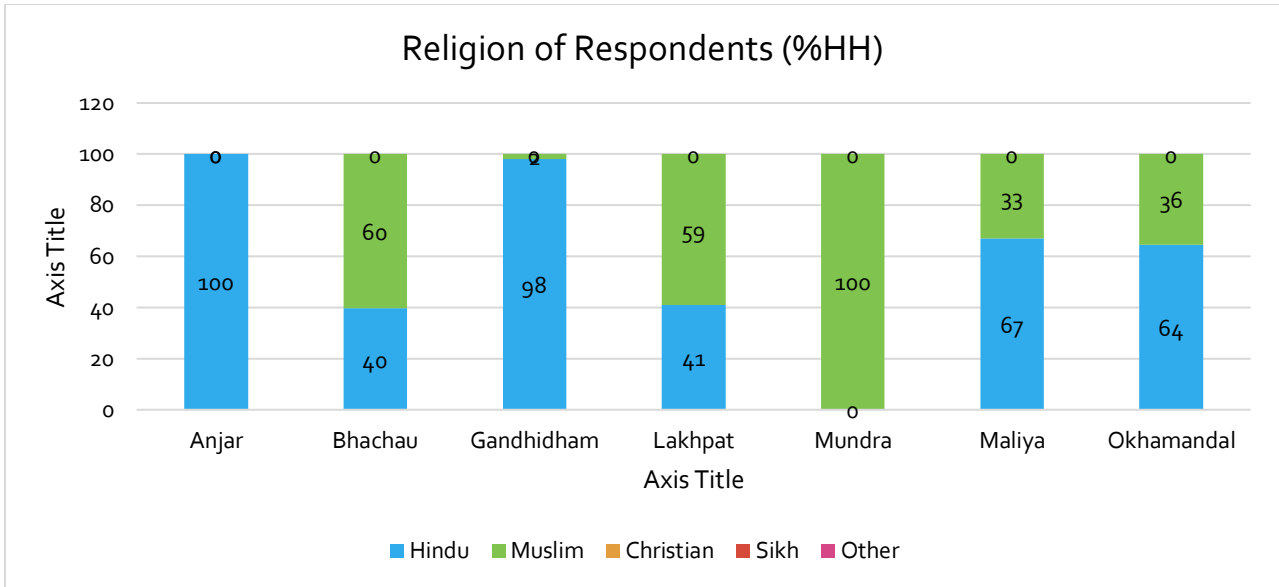


FIGURE 6 RELIGION OF RESPONDENTS

3.1.3 Social Category

All the blocks/talukas are predominated by the OBC category, with Gandhidham having 100% OBC population, followed by Maliya at 96%, while the lowest percentage is in Lakhpat at 58%. Similarly, Lakhpat has the highest population of the General category at 22%, with no general population in Anjar, Gandhidham, Mundra, Maliya, and Okhamandal. The Scheduled Caste (SC) and Scheduled Tribe (ST) populations are the lowest in the social category, with the highest population of SC in Okhamandal at 25% and ST in Mundra at 4%.

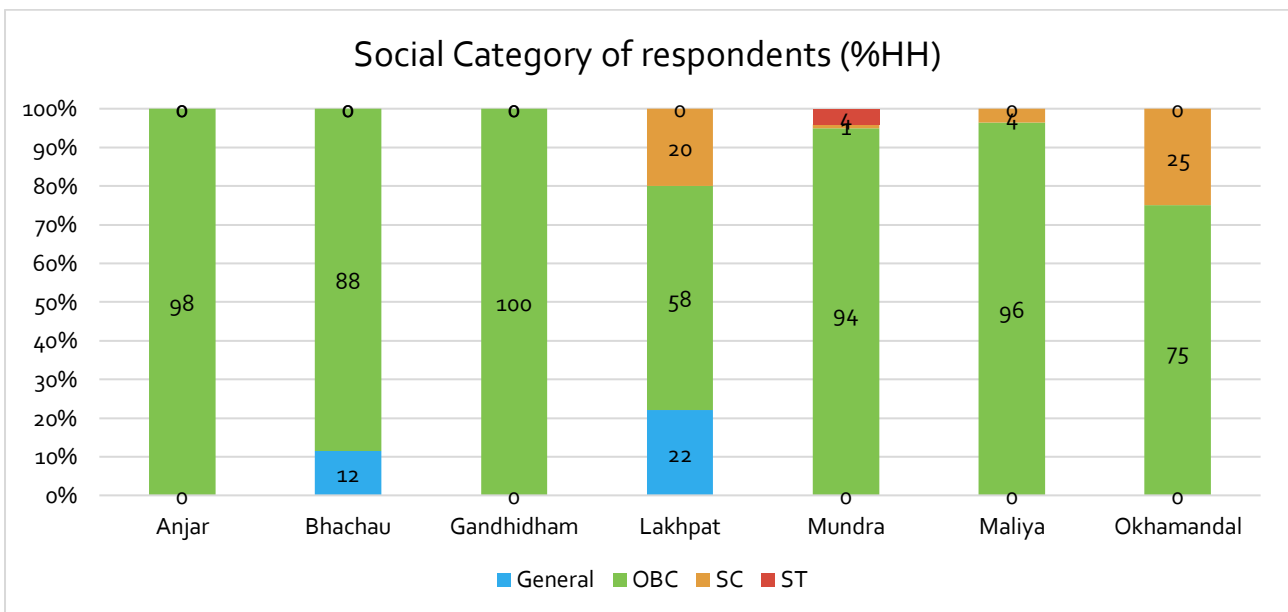


FIGURE 7 SOCIAL CATEGORY OF RESPONDENTS

3.1.4 Occupation

It is evident that Salt Pan workers are concentrated in blocks of Anjar and Gandhidham, and at few locations in Maliya and Bhachau. Fishing is the main source of income for significant 208 HH covered in the study in Mundra, Okhamandal and Bhachau. Pastoralists community are present in Lakhpat and Maliya.

The main source of income in Anjar is salt-pan works, with 100% of the population involved in salt-pan activities, while their secondary income also involves salt-pan and labor at 65% and 35%, respectively. Similarly, the main source of income in Bhachau is fishing (41%), followed by labor (38%) and salt-pan (18%). For their secondary income, they are involved in salt-pan, labor, agriculture, and pastoralism at 51%, 24%, 10%, and 5%, respectively.

In Gandhidham, 98% of the population is involved in salt-pan work, while 2% are involved in fishing. Similarly, 62% of the population is involved in labor as their secondary source of income.

In Lakhpat, the income source of the population revolves around different sources such as 23% involved in labor work, 21% in fishing, 18% in agriculture, and 16% in pastoralism. Similarly, for secondary income, they are dependent on labor (43%) and agriculture (39%).

In Mundra, 100% of the population is involved in the fishing sector for their main source of income and 99% as a secondary source of income.

In Maliya, the majority of the population (29%) is involved in labor work, while others are involved in salt-pan (23%), pastoralism (20%), fishing (17%), and agriculture (5%) as their primary source of income. Additionally, in Okhamandal, 68% of the population is involved in the fishing sector and 12% in labor. It is also to be noted that 7% of the population is involved in private and government jobs in Okhamandal block.

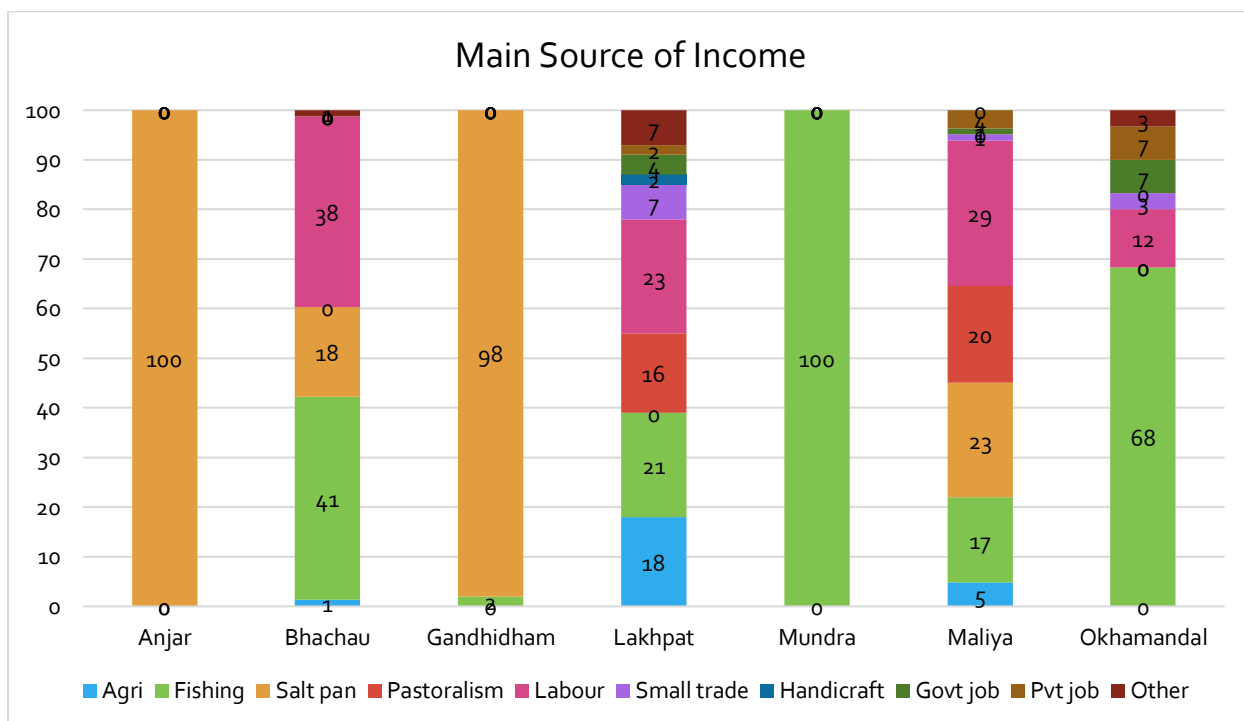


FIGURE 8 MAIN SOURCE OF INCOME ACROSS BLOCKS

Since our study focuses majorly on the three livelihoods, i.e., Fishing, Salt-pan, and Pastoralism, it is seen from the above figures that the majority of the fishing population is found in Mundra (100%), salt-pan in Anjar (100%), and Pastoralist in Maliya (20%).

The Fishing community was found to be having significant presence in almost all the blocks, whereas Salt pan workers were in majority in Anjar, Mundra, Gandhidham, Bhachau, Maliya & Okhamandal blocks.

The pastoralists were found present in only 2 blocks Lakhpat & Abdasa respectively. Though there are other professions like manual labour, agriculture, small grocery stores etc present in these Habitations

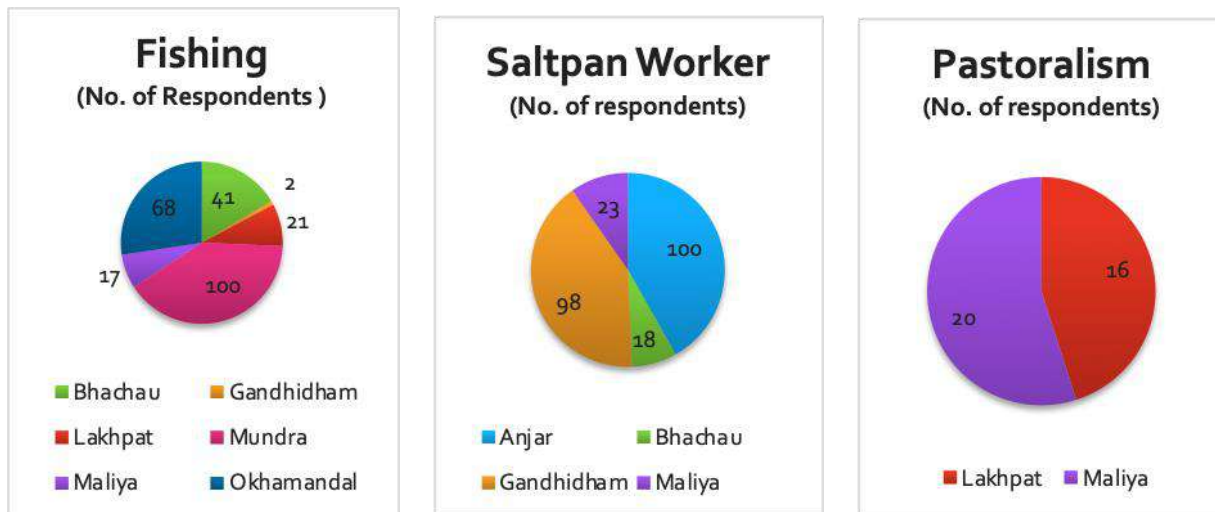


FIGURE 9 VULNERABLE COMMUNITIES ACROSS BLOCKS

The Occupation wise poverty status reveals that BPL families in Fishing communities is less than 20% while in Pastoralist communities is 31%,

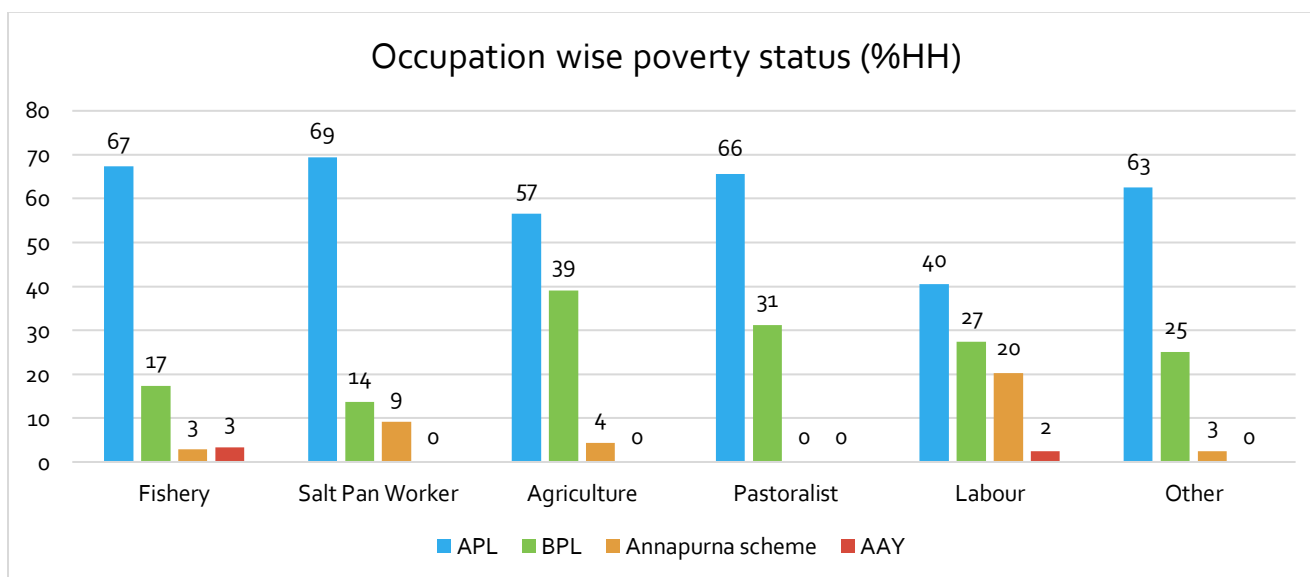


FIGURE 10 OCCUPATION WISE POVERTY STATUS

4. SECTORAL KEY FINDINGS

The study covered data and insights from sectors of Housing, Infrastructure, Water, Sanitation and Waste Management, Nutrition and Food Security, health Facility, Education and Social Security.



FIGURE 11 SECTORS COVERED IN THE STUDY

The details of insights from different blocks are explained in this section

4.1 Housing

Block wise housing typologies differ a lot. It was observed that Semi Pucca houses are dominant category across all the blocks except Anjar and Bhachau. While Pucca houses were seen in over 50% of HHs in Anjar, in rest of the blocks, it varied from 3% to 18%. In Bhachau, nearly 64% HHs lived in Kutcha houses.

4.1.1 Housing Typology

In these 7 blocks, the majority of the population have semi-pucca housing typology, with 80% of the population having semi-pucca housing in Gandhidham, followed by 77% in Lakhpat. However, kutcha housing typology is more prevalent in Bhachau at 64%, followed by Anjar at 47%, while it is least in Gandhidham at 2%. Moreover, the population in talukas such as Bhachau (6%), Lakhpat (4%), and Maliya (2%) have very temporary shelters. Block wise housing typologies differ a lot. It was observed that Semi Pucca houses are dominant category across all the blocks except Anjar and Bhachau. While Pucca houses were seen in over 50% of HHs in Anjar, in rest of the blocks, it varied from 3% to 18%. In Bhachau, nearly 64% HHs lived in Kutcha houses.



FIGURE 12 HOUSING TYPOLOGY

4.1.2 Damage to the shelter during Cyclone Biparjoy

During Biparjoy, the majority of the population have witnessed minor damage to their shelters, with 59% of the population in Mundra and Maliya experiencing minor damage to their infrastructure. Major damage in the housing sector, which led to the demolition of the HH, is seen in Okhamandal, where 19% of the population have witnessed major damage to their shelters. Similarly, in Anjar and Maliya, 6% of the population had incurred major damage, followed by Bhachau (5%), and Mundra and Lakhpat (6%).

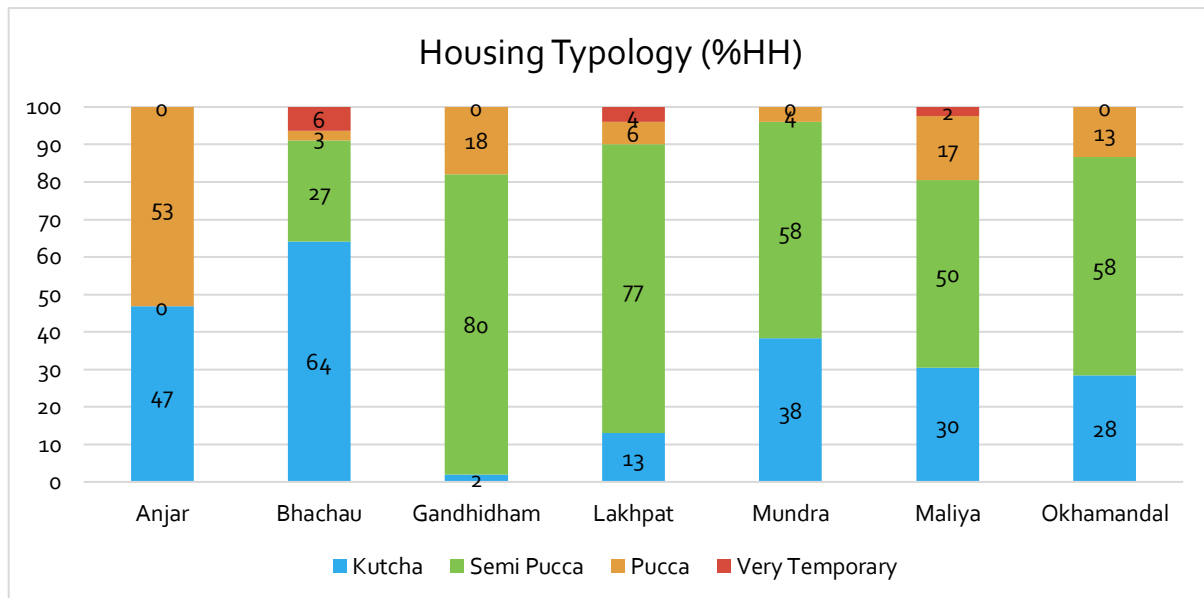


FIGURE 13 HOUSING TYPOLOGY ACROSS BLOCKS

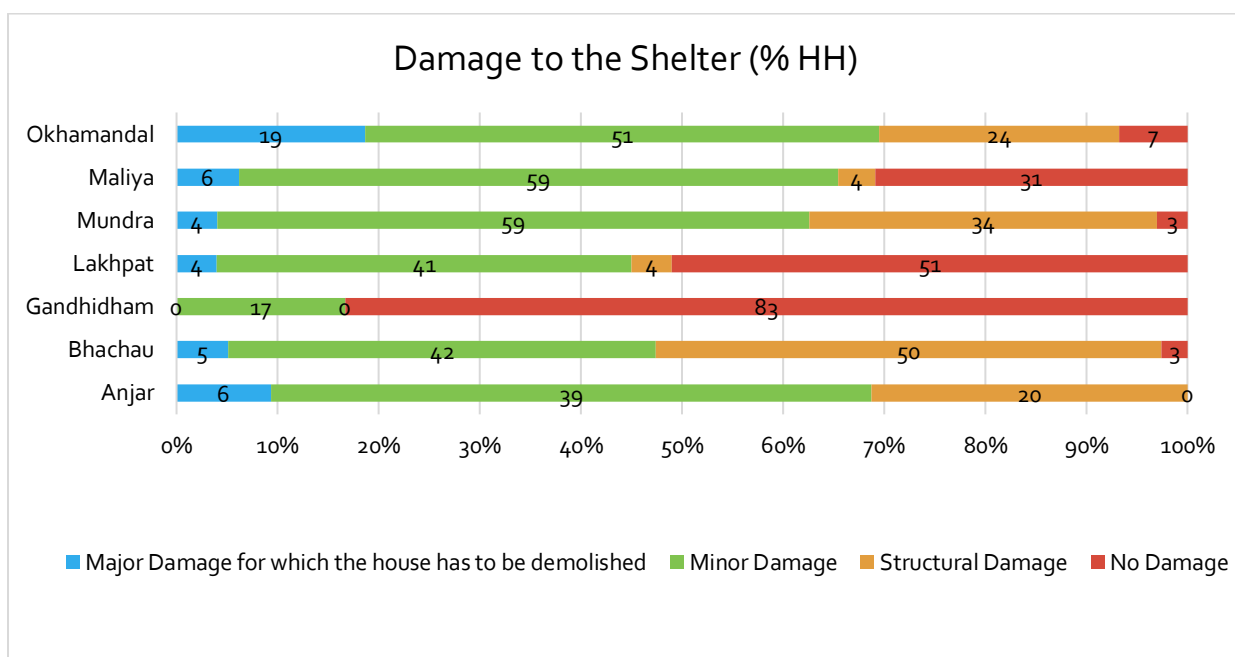


FIGURE 14 TYPE OF DAMAGE TO SHELTERS ACROSS BLOCKS

It was also evident that fishing communities were hit hardest when it comes to damage to shelter in all three categories of minor damage, structural damage and collapsed houses.

Most of the houses spent between Rs. 1000-20000 for repairs of houses. In Gandhidham, all the houses spent upto Rs. 10000, while in Mundra and Okhamandal, 33-50% HH spent in between Rs. 10000-20000. The table below gives idea of spending in terms of % of houses in particular block.

TABLE 5 AMOUNT SPEND ON REPAIRS OF HOUSE

Blocks	Amount spend in Rs. For repairs of house after cyclone Biporjoy (%HH)				
	No/Minimal Cost	1000-10000	11000-20000	21000-30000	More than 30000
Anjar	0	85	15	0	0
Bhachau	14	78	7	0	1
Gandhidham	0	100	0	0	0
Lakhpat	21	33	29	8	8
Mundra	0	50	50	0	0
Maliya	41	38	15	0	5
Okhamandal	0	56	33	5	5

However, people do know about the safe housing techniques which is evident from HH survey. Knowledge of securing walls and enclosure of the houses in times of cyclone has been reported widely across all habitations.

TABLE 6 KNOWLEDGE OF SAFE HOUSING TECHNIQUES

Blocks	Knowledge of safe housing techniques (% HH)			
	Secure roof	Secure walls/ enclosure	Secure foundation from scouring	Other
Anjar	0	69	31	0
Bhachau	54	25	21	0
Gandhidham	0	100	0	0

Lakhpat	12	6	6	1
Mundra	36	31	24	0
Maliya	23	49	48	4
Okhamandal	75	87	42	7

It is evident that housing conditions in Gandhidham and Mundra has improved significantly after cyclone. Nearly 40-60% of respondents in Anjar, Maliya and Lakhpat have acknowledged that their housing condition have improved after cyclone. In other blocks majority of respondent said that the condition has not improved.

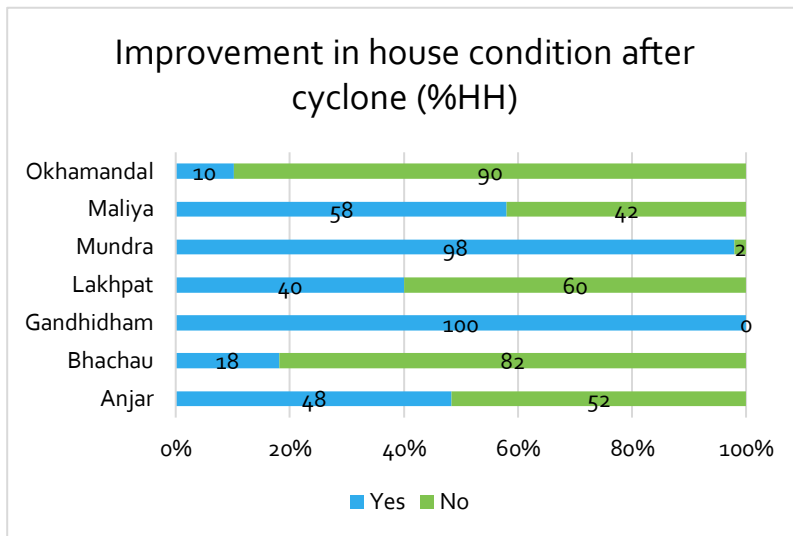


FIGURE 15 HOUSE IMPROVEMENT AFTER CYCLONE

Only in Anjar, Lakhpat and Maliya, respondents have shown confidence that they can guide mason for a safe housing construction

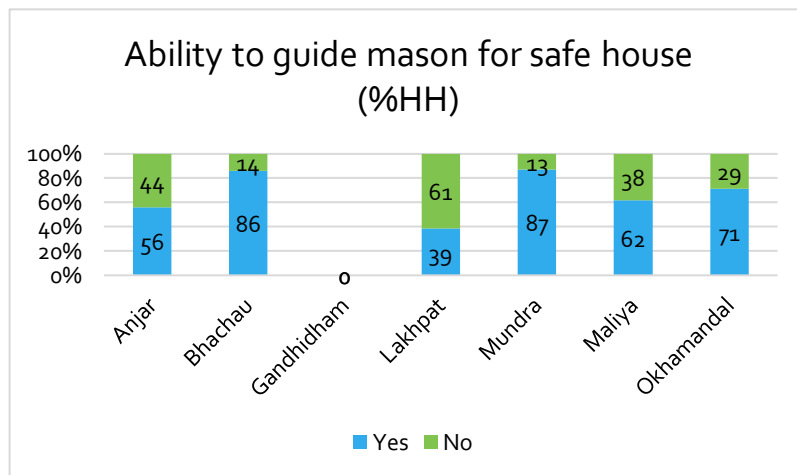


FIGURE 16 ABILITY TO GUIDE MASON FOR SAFE HOUSING

Study reveals that safe housing is still a critical need in several habitations. Kuchcha houses are vulnerable to cyclone and floods. The damages to houses in last cyclone significantly impacted lives of communities living in these remote habitations. However, there has been improvement in housing condition and people are also aware of safe housing techniques and have spent significant amount for repairs.



4.2 Infrastructure

4.2.1 Road Connectivity

More than 50% of the habitations are connected with pucca road, while 1/3rd of habitations are connected with kutchra fair weather roads. Habitations of Okhamandal, Bhachau and Lakhpat have more kutchra roads compared to other blocks.

Only 15% habitations have public transport facility like bus. This includes habitations of Okhamandal, Maliya and Lakhpat. Most of the other habitations are accessible by private transport only. Commercially used private four wheelers and autos are not available to access habitations of Lakhpat and Mundra.

In cyclone Biporjoy, road connectivity to most of the habitations across the blocks was disrupted due to inundation. The damage to roads have not been repaired till date.

Interaction with communities during FGD suggest that the road connectivity till the Habitation is approachable and has been repaired many times, during monsoon the area becomes inundated and cut off from the main road. During Monsoon, the Fisher community & the Salt pan workers either migrate to the nearby village or stay put without any livelihood options. For communities who are practice livestock rearing, this becomes their main source of income during the monsoon season.

4.2.2 Mobile connectivity

Most of the habitations have mobile connectivity except few places of Bhachau and Maliya. More than 50% of habitations across the blocks have 100% households with mobile phones.

Mobile connectivity was disrupted in most of the habitations during cyclone for 2-7 days.

In Gandhidham, mobile services were affected due to power disruption for 8 days after cyclone. Similarly in Abdasa, it took more than 15 days in some habitations to restore mobile connectivity due to damage to power supply.

In Okhamandal, people have complained that mobile connections get disrupted in monsoon season and emergency calls like 108 can also not be made.

4.2.3 Power supply

Almost all habitations have power supply except very remote of habitations in Bhachau and Mundra.

In more than 50% habitations, power supply is available to all houses, while in 25% habitations, the coverage of household connection is 50-75%.

In 50% of habitations, electric power transformer is there within habitation, while in another 25% habitations it is at distance of 1-2 km.

However, more than 90% of habitation were hit by power disruption during cyclone. While power supply was restored in most of them within 15 days, in some places of Okhamandal and Mundra, it took more than a month due to uprooting of electric poles in large numbers. Electric poles were damaged in Lakhpat, Abdasa and Maliya also. One of the habitations of Bhachau, was connected to power supply after the cyclone. Earlier people used solar power only.

People have acknowledged in discussion that electricity is available in most of the villages but it becomes irregular during the summer season and during the monsoon season many times they have to experience power cuts due to heavy wind or rainfall.

Solar power facility is found in none of the habitations of Okhamandal and Maliya, while few households use solar power in Mundra, Anjar and Gandhidham. In one of the habitations of salt pan workers in Mundra, more than 75% households use solar power. In other habitations across the blocks, the usage is 25-50%. Use of Solar lights has been promoted in some of the villages like Medi where the street lights are used to illuminate the Habitation. Rundh Bandar has HH using solar lights during electricity breakdown or faults.

There have been crucial gaps in critical infrastructure and connectivity in these habitations, which aggravates during emergencies. Many habitations do not have roads and transport facilities, while most of the habitations are cut off in times of flood and cyclone. Power supply and electric supply is also disrupted during such events. The recovery period varies from two weeks to over a month in most cases.

4.3 Water

The study looks into water-related several indicators of quantity, quality, frequency, timing and storage facilities across the habitations. The Key findings shed light on the impact of shocks/emergency events like cyclones on access to water safety and security, varying levels of water access across different habitations, and challenges related to water quality and infrastructure.

4.3.1 Water Supply Sources and access:

The Drinking water situation in all the habitations have been similar i.e. the supply of water has reached the village but not all households. The standpost at the village level is often used by the communities to fulfill their daily domestic requirements of water. In more than 20 Habitations, almost every able bodied member especially women in the households is involved in the fetching of water during summer season. Piped water supply was prevalent in Lakhpatt and Abdasa, while tanker water supply is relied upon in Mundra, Gandhidham, Anjar, Bhachau. Water supply in habitations of Okhamandal is available once in every 15 days. Scarcity of water was reported in over 50% of habitations studied except Mundra.

In the salt pans of Gandhidham and Anjar, where salt pan workers' families reside for eight months each year, employers have constructed water storage tanks to ensure access to clean water. Additionally in some places, Unnati a local NGO supplies water through tankers to three remote Habitations for most the summer period in Bhachau block. Jogni nar Habitation people use horse cart and small barrels of 50 litre and 200 litre drawn by horse cart from the stand post.

"Community living in Rupen Bandar, Devbhoomi Dwarka, purchase 1000 liters of water for Rs. 300 nearly every week. They rely on horse carts to transport water from the standpost to their Habitation on a daily basis."

The water availability per person per day ranges from 50-250 litres. Remote Habitations faced similar challenges, with irregular water supply necessitating community efforts to manage domestic water needs. In Okhamandal, water supply occurred every 15 days, while interruptions were common in Lakhpatt during summer or due to technical faults.

4.3.2 Quality of water:

Some areas mentioned issues with hard water and associated *health concerns like kidney stones*. Some of habitations in Bhachau had rooftop rainwater harvesting structures constructed post earthquake as part of the rehabilitation plan but most of them have now become defunct as the sides and bottoms of the tanks have cracked hence not able to store the water. Some of the communities in Lakhpatt, Mundra, Bhachau mentioned about the hard water they have to drink and the rising cases of kidney stones in some of the HH.

During FGDs, it was observed that the local population have limited knowledge about the water quality testing process being done by the Government as most of them are busy with availability of water rather than quality of water.

4.3.3 Storage Facilities and Infrastructure:

Household water storage varied from small containers to barrels (5 litres to 200 litres), with communities adapting to erratic water supplies. Community-level water storage was available in some habitations, while individual household storage was the norm elsewhere. In Abdasa, broken water supply pipelines

necessitated alternative arrangements by Ultratech Cement Company. Over 15 Habitations reported purchasing water every week to meet their daily water needs.

4.3.4 Cyclone Impact on Water Supply:

During events like the Biparjoy cyclone, water supply disruptions were widespread, notably in Bhachau and Lakhpat where full or partial damage to supplies occurred. Power failures during cyclones also affected water supply in Lakhpat and Maliya, with reported damages to water tanks in Lakhpat. Defunct rainwater harvesting structures observed in Bhachau due to cracks. The restoration of water supply post-cyclone

Block	No. Of Habitations	Population	Children (0-18 Y)	Source of the drinking water in the Habitation/ community	Water shortage at daily level	Periodicity of the water shortage	Quality of drinking water	Water quality testing incharge	water storage facility	Damage to Water supply and time to restore
Lakhpat	5	5202	780	Piped water supply with Tap connections	No	Seasonal	Water is good taste	WASMO	Individual plastic containers of 5 lits to 200 lits capacity	Partially, 2-4 weeks
Abdasa	4	6258	938	Piped water supply with Tap connections	Yes			Other Department		Yes, upto 2 weeks
Mundra	3	5266	790	Tanker	No			None		No, 2-4 weeks
Gandhidham	3	2796	419	Tanker	No			None		Partially, less than a week
Anjar	2	2160	324	Tanker	No			None		Yes, less than a week
Bhachau	6	2910	437	Tanker / Piped water supply	Yes			Dont know/ Gram Panchayat		Yes, 2-4 weeks
Maliya	5	896	134	Piped water supply with Tap connections	No			Gram Panchayat/ WASMO		Partially, less than a week
Okhama ndal	4	21258	3189	Tanker/ Piped water supply	Yes			Gram Panchayat		No

varied from a few days to several months across different Habitations. Generally, water supply was restored within 15 days, except in Bhachau where it took over a month.

TABLE 7 WATER MANAGEMENT SCENARIO ACROSS BLOCKS

Overall, the study highlights significant disparities in water access and quality across the region. While piped water exists in some areas, many communities rely on unreliable tanker supply or face water scarcity. Physical and chemical contamination was reported and lack of clarity around water quality testing are further concerns. The findings highlight the need for improved water infrastructure, reliable supply systems, and robust water quality monitoring in these regions

4.4 Sanitation

4.4.1 Access to safe sanitation (%)

None of the habitations have 100% toilet coverage. In fact, in few settlements of Mundra, Bhachau, Maliya and Okhamandal Mandal, none of the households have individual toilet. Coverage of toilet and its usage is better in Abdasa compared to habitations of other blocks.

Majority of habitations with toilets have single pit toilets. Double pit toilets are there in few habitations of Okhamandal, Maliya and Abdasa.

Most of the habitations have reported that sanitation facilities get affected during cyclone. Only exception in this regard is Abdasa, where no damage was reported to toilets or sanitation facilities in Biparjyo.

Damages to water tanks, doors of toilet have been reported in Okhamandal. While barriers to use of toilets during cyclone include water logging (that blocks access to toilet), and water scarcity to use toilet.

Maintenance of toilets is done by the individuals in most of the cases. In Okhamandal, community toilets are maintained by Gram Panchayat.

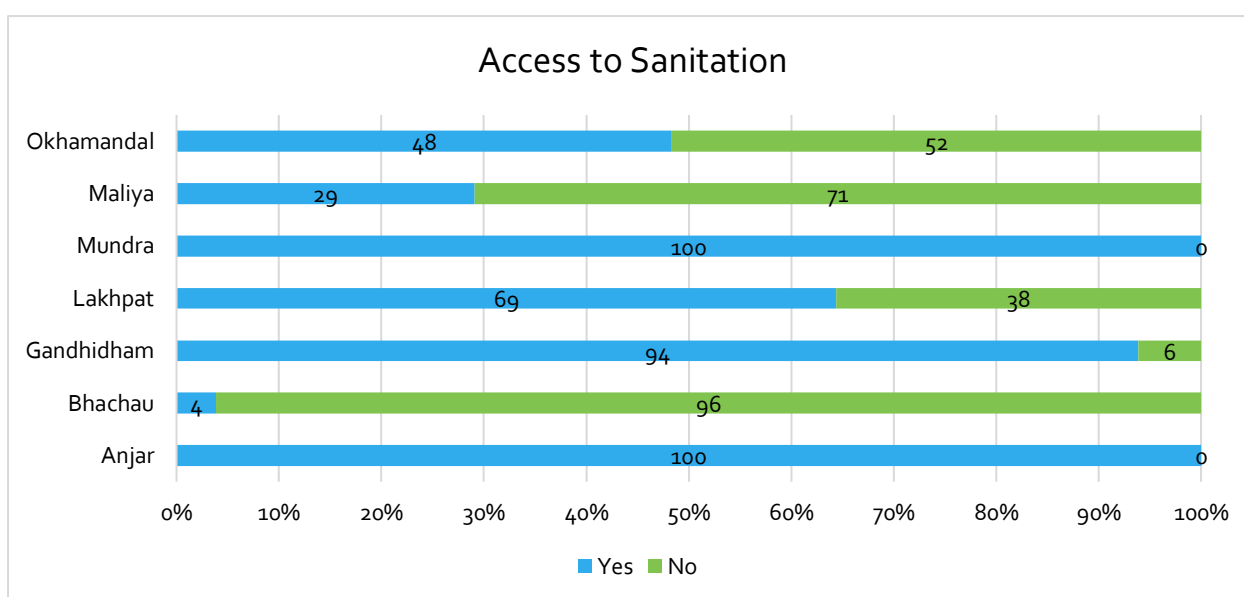


FIGURE 17 ACCESS TO SANITATION

FGDs reveal that most of the HH practice open defecation, some of the HH do have Toilet blocks but they are not used by communities, they do have bathing space demarcated for the women by making a makeshift arrangement for the women to take bath and maintain privacy. The basic infrastructure of Sanitation is available for 25% HH and even then, most of them do not use it.

Domestic water disposal from washing of Kitchen utensils or clothes is left out in the open where swamps are created which become breeding ground for mosquitoes during some seasons. Safe disposal of Liquid

waste as well as solid waste is not available in the Habitation due to which there are cleanliness and hygiene issues.

4.4.2 Sanitation of Women:

Regarding access to sanitation facilities, the majority of women responded positively. However, it is observed that 96% of women in Bhachau lack access to sanitation facilities. Despite populations in other blocks having access, some women reported facing issues in Mundra, with 100% experiencing difficulties in maintaining personal hygiene, followed by Bhachau at 91%, and Okhamandal at 57%.

4.4.3 Waste management

In most of the habitations, solid waste management is either non-existent or rudimentarily managed by individuals. In many cases, waste is dumped in open or in pit, either within the habitation or nearby coast. There are no safai karmcharis (sanitation workers) deployed by any agency in these habitations. No dustbins were observed in any habitations. Open dumping leads to contamination of land, forests, vegetation and sea water.

Sanitation facilities have been found poor in most of the habitations. Open defecation is rampant and availability of toilets and its use remain low. Solid waste and wastewater management is virtually non existent in most of the habitations. No services of cleaning is provided by Gram Panchayats in these habitations.

4.5 Health Facility and Maternal Care

Key findings on health and maternal-related shed light on the impact of shocks/emergency events like cyclones on access to health care and access. Current situation and details on different indicators is elaborated here.

4.5.1 Accessibility of Health Facilities:

Sub centres or government health facilities are located more than 3 km away from most Habitations, posing significant challenges to access. Only a few habitations in Okhamandal, Maliya, and Abdasa have nearby facilities. In Bhachau, Lakhpat, and some habitations of Abdasa, less than 25% of the population accesses these facilities, while in Mundra and Okhamandal, the majority avail services of government health facilities.

4.5.2 Awareness of Healthcare Workers:

Communities face challenges accessing primary healthcare, with PHCs located 3-5 km away from habitations. Issues such as loss of livelihood and lack of doctor availability at hospitals compel reliance on private medical practitioners, adding financial burdens. Many villagers lack awareness of the roles of ANMs and ASHA workers. Okhamandal reported regular ANM visits for healthcare and addressing illnesses. Bhachau had a mobile clinic visiting weekly in one village. Lakhpat's poor road conditions prevent ANM visits, forcing residents to travel far for PHCs (Primary Health Centers).

4.5.3 Maternal and Child Healthcare Services:

Lakhpat and Maliya demonstrate better maternal services with regular care provided by ASHAs and ANMs, followed by Okhamandal and Bhachau. However, Bhachau faces irregular services for maternal healthcare. Immunization coverage varies, with Lakhpat and Maliya achieving complete immunization for all children, while Bhachau has partial coverage.

All children in Lakhpat and Maliya have received complete immunization, followed by 91% in Okhamandal and 27% in Bhachau. No children in Gandhidham have received any immunization.

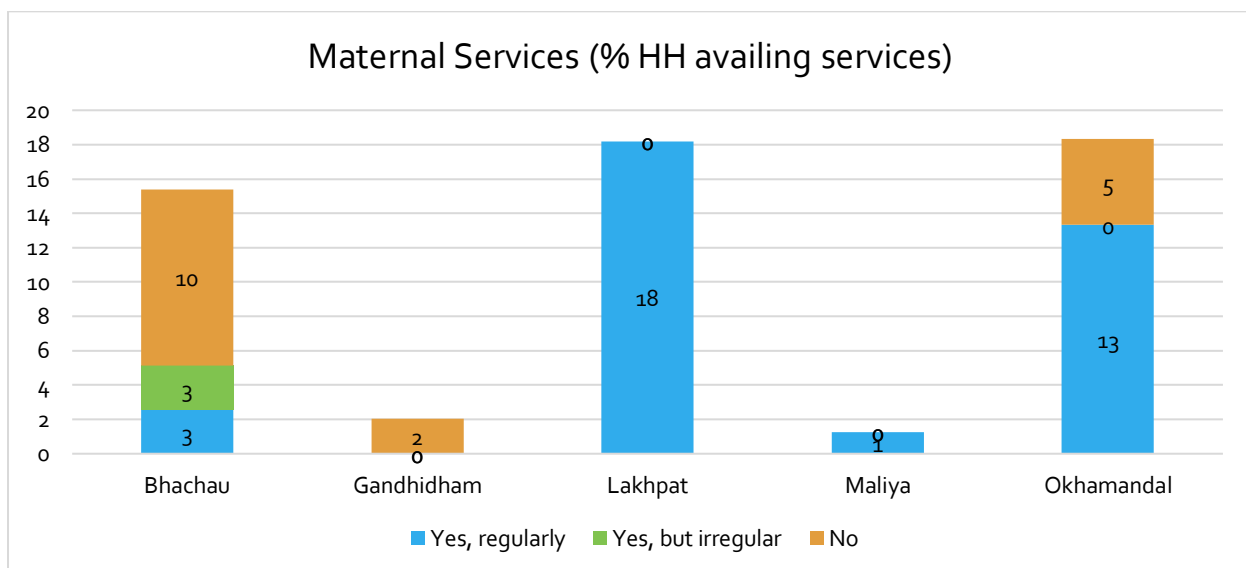


FIGURE 18 MATERNAL SERVICES

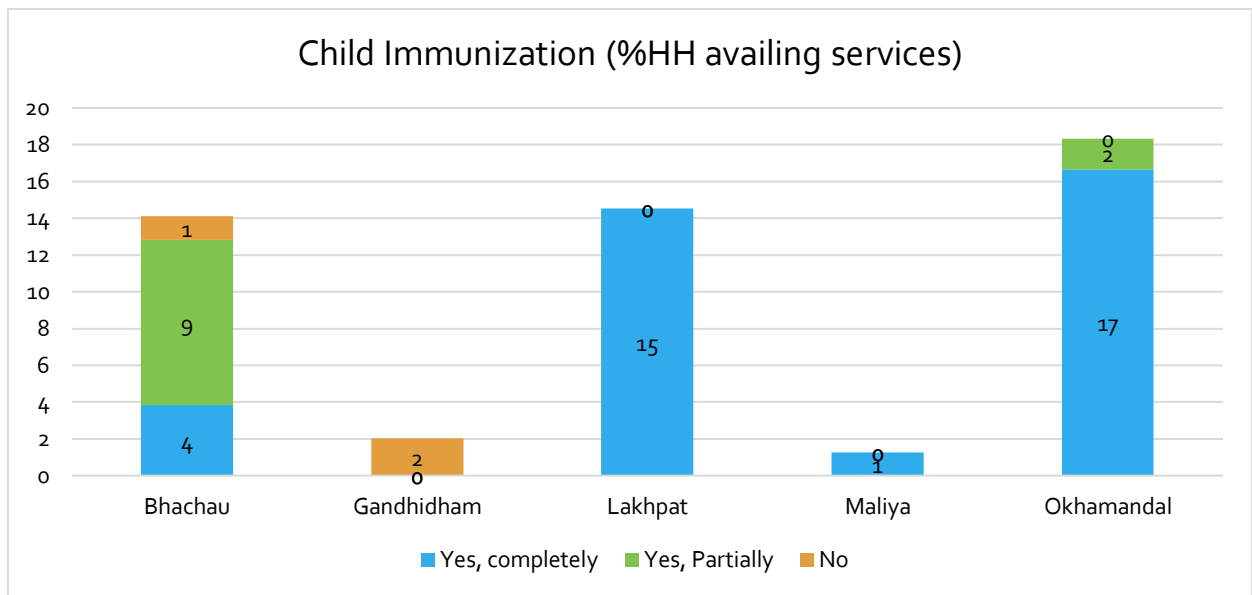


FIGURE 19 CHILD IMMUNISATION

4.5.4 Impact of Cyclone on Health Infrastructure:

During Cyclone Biparjoy, over 50% of sub centres were affected, with notable damage in Bhachau, Maliya, and Lakhpat. Access to sub centres was hindered in Bhachau due to inundation, exacerbating healthcare challenges. Awareness of the role of ANM and ASHA varies, with some areas reporting regular visits and services while others face constraints due to poor road conditions and staff shortages.

4.5.5 Emergency Healthcare Services:

During emergencies like Cyclone Biparjoy, critical gaps in emergency healthcare services were observed, particularly in Gandhidham and Bhachau. Mundra stands out with 100% coverage, highlighting effective emergency preparedness and response. During Cyclone Biparjoy, more than 50% of sub-centers were affected. Damages was prominent in Bhachau, Maliya, and Lakhpat. In Mundra, one sub-center structure collapsed during the cyclone. In Bhachau, most sub-centers were inaccessible due to inundation.

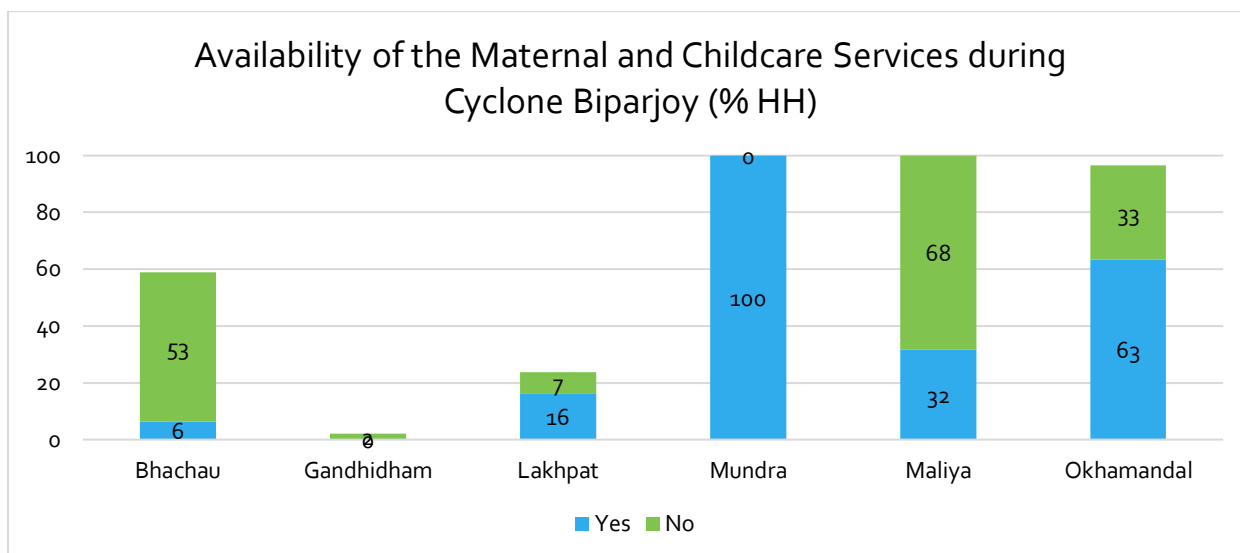


FIGURE 20 MATERNAL AND CHILD HEALTHCARE SERVICES DURING EMERGENCY

TABLE 8 SERVICES AT HEALTH CENTRES

Block	Total no. of Habitations	Women Population (approx)	Children (0-6 years)	Distance of Centre Habitation	Sub-from	% of Children and women access sub-centre services	Access to sub-centre after cyclone
Lakhpat	5	2601	195	More than 3 Kms		Less than 25%	Yes
Abdasa	4	3129	235	More than 3 Kms		Less than 25%	No
Mundra	3	2633	198	More than 3 Kms		50-75%	No
Gandhidham	3	1398	105	More than 3 Kms		25-50%	Yes
Anjar	2	1080	81	More than 3 Kms		25-50%	Yes
Bhachau	6	1455	109	More than 3 Kms		25-50%	Yes
Maliya	5	448	34	More than 3 Kms		50-75%	Yes
Okhamandal	4	10629	797	More than 3 Kms		75% & up	No

This study reveals access to healthcare disparities in the region. Bhachau faces significant challenges in accessing government health facilities, maternal and child healthcare services, and immunization. While some areas show better service provision, gaps persist. Strengthening healthcare infrastructure, particularly in Gandhidham and Bhachau, improving awareness of healthcare workers' roles, and ensuring reliable doctor availability at PHCs are crucial suggestions by the local community achieving equitable healthcare access.

4.6 Nutrition and Food Security

4.6.1 Access to Anganwadi

All habitations of Maliya, Okhamandal and Abdasa have Anganwadi within habitation, while in Gandhidham and Anjar no habitations have Anganwadi. Also, more than 60% of habitations of Lakhpat, Mundra and Bhacahu do not have Anganwadi. Distance of nearest Anganwadi in habitations of Gandhidham, Anjar and Bhacahu is more than 3 Km and majority of these habitations report less than 25% of children availing its services.

4.6.2 ICDS Services

In about 50% of habitations across the blocks, it has been reported that nutrition for children, pregnant and lactating mothers are availed from Anganwadi. Vaccination drives are also carried out regularly as reported in Okhamandal. However, in few habitations of Bhachau, none of these ICDS services are available as no ASHA/ ANM reaches here. Also as the habitations are remote (6-10 Km), many families do not even know what kind of services and benefits are available through AWC. It is also reported the AWC is closed most of the time and the building has chronic dampness in walls and floor and so its not suitable for children to sit there. In Bhimrana, the village has an Aanganwadi and all the children are enrolled for which they are also provided home ration regularly. The community receives take-home rations for children, pregnant and lactating mothers, and adolescent girls, along with Early Childhood Care and Education (ECCE) services.

4.6.3 Effect of Cyclone

Most of the Anganwadis were damaged due to cyclone and services were disrupted for 1-2 weeks. The damage was more severe in Bhachau and Mundra where it took more than 4 weeks to restore the services. Lakhpat, roof of centre was blown away. In Abdasa, it was reported that anganwadi is been run by helper as the Anaganwadi worker (AWW) comes from city and is not regular. In Okhamanda, it was reported that ICDS services were provided in cyclone shelter also, when people were living there during Biporjoy.

4.6.1 Food Security during emergency

Disparities in food security duration are evident across regions, with some communities having significantly shorter provisions of ration than others. Bhachau stands out as particularly vulnerable, with a large portion of the population having access to food for only 1-2 days. Interventions focusing on increasing food reserves and emergency response mechanisms should prioritize Bhachau to ensure adequate food supply during crises. Long-term strategies should aim to improve food security infrastructure and resilience in all regions, especially those with limited provisions during emergencies.

FIGURE 21 FOOD AVAILABILITY DURING EMERGENCY

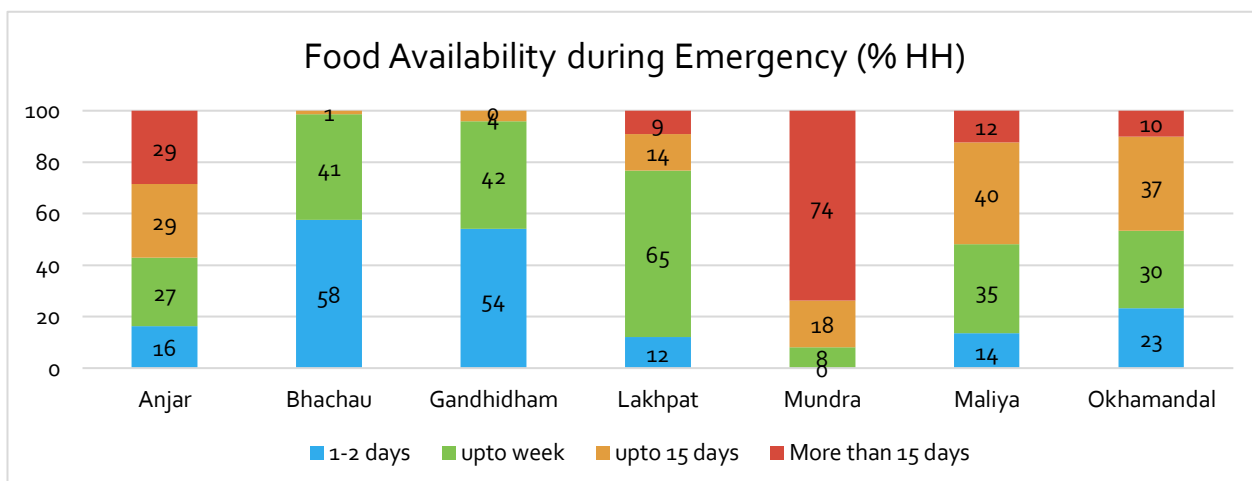


TABLE 9 ICDS SERVICES

Block	Total no. Of Habitations covered in the study	Population (approx)	Children (0-18)	Does the Habitation have Anganwadi		If no, how far is the nearest Anganwadi ?	How many Habitation children access Anganwadi services? In %	What kind of services is availed in Anganwadi?		
				Yes	No			Nutrition For Children	For Pregnant women & Lactating mothers	For Adolescent girls
Lakhat	5	5202	780	3	2	2-3 Kms	50-75%	YES	YES	YES
Abdasa	4	6258	938	4	0	1-2 Kms	76-99%	YES	YES	YES
Mundra	3	5266	790	1	2	More than 3 kms	<25%	YES	YES	YES
Gandhidham	3	2796	419	0	3	More than 3 kms	25-50%	YES	YES	YES
Anjar	2	2160	324		2	More than 3 kms	25-50%	YES	YES	YES
Bhachau	6	2910	437	2	4	More than 3 kms	25-50%	YES	YES	YES
Maliya	5	896	134	5	0	Less than 1 km	51-75%	YES	YES	YES
Okhamandal	4	21258	3189	4	0	Less than 1 km	76-99%	YES	YES	YES

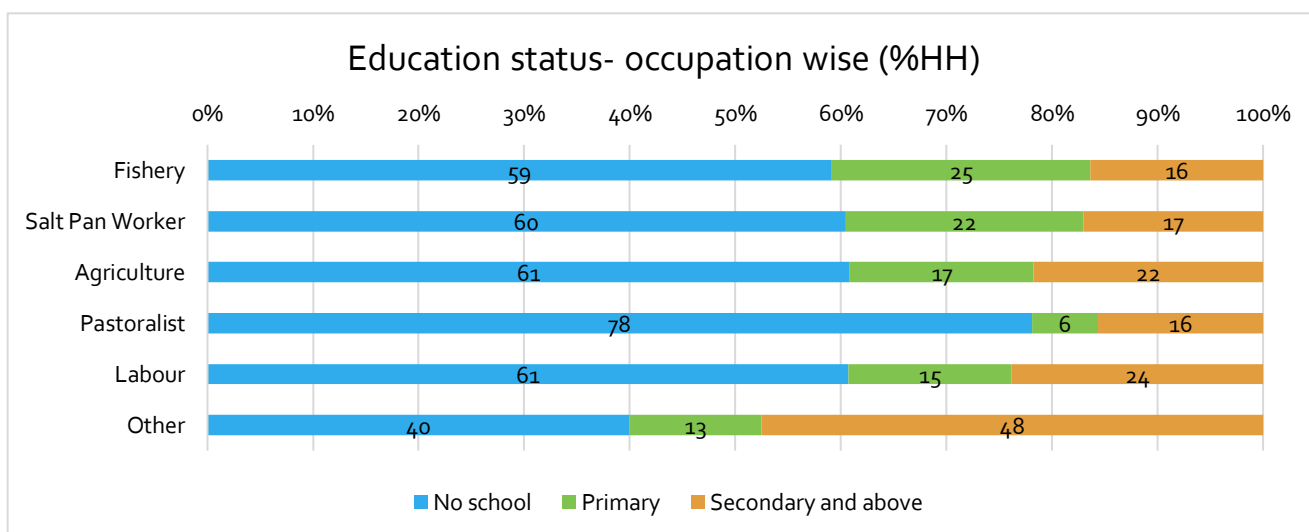
Study reveals that due to remote locations and issues of accessibility, ICDS services have not reached all households of the vulnerable communities. Also there has been disruptions in ICDS services in times of emergencies. As per community, there is no perceived threat to food security despite having less than a weeks ration for many households. However, in absence of disaggregated data of women and children of these habitations, evidence based conclusion cannot be made on nutrition and food security.

4.7 School and Education

4.7.1 Literacy in Adults

Household survey reveals that there is high level of illiteracy in all three focus communities. While, the percentage of respondents with no schooling was around 60% in both fishing communities and saltpan workers, it was as high as 78% in pastoralists communities.

In almost every block, the majority of the population have not attended school. Bhachau and Maliya have the highest percentage, i.e., 76% of the population have not attended any formal education, whereas it is least in Anjar at 35%. Primary education is predominantly seen in Anjar at 43%, whereas it is lowest in Maliya at 6%. Secondary education is highest in Lakhpat at 24%, while it is lowest in Maliya at 13%. The highest level of education (Higher Secondary and College) is prominent in Maliya with 4%, followed by 3% in Lakhpat, and it is least in Anjar, Gandhidham, and Okhamandal with 0%.



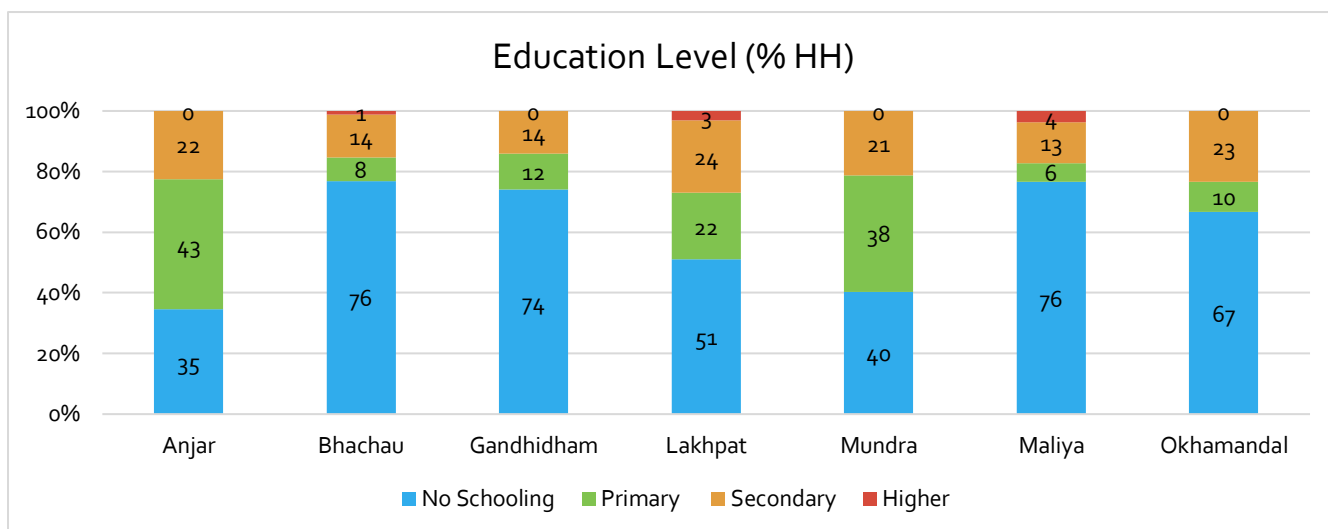


FIGURE 22 EDUCATION LEVEL ACROSS BLOCKS

Figure 23 Occupation wise education status

4.7.2 Distance to School and enrolment

In more than 2/3rd of habitations, primary school is within habitation. However in Gandhidham, Anjar and Bhachau, schools are more than 3 Km away. Where accessibility is not a problem, most of the children attend government school. But in remote habitations of Bhachau and Anjar, less than 25% children attend government school, while others have been enrolled in NGO run school. Sagar shala schools are run by Yusuf Mehrauli Centre in Gandhidham and Anjar. Unnati also runs an informal school in one of the habitations of Bhachau. Few children also go to Madrasa in Okhamandal, Bhachau and Maliya. Children without schooling was reported in habitations of Mundra and Maliya.

4.7.3 Effects of cyclone on school and education

As many as 50% of schools across the blocks were affected in Biporjoy cyclone. Structural damage and non accessibility due to water logging were main issues raised by the people in different Okhamandal, Bhacahu, Maliya and Mundra. In some schools, people were also sheltered during cyclone.

Most of the schools reopened within a weeks time after the cyclone, except for few schools in Okhamandal and Mundra which were damaged more. In Okhamandal, school roof was broken and school was closed for 15 days. In Abdasa few schools were closed for 2-4 weeks due to disruption of power supply and fear of electrocution after deluge and damage to electricity poles.

In Rundh Bandar & Bavdi Bandar, the children are going to schools which are managed by an NGO which provides education till 5th grade. The NGO has tie up with the Government school nearby to accommodate the students after 5th grade and also they run a hostel facility to support 50 children from the Habitation to continue further education.

In Tehra Vandh there is a school which provides education to children upto 5th grade. The community has developed the interest in educating their children and even sending to schools upto 5 kms to attend the schools.

TABLE 10 EDUCATION SERVICES IN HABITATIONS

Block	Total no. Of Habitations covered in the study	Population (approx)	Children	How far is the government primary school from your Habitation	How many Habitation children go to the government school?	If not going to govt school, where do most of them go?	Does the school got affected in the cyclone?	If yes , what were the issues?
			0-6 years					
Lakhpatt	5	5202	195	Inside the Habitation	75-99%	Private Schools nearby	No	
Abdasa	4	6258	235	Inside the Habitation	75-99%		yes	Structural Damage
Mundra	3	5266	198	Inside the Habitation	75-99%	NGO run informal school	Yes	Structural Damage
Gandhidham	3	2796	105	3-5 Kms away	50-75%	NGO run informal school	yes	Structural Damage
Anjar	2	2160	81	3- 5 Kms away	50-75%	NGO run informal school		
Bhachau	6	2910	109	3-5 Kms away	<25%	NGO run informal school		
Maliya	5	896	34	3-5 Kms away	<25%	NGO run informal school	yes	Structural Damage
Okhamandal	4	21258	797	Inside the Habitation	75-99%	NGO/ Madarsa	yes	Structural Damage

Illiteracy is high among adults of all three vulnerable communities, however, most of the children are enrolled in school. School buildings were damaged and education was disrupted during last cyclone, and also school buildings are being used to shelter people. In few remote habitations, the schools are being run by NGO.



4.8 Social Security

4.8.1 Insurance

The widespread lack of insurance poses significant financial risks across the study area. In Anjar, 100% of the population lacks insurance coverage. Similarly, in Gandhidham and Mundra, 98% of the population are uninsured. In Maliya, insurance coverage varies, with 24% having house insurance, 13% with livestock insurance, and 4% with family insurance. Lakhpat exhibits limited coverage, with only 2% having family insurance, 1% with livelihood insurance, and 18% with other forms of insurance. Bhachau also has limited coverage, with 1% having family insurance, 1% with house insurance, and 5% each with livelihood and other insurance. In Okhamandal, only 7% have family insurance, leaving 93% of the population uninsured.

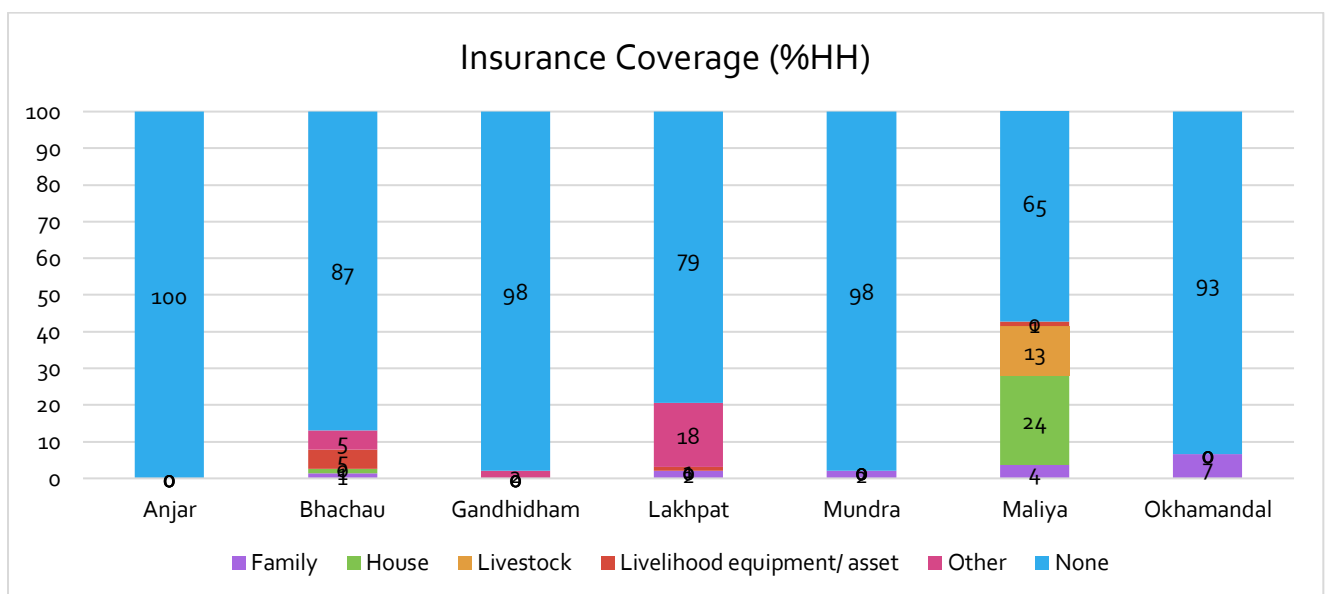


FIGURE 24 INSURANCE COVERAGE

5. HAZARD, VULNERABILITY AND EMERGENCY SUPPORT

5.1 Early warning and Evacuation

Almost all habitations got warning of cyclone beforehand. Around 70% of them got early warning from various sources well before 2 days, while 25% of habitation got early warning before 24 hours. Only one settlement in Maliya reported to get warning just few hours before the cyclone, and one habitation in Mundra did not get the warning at all.

Evacuation was carried out in 75% of habitations, except in Maliya and few habitations of Bhachau and Mundra.

In 2/3rd of the habitation, people were shifted to schools or other public buildings, while Cyclone shelters were used for sheltering vulnerable families from habitations of Okhamandal, Gandhidham, Mundra, Abdasa and Lakhpat. Few families also took shelter in relatives' houses across different blocks. In Jakhau and Bhachau, people living in kutcha houses and bhunga were evacuated.

However, in 50% of habitations, people were reluctant to leave their homes due to livestock and fear of burglary. In many habitations, few men from community stayed back in habitation even during cyclone. There was no reluctance from people in Anjar, Gandhidham and Mundra, as these were primarily salt pan workers without much assets or livestock to worry about.

Food, water, shelter (stay), sanitation facilities and first aid were provided in all shelters. Availability of Child care services were reported in few shelters of Okhamandal, Abdasa and Bhachau. Mostly people rated these services to be good, except in some places of Lakhpat where people complained that the food packets were not good and not in enough quantity. In Bhachau, it was reported that government cyclone shelter was in dilapidated condition. Also people from other village were given shelter in nearby school and hence people from habitation did not get place there.

It was reported in 2/3rd of the habitation that government response come only when there is emergency and there are no preparedness measures in the habitation. However, in more than 40% of the habitations, mainly in Bhachau, Maliya, Anjar and Mundra, NGOs have been providing disaster response support. Apda Mitra groups have been created and trained at Gram Panchayat level as well as habitation level in some habitations except in Lakhpat.

Over 60% of habitations received immediate relief either from Government or NGO/ religious groups. Some families also acknowledge support from their employers in Okhamandal and Abdasa. People have reported to receive cashdoles and dry ration from government (mainly in Okhamandal) However, many families of Bhachau, Maliya, Gandhaidham, and Okhamandal did not receive any support.

Some of the key insights related to evacuation and services from various habitations are given below:

People from Tehra did not have had much problem, they were informed about the cyclone 5 days in advance and they stopped going into the sea for fishing, the district administration informed them about the cyclone and advised them to move to nearby school for safety. Most of the HH were located to a nearby school for a day and they had left a group of youngsters to stay put taking care of the household and

property. When they came back, they could see some temporary structures like makeshift bathrooms, tin sheet roofs affected by the cyclone.

Medi did not have much problem; they remained in the Habitation itself. The temporary structures were affected which they got it repaired themselves. They had taken care of moving the livestock in a safe place and collectively took care of the facilities.

Most of Habitation, were informed about the Biparjoy much in advance from 10 days to 5 days, some got to know from the administration, colleagues, family members, relatives etc. The preparation for relief camp was done by YMC in which more than 5000 persons took shelter instead of 2000 persons planned by the NGO resulting in chaotic situations but since the stay was not prolonged, many of the families returned the very next day to their respective HH.

This section analyses the key vulnerabilities of all three focus communities, based on their experience and perception. It includes access to infrastructure and services critical for their lives and livelihoods, and emergency support received during last cyclone event.

5.2 Community Specific vulnerabilities

5.2.1 Cattle rearers/ Pastoralites

Percentage of households having animals (or cattle rearing as primary occupation) vary from block to block. However, cattle rearing or animal husbandry is prominently seen in Lakhpat, most of houses across all habitations having small and big animals. In Abdasa, Maliya, Okhamandal and Bhachau, number of households having animals vary from 25-75% across different habitations. The communities in these habitations have been identified as pastoralists. (In Anjar, Gandhidham and Mundra, no households have animals, as most of them are either salt pan workers or fisher folks). In Bhachau, people keep 2-3 goats per household.

5.2.1.1 Livestock during emergency

During cyclone, people had to keep cattle at the habitations as there was no facility at shelter. Many families were reluctant to shift to shelter even temporarily because of livestock. In Okhamandal, many cattle died in cyclone. During cyclone vet services were disrupted for 2-4 weeks due to inaccessibility to these habitations.

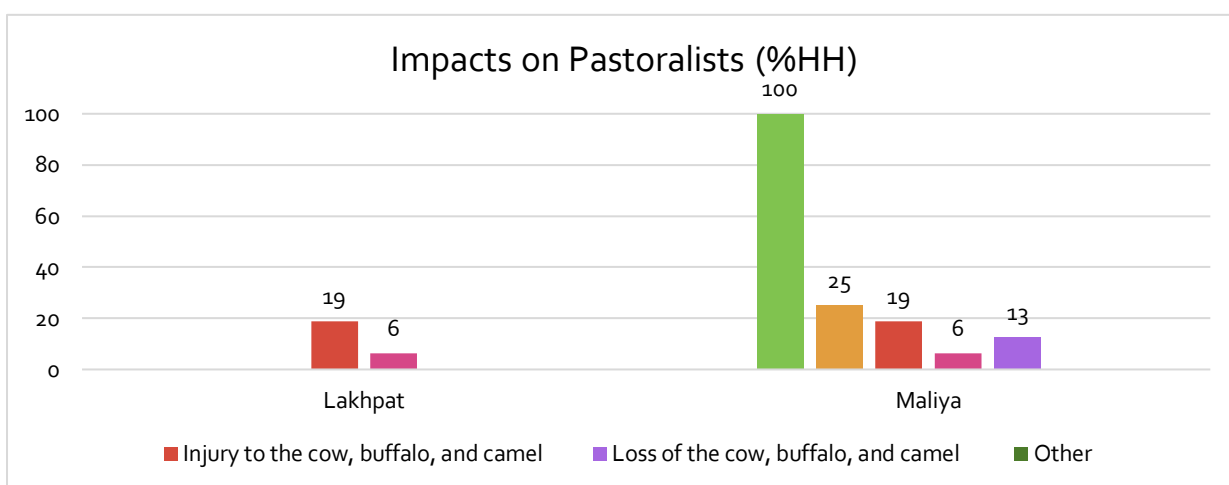


FIGURE 25 IMPACT OF CYCLONE ON PASTORALISTS

5.2.2.2 Health hazards of livestock

Health of animals/ cattle has been a prominent issue for pastoralists. Diseases in goats and cattle are common across habitations. However, government veterinary services are hardly accessible to these communities. Government vet hospitals are quite far away from the habitations. In Lakhpat and Abdasa, the distance to nearest government vet facility may be as high as 30-75 Km. In the study it was found that most of the pastoralists manage veterinary service by their own by calling private doctor. Only in Okhamandal, people avail government vet hospital services. Households from very few habitations of Okhamandal, Maliya and Abdasa attend health camps organized by government department.

FGDs in these communities also reveal that Veterinary care is available 5-10 kms from the village, both government as well as private. But most of the HH take care of the livestock and purchase the medicines from the market or by consulting the veterinary doctor in the nearby village.

5.2.2.3 Loss of fodder

Most cattle owners say fodder availability has decreased, more so in Lakhpat and Abdasa. Main reasons reported include factors of draught and climatic conditions, as well as open grazing, encroachment of pastureland and non-conservation of grassland. Fodder cultivation by farmers have also decreased because of more cultivation of cash crops. Use of excessive pesticides and ground salinity has also affected production of grass and fodder crops. In Lakhpat, ever increasing growth of invasive species like *Prosopis Juliflora* (Ganda Bawal) have not only affected vegetation and water resources, but have also provided safe haven for wild animals which prey on domestic animals. People have reported this species has also reduced soil moisture in and near the farms. 100% of the pastoralists have witnessed the loss of fodder, injury to the goats and sheep (25%), injury to the cow, buffalo, and camel (19%), and loss of the cow, buffalo, and camel in 13%. Similarly, in Lakhpat, 19% have witnessed cow, buffalo, and camel loss.

5.2.2.4 Water for animals

Water availability of cattle has reduced due to climatic factors and also lack of storage facilities at community level (cattle trough). Ground water depletion and increased salinity in water resources are also responsible for reduction in drinking water availability for cattle. The situation in summer is particularly concerning.

5.2.2.5 Grass and biodiversity

Trees, shrubs and herbs in pastureland has decreased due to cutting of trees, increased invasive species of shrubs and other climatic factors. Variety of grass has also changed due to climatic condition.

5.2.3 Fishing community

5.2.3.1 Damage due to cyclone

As seen in the figure below, it can be noted that in almost all the blocks, the majority of the fisher folks have witnessed damage to the nets and boat, which was highest in Gandhidham followed by Bhachau.

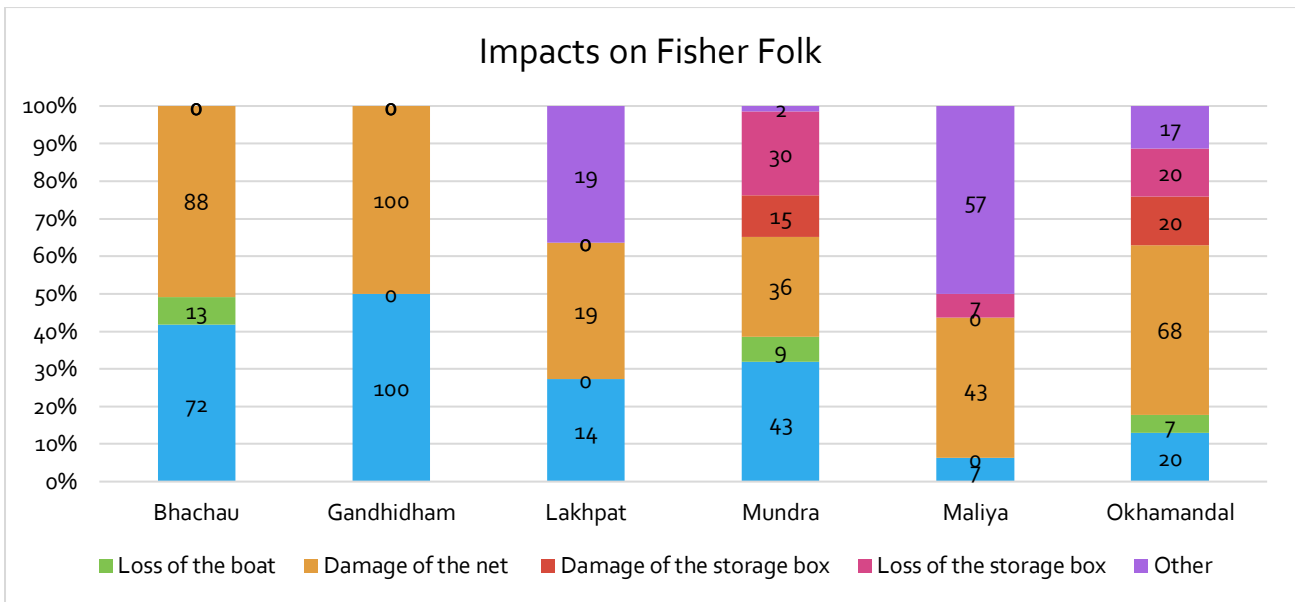


FIGURE 26 IMPACT OF CYCLONE ON FISHERFOLKS

The study also probed the perception and experience of coastal communities in regard to changes in climate and its effect on natural resources, along with the factors of human and economic activities in the vicinity of their habitations.

Some of the key insights from focus communities in this regard are shared here.

5.2.3.2 Sea Level

Communities in Okhamandal Mundra and Abdasa have experienced that sea (coastline) is encroaching upon the open land, while communities in Maliya, Bhachau, Gandhidham and Lakhpat say that sea is receding. Most of them believe that the changes in the coastline is due to climate change and natural cyclic processes. Few also suggest that the changes are due to natural events like earthquake. In Maliya people have said that coastline has receded due to expansion of salt farms and the bunds constructed for it. Communities living near coastline has reported that due to use of chemicals to produce salt, the sea water is getting contaminated and fish stock has reduced significantly near the coastline.

5.2.3.4 Mangroves

People in over 50% of habitations believe that mangroves have decreased due to cutting of mangrove forests and development activities. Animal grazing (mainly camel) have also impacted the mangrove cover. Reduction in mangroves have been prominently reported in Bhachau and Abdasa, and also in few habitations of Mundra, Lakhpat, Anjar and Maliya. In Bhacahu people blame expansion and construction of new salt pans near coastline for destruction of mangroves. In Lakhpat, people remember the destruction of mangroves in 1998 cyclone. They say that the situation as of now is quite better than that time when the mangroves were significantly destroyed.

In some habitations of Mundra and Lakhpat, people have also reported that mangroves have increased due to natural growth and additional plantations. In Okhamandal, people have said that mangroves have remained same.

5.2.3.5 Marine Biodiversity

In over 50% habitations people have said that marine biodiversity is on decline, mainly due to increased commercial activities. However, there are instances in Abdasa where it is reported that marine biodiversity has increased due to conservation efforts. Around 20% of habitations have reported no change marine biodiversity.

5.2.3.6 Salinity

Communities in around 30% of habitations have said that salinity has increased significantly, while other 25% habitations have reported slight increase in salinity, both in groundwater and surface water. Main reason for increased salinity is ground water extraction and sea water intrusion because of development activities. Construction of more salt pans, reclamation of coastal land, sand mining, mineral mining and destruction of corals have been reported main reasons for increased salinity ingress. In Lakhpatt, mining activities have broken the natural barriers and sea water has entered mainland and made ground water saline.

In few habitations of Mundra, Gandhidham, Bhachau and Okhamandal, people have reported that there is no salinity ingress. Drinking water sources have also become saline. Salinity has also affected the walls of houses which show effervesce and degradation.

Fishing activities have reduced due to salinity. However, no activities of water recharge have been initiated in any areas. In Abdasa, Anjar and Maliya, people have reported that salinity has affected ground water but not surface water.

5.2.4 Salt Pan Workers

Impact of the cyclone can be seen majorly in the dilution of the salt, which is highest in Gandhidham (94%), followed by Anjar at 65%. Secondly, the dilution of the brim also caused by the cyclonic event where 65% of the salt-pan workers have witnessed the dilution of brim in Anjar and 64% in Bhachau. Cyclones cause strong winds to mix salt with earth, which reduces the quality and price of the harvest and the Agariyas' income. An average family spends about 60 percent of its annual income on diesel to power pumps that draw salt-saturated water from the earth into the pans⁴. This annual fuel expense is a major factor in keeping the Agariyas, who have no collateral or income outside of the salt-harvest season, locked in a perpetual cycle of poverty and debt.

⁴ Sromona Burman and Suparana Katyaini, Vulnerability of Coastal Communities and Livelihoods Through the Experiences of Developmental Organizations: A Case Study of Kachchh, Gujarat, India; School of Livelihoods and Development, Tata Institute of Social Sciences, Hyderabad, India

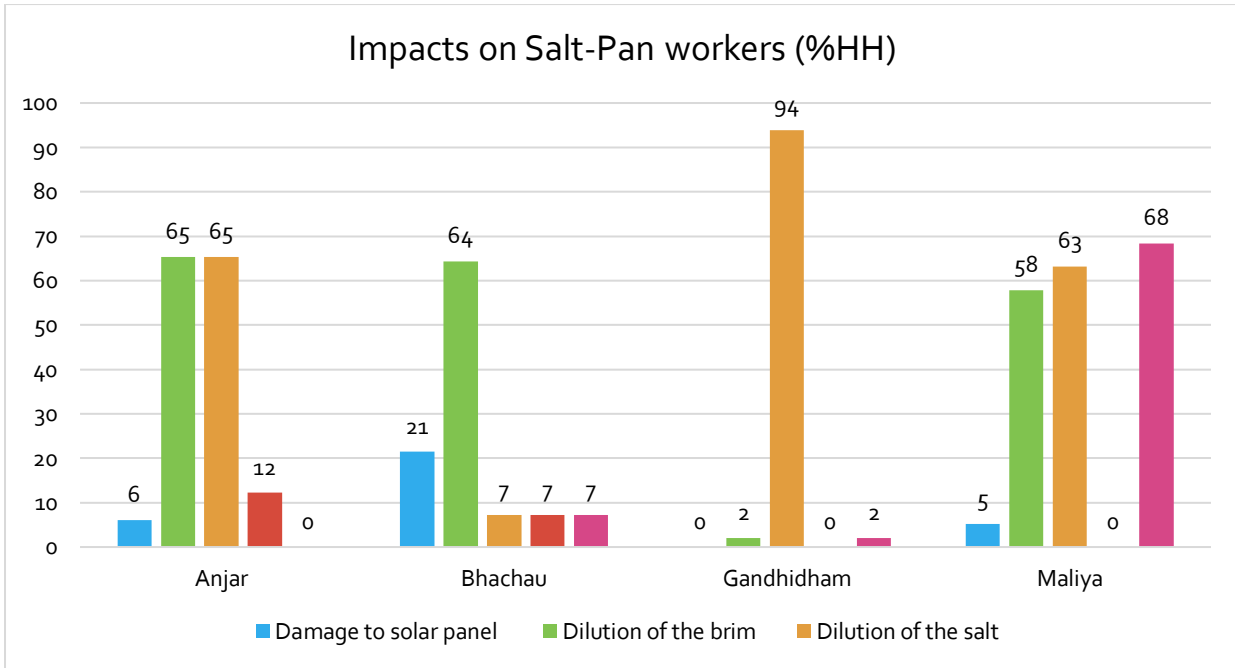


FIGURE 27 IMPACT OF CYCLONE ON SALT PAN WORKERS

5.3 Resilience

It is worth noting that there is no source of income during emergency in most of the communities in Anjar, Lakhpatt, Mundra and Maliya. In Bhachau, Gandhidham and Okhamandal, many families resort to labour work if and when available in times of any hazard or disaster.

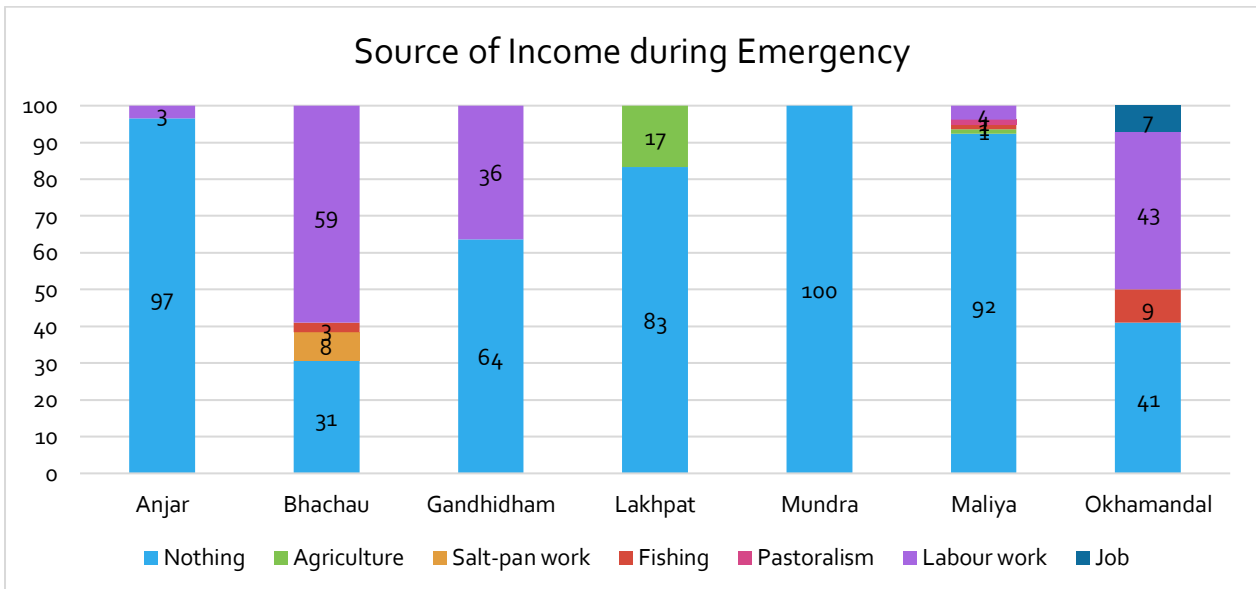


FIGURE 28 SOURCE OF INCOME DURING EMERGENCIES

It is reported that the majority of the population require 2-3 months to return to normalcy after the emergency situation.

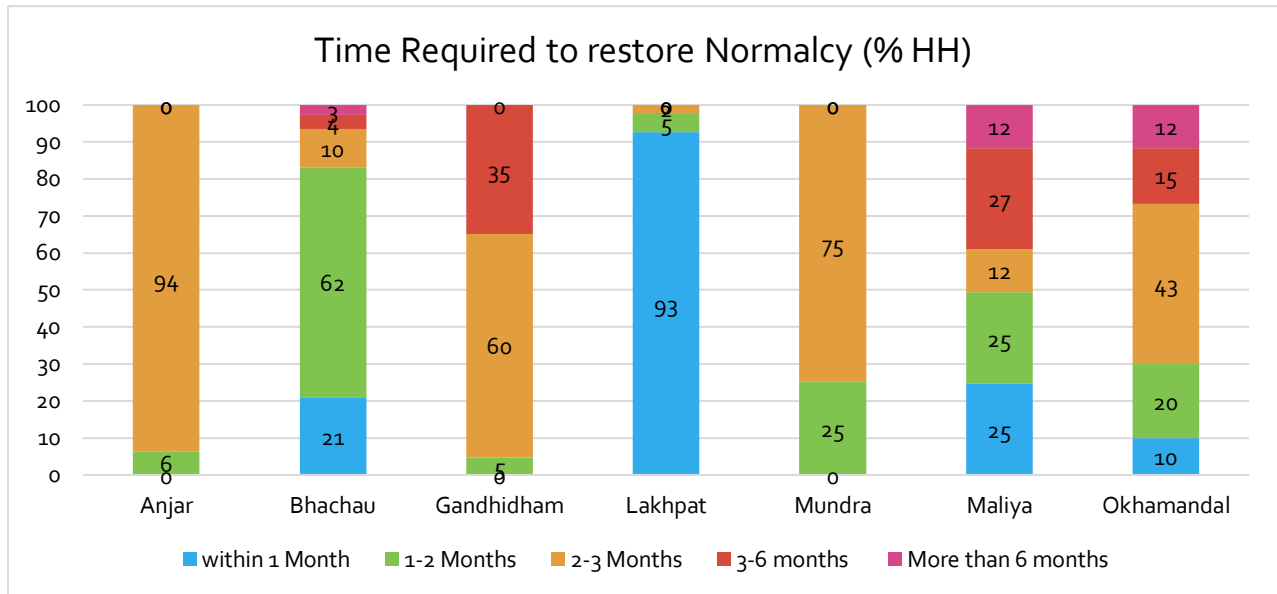


FIGURE 29 TIME REQUIRED TO RESTORE NORMALCY

6. The Way Forward

The study gives multifaced insights on vulnerabilities of coastal communities across different sectors. Each sector can have multiple measures to address the current and future threats and vulnerabilities. However, for brevity of the document and the scope of study, this section summarised the way forward in two tracks, consistent with the objectives of the study. i) Reducing vulnerabilities of coastal marginalised communities, especially in emergencies, and ii) using the data and insights to strengthen the governance and outreach of government and NGO works in normal times.

Some of the immediate and medium to long term measures to reduce vulnerabilities of coastal marginalised communities may be as follows:

a) Immediate Measures

- Creating and sharing database of coastal marginalised communities at GP, Block, District and State level, so that issues and challenged faced by them can be addressed at different levels of planning and implementation of government programmes as wells as NGO initiatives.
- Bridging the gap of early warnings to remote habitations
- Documenting indigenous coping capacity of marginalised communities against multiple hazard, including preparedness, adaptive practices and collective action.

b) Medium to Long term measures

- Bridging the gaps of infrastructure and services to the habitations
- Strengthening local DRR institutions like Apda Mitra through District and Block Disaster Management Committee.
- Creating SOPs evacuation and temporary relocation during emergencies, and Citizen's Charter for services and facilities provided for relocated families.
- Creating SOP for livestock safety in times of emergency to integrate the measures in early warning, evacuation and relief works, including identification of safe space for livestock and its management during emergencies.



Annexure

Annexure1: List of habitations

Name of the IAG partner	Taluka included in the Study	Habitation/ Village included in the Study	Total no. of HH
SETU	Lakhpat	Narayan Sarovar	237
		Shen	42
		Gruhar Moti	43
		Aadhar vandh	40
		Dhraga vandh	32
		Bhutau	24
		Medi	35
		Lakhpat	97
		Kaner	49
		Gunau	110
		Tahera	52
Pipar	106		
YMC	Mundra	Juna Bandar	350
		Luni Bandar	56
		Randh Bandar	360
		Goradiya Bandar	35
		Bawadi Bandar	70
	Anjar	Veera Bandar	40
		Jogninar Bandar	320
	Gandhidham	Chudva 2	180
		Chudva Salt	166
		IOC Golai	120
UNNATI	Bhachau	Godpar	170
		Lakhapar	180
		Surajbari	35
		Ambaliyara	30
		Tapal vandh	20
		Amaliyara Salt	13

Name of the IAG partner	Taluka included in the Study	Habitation/ Village included in the Study	Total no. of HH
		JangiHabitation(Kanodiya vandh)	35
		Jangi vandh (Salt)	25
ANANDI	MALIYA	Bagasara	174
		Venasar	323
		Nava Hanjiyasar	273
		Varshamedhi	129
GVT, Dwarka	Okhamandal	Zavernagar	68
		Rupenbandar	1200
		Bhimrana	375
		Varvala	1900
VRTI	Abdasa	Jakhau	627
		Singhodimoti	156
		Mohadi	230
		Nimni vandha	30
		TOTAL	8557

References

- I. Sromona Burman and Suparana Katyaini, Vulnerability of Coastal Communities and Livelihoods Through the Experiences of Developmental Organizations: A Case Study of Kachchh, Gujarat, India; School of Livelihoods and Development, Tata Institute of Social Sciences, Hyderabad, India
- II. Dr. P.G.Dhar Chakrabarti, Measuring Disaster Risks and Resilience at Sub-National Level in India
- III. How does climate change impact women and children across agroecological zones in India- A scoping study, MSSRF, ASSOCHAM and Karmanya
- IV. Varsha Bhagat-Ganguly, Karen Pinerio, Impact of climate change on Gujarat pastoralists' traditional livelihood
- V. PASTORALIST'S LIFE IN LOCKDOWN A study of five States during COVID-19, Action Aid, Marag, SAPA
- VI. Vijay Paul Sharma Ilse Köhler-Rollefson John Morton, Pastoralism in India: A Scoping Study; Centre for Management in Agriculture Indian Institute of Management (IIM) Ahmedabad
- VII. Koya K Mohammed et.al; Vulnerability of Coastal Fisher Households to Climate Change: A Case Study from Gujarat, India



For more details please contact



UNNATI

Organisation for Development Education

UNNATI

**G-1, 200 Azad Society, Ahmedabad 380015.
Gujarat (India),**

Tel: +91-79-26746145, 26733296

Email: psu_unnati@unnati.org



UNICEF Gujarat State Office

Plot#145, Sector-20, Gandhinagar,

**Gujarat 382021, Follow us on Facebook
Twitter and at www.unicef.in**

Email: gandhinagar@unicef.org

Contact Us: