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I hereby declare that this dissertation entitled, "**IMPACT OF FLOOD DISASTER ON THE LIVELIHOODS OF PEOPLE IN ALUVA**", submitted by me in partial fulfillment of the requirements for the award of an M.A Degree in Economics is my original work. This work has not previously formed the basis for other academic qualifications.

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IMPACT OF FLOOD DISASTER ON THE LIVELIHOODS OF PEOPLE IN ALUVA

Dissertation submitted to

ST. TERESA'S COLLEGE (AUTONOMOUS), ERNAKULAM

(AFFILIATED TO MAHATMA GANDHI UNIVERSITY, KOTTAYAM)

In partial fulfillment of the requirement of the degree of

MASTERS OF ARTS IN ECONOMICS

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ERNAKULAM

MARCH 2026

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Signature of the supervisor **Signature of Candidate**

Dr Mary Liya C A **Soofiya M A**

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CHAPTER 1
INTRODUCTION

1.1INTRODUCTION

A disaster is an unexpected event that provide server damage, loss, destruction to property and lives of the people. Flooding is one of the most recurrent natural disaster affecting India. Kerala has been witnessing vulnerable in recent years. The main courses of flooding are the insufficient capacity of the river bank to retain the heavy flow of water carried from upper catchment due to rainfall. Flood effect disproportionately by poor especially those who live in peri urban settlements low income and informal sector. The impact of flooding is much beyond the immediate loss in low income areas. Livelihoods and informal economic activities are highly sensitive to environment shocks. The limited access of financial services and effective disaster risk reduction infrastructure the vulnerable population will struggle to rebuild or recover which lead to cycle of poverty.

Kerala in India is known for its high human development index (HDI), experienced High flood in 2018, which were widely considered a worst in the nearly century. This event causes immense loss of lives, widespread destruction to property and severe damages to the state's economy, it reveals the significant vulnerability despite the state advanced social indicator.

Between June 1 and August 19, 2018 Kerala went thought the worst ever flood after 1924. One sixth of the population that is around 5.4 million people were affected by the flood. Flooding has emerged as most environmental challenges in Kerala particularly in Ernakulam district. The livelihoods are often agriculture, fishing, small scale industries and informal labor the occurrence of flood has disrupted the income source, long term and short term impact on social and economic resilience. The floods of 2018 and 2019 exposed the structural weakness in disaster preparedness leads to socio economic vulnerability of local population. Geographical location make Ernakulam to flood prone area. Rapid urbanization and poor infrastructure have made the situation worse. Low-income families are most affected as they lack resources and informal source of income.

1.1 REVIEW OF LITERATURE

Erich Wolff, Matthew French et.al (2021) provide an extensive study based on the participatory flood monitoring in Fiji and Indonesia. The study was carried in the urban informal settlement emphasis on local engagement and livelihoods. The study highlights the active role of people in managing flood risk. Through the citizen science approach, the residents actively collect and monitor the flood information without government data. The citizen science approach provide data regarding flood from the local community as well as it will create knowledge, skill, risk awareness about the disaster. This study highlight that participatory flood monitoring is not just a water level measurement system rather than this it will encourage the local communities a strong voice in decision making, protecting their livelihoods, and building local capacity[1]

Hamidi et.al (2022) on their work flood exposure and social vulnerability analysis in rural areas of Charsadda Pakistan. Investigate the social vulnerability factors in rural areas and the flood impacts such as literacy, house hold size and weak economic capacity. The highest vulnerable area consist lowest elevation, big household size, lower literacy rate more children and women, and weak financial capacity. [2]

Jun Rentschler et.al (2018) study the Flood exposure in 188 countries. The study highlights the Cross-country analysis witch showing the flood disproportionately affect the poor. Poverty and flood exposure bring compound long-term livelihood losses. It shows that 1.81 billion people were directly exposed to 1 in 100 year flood. The study show that around 170 million people who face high flood and poverty. From the effected total population 89% of the people live in low- and middle-income countries It highlight scale and priority regions for the flood mitigation measures to support the development.[3]

Oluwafemi Olajide and Taibat Lawanson (2014) in their study environmental planning and management this article examines the vulnerability of low-income people in Lagos, Nigeria. The study reveals that Vulnerability of Lagos into flood is caused by biophysical, topographical, climatic and socio-economic factors. The study also highlights how the environmental hazard tend to impact the low-income communities living in the ecological area disproportionately. [4]

Abdul Rashid Wiar et.al examines the Flood impact on the socio-economic livelihoods in Paktia Afghanistan. The study found that extreme flood will negatively impact the socio-economic livelihoods, agriculture, health, education, housing, water, sanitation and property. Any negative impact on livelihood would result in lower household incomes and purchasing power of households. [5]

Saleem Ashraf et.al (2013) study the impact of flood on livelihoods and food security of rural communities of southern Punjab Pakistan, particularly in Muzaffargarh district. The flood effect more than 20.1 million people in the whole country. Examine how flood destroy the asset and primary source of income. Agriculture was the major source of income of that area and the situation bring people food deficit and food insecurity. Study show that financial asset and natural asset which were significant for sustainable livelihoods were almost washed off. [6]

James C Younget.al explore the impact of flood in 2018 Kerala, India. This state the use of social media and geographic information to map flood impacts and recovery needs, supplementing field surveys. It Shows how rapid social sensing can detect livelihood disruptions in informal faster than traditional surveys. It focused on the comparison of different platforms including sources such as Telegram and Kerala Rescue, and validation against qualified governmental sources. It shown that social media sources allow the rapid collection of data from people which is difficult to gather in other ways. [19]

Juan Alberto Gran Castro et.al (2019) examines the vulnerability assessment flood in urban poor community in Mexico. By using a mixed-methods approach analyse the vulnerability to climate change in EL Colli. To analyse the case of El Colli a community with high marginalization and poverty in an informal settlement in metropolitan area of Guadalajara in Mexico. Vulnerability assessment that underscores how urban poor communities in informal settlement faces amplified flood exposure and limited services. [7]

Faxi Yuan et.al (2021) examines the extend of flood impact of 2017 Hurricane Harvey in Harris country, Texas. The study explore the temporal importance if community scale human activity features for rapid assessment of flood. To conduct the rapid impact assessment the study is not taken the traditional data like maps rather the study uses community scale human assessment

data. The study examines the heterogeneous human activity in different flood event using the community scale big data to find the rapid impact of flood assessment. [8]

Jithin Thomas Parel and G Balamurugan (2021) analyse the psychological issues of people effected with flood across six countries like China, UK, India, Australia, Pakistan. The study highlights the impact of psychological issue of people with food effected people. The study recommended treatment and intervention for people. It also givean special consideration for old age people infant and pregnant women. Study also highlight that nearly 67% of people have an anxiety issue.[9]

Til Prasad Pangali Sharma et.al (2019) examines the monsoon flood severity in the southern Nepal. The disaster is review in a remote sensing perspective. The study review the previous studies of regional and nation with global context. Most if the study area are field based and only few uses modern satellite images. [10]

Pritee Sharma, Anup karanth et.al (2016) study about the economic impact of floods and waterlogging in low-income households. This working paper examines the economic costs of flooding to the urban poor which include asset loss and reduced productivity in Indore, where inadequate urban infrastructure create vulnerability.[11]

Gulsan Ara Parvin, Rajib Shaw et.al (2018) on their study “Flood in a changing climate: The impact on livelihoods and how the rural poor cope in Bangladesh” this study highlight, how flood disproportionally effect the rural poor people who were depend on agriculture. Impact of flood on livelihoods, income and the occupationof the rural people. They loss assets, income and homes. The loss push the people into deeper poverty. Coping capacity is limited due to existing vulnerability[12]

Eva Gregory (2022) in his work the effect of flooding on inequality in developing countries state that how flooding increases the income inequality in the developing countries and how poor communities more vulnerable. And it states that increase in urbanization and population growth means flooding cause major economic turmoil especially in the developing countries. Low-income people are more vulnerable because they leave in flood prone location with less flood resilient infrastructure due to the budget constraints.[1]

Journal of Emerging Technologies and Innovative Research (JETIR) 2019 focus on the employment losses across the various sectors in post-flood Kerala 2018. The study highlights that the wage loss is INR 7,301 crore due to flood It estimates wage loss especially for migrant workers, agriculture, construction and handicraft sections.[14]

Lavanya Sivan and Anitha V (2024) study about the impact of flood in Alappuzha, one of the worst hit district in 2018 flood. It study the cause and effect of flood and the unique recovery strategy of the state. The study highlight how the flood exacerbated economic vulnerability for low income families leading to mental health issues and a low standard of living.[15]

S Santhi G Veerakumaran (2019) on their work Impact of assessment of Kerala flood 2018 on agriculture of farmers. Focused on Eduthua panchayath in kuttanad. It analyze the impact of flood on farmers. The continues flood for 12 to 15 days had destroyed the cultivation land, agriculture, equipment of farmers etc. They borrow money from bank and an active participation of government also found in the study. The area rich in back water affect the flood severely.[16]

Sachin B P et al, (2022) examines the Kerala flood of 2018-exploring the socio-economic characteristic of flood affected diary farmers in Ernakulam and Thrissur district. The study is conducted using cross-sectional survey and used the variables like Age gender, marital, family type, educational attainment, primary occupation, experience in dairy farming. It states that flood affected dairy farmers belong to medium age category and there is Higher involvement of women in dairying. Majority of them have low land holding with low positions shoeing the economic vulnerability. [17]

Kerala flood and landslides 2018. It is a comprehensive state report that field assessments of household and enterprise losses, displacement, impacts of seasonal labour markets income people were negatively impacted they faces economic loss and social challenges .Highlights long-term livelihood disruptions like loss of tools, seed stock, seasonal incomes and differential vulnerability of low-income households. Useful background for understanding systemic drive that also affect Aluva. The report provide recommendation for financial support and skill development.[18]

1.3 STATEMENT OF THE PROBLEM

Flooding is the recurring natural disaster that significantly impact human life infrastructure and socio economics wellbeing. Despite recurrent and severe flooding in Aluva, there's a significant knowledge gap regarding its specific and disproportionate impact on the diverse local livelihoods of low-income communities. Existing data often lacks the detail to understand how various informal and formal income-generating activities are affected, hindering targeted recovery efforts. Furthermore, the long-term economic losses and recovery challenges, as well as the effectiveness of current coping mechanisms. This deficiency limits the development of equitable and effective flood preparedness, response, and recovery policies tailored to the unique needs of Aluva's low-income population.

1.4 OBJECTIVES

- To analyze the socio economic impact of flood damage on household and livelihoods of people in Aluva
- To identify the most vulnerable occupation and income groups effected by flooding

1.5 Theoretical Framework

1. Extend of Vulnerability: Vulnerability theory explain that the flood disaster did not effect all the people equally. The effect and impact of flood depend on natural hazards, social, economic and the environment. Increase in the vulnerability is due to lack of savings, limited access to resources, poverty, informal livelihood, weak house structure. Aluva is highly vulnerable to flood because people are living near the river banks, informal occupation, small business owners, daily wage labors, and the low-income people have limited access to recovery methods. Vulnerability theory analyze the difficulty faced by the weak people.

2. Sustainable livelihood Analysis; The Analysis is used to understand effect of flood on different form of things. The flood effect the human capital, the household structure and the infrastructure, health care system, natural resources, the community network or the social capital. The impact of flood on aluva is huge it include damage of house, loss of employment,

psychological issues, mental health problems. The sustainable livelihood framework help to understand the impact of flood and long-term effect of people.

3. social capacity: the theory provides an insight into the importance of social network, community resilience, corporation and the trust among the people. During the flood time strong and collective community participation will increase the speed of recovery and reduce the suffering faced by poor people. During 2018 flood the local people, neighborhoods, non-government institutions and the volunteer groups play an important role in the rescue period. The theory help us to understand the collective capacity of community during the recovery time

1.6 Methodology

1. **Area of the study**: The area chosen for the study is from Aluva Municipality in Ernakulam district.The study was conducted among the households in the flood prone wards of Aluva municipality. There are 26 wards in Aluva municipality. Sample is collected from the ward 1,2,3,4,5,6,7,8,9,12,22,23,24,25,26.

Sample taken

Total ward	Selected ward
26	1,2,3,4,5,6,7,8,9,12,22,23,24,25,26

Source: municipality

2. **Source of data**: The data is collected through primary and secondary data. Primary data Collected through personal interview, telephone interviews, questionnaire and google form is used to collect the data. Secondary data is collected through news article, report books and other publish available.

3. **Sample Size: The** total population under the study was 3200 households. And we taken 100 household's sample. The sample represent 3.1% of the population.

4. **Method of Analysis:** The analysis is done using frequency, diagrammatic presentation, charts, frequency and valid percent analysis. Chi-square test is also used to analyse the objectives.

5.**Period of study**: All the data are collected during the period 2025-2026

1.7 Limitations of the study

- Difficulty in collecting primary data, people are not willing to provide their experience regarding flood
- Time constraints the study was conducted within a limited time period.
- Sample constrain due to the limited time period small sample size were selected.
- Some households are not willing to respond or participate
- Difficulty in requiring secondary data. The relevant data are not available in the official website.
- Lack of published data regarding the flood
- With a small sample size, the chi-square rest validity is limited. A large size or merging category might help in improving the study

1.8 Scheme of the study

The study is divided into 4 Chapter, Chapter 1 Include Introductions, Review of Literature, Statement of the problem, Objective, Theoretical frame work, Methodology, Limitation of the study and Scheme of Study. Second Chapter provide an overview regarding the Socio-Economic Impact of Flood on Aluva. Chapter 3 provide a comprehensive analysis of the collected data through frequency, graphs, valid percent and chi-square test. Chapter 4 contains the findings of the study, Recommendation and Conclusion.

CHAPTER 2

IMPACT OF FLOOD: AN OVERVIEW

2.1 INTRODUTION

This chapter aim to review the effects of flood disaster on the livelihoods of people in international, national and state level. Flooding is not only a localized environmental problem but a global challenge that effects millions of people each year disproportionately. This chapter focus on the clear understanding on impact and effect of flood.

A Natural disaster is a sudden event that is caused by natural forces such as flood, earthquake and volcanic eruption that causes major loss of lives, damage to property and environment. These are occurred by natural process of earth that include geological movement, weather and climate condition. There are several factors that influencing the natural disaster. The major impacts are vulnerability of population for example the quality of housing and the access to resources and level of preparedness that including the warning system and emergency response plan. The population density and the location also effect the scale of destruction as places that are hazard prone and highly crowded experience more severe outcomes. Other impacts of natural disaster are depend on strength and the duration of the disaster, quality of infrastructure like road and bridges, deforestation, land use patter also affect the severity of the natural disaster.

World Meteorological Organization (WMO) is a UN agency tracking Earths land water and atmosphere. From 1979 to 2019 there was a fivefold increase in the natural disaster and this was reported in 2021. The data collected from the EM-DAT show that more than 300 disasters have been occurred each year since 1998. Thus many natural disasters cannot be predicted and prevented. Global warming is caused by human activity of greenhouse gas emission from burning the fossil fuels causes the natural disaster like drought, heat waves and flood. Flood is caused due to the raising sea level. High temperature will affect the rain fall pattern and some places will get high rain fall or snow fall it will cause flooding. Some other place will get less temperature or snow and will cause drought. In India it is important to consider the south Asian monsoon for farming and it is less predictable. When there is sever raining it will cause high damage and flooding

Floods are the most frequent and devastating natural disaster in the world wide. It will cause extensive loss of live and damage to property. Their socio-economic impact effect beyond the

immediate physical destruction that effect the infrastructure public health education and the long-term economic development.

2.2 INTERNATIONAL SCENARIO

The international scenario of flood disaster reveal that flood are the most frequent natural disaster in the world wide. Flood show an disproportionate impact on the lives of the low-income communities and vulnerable population. WOLRD BANK 2022 published in the development and climate change this study show that around 1.81 billion people or 23% of the world population are exposed to flood in a 1 in 100 year flood events. This was worsened because of the unplanned urbanization and climate change. “4 in every 10 people exposed to flood risk globally live in poverty”. Out of these around 89% of people were live in low- and middle-income countries. And the studies show that most flood effected people live in south and EastAsia. 1.24 billion people that is around 70% of the people exposed to flood is live in South and East Asia. From this one third of flood exposure was in India and China. Long term consequences of flood has been affected by the poorest households.

The major international flood events are: The (2022) Pakistan flood were the worst natural disaster and millions of people are affected. The world bank estimates that flood caused $ 40 billion damage. Pakistan minister Sherry Rehman called the flood as “Monster Monsoon of the Decade”. The 2021 German floods in western Germany heavy flooding in Ahr Valley region. A sudden rush of water from Ahr River cause the flood. China experience flood in 2021. Heavy rainfall causes deadly floods in china. Extreme rainfall in Henan Province, where Zhengzhou experience severe flooding and 200,000 people were displaced and more that 3 Million people were effected. Eight district in Bangladesh experience heavy rainfall and upstream flooding.

A study on sub–Saharan Africa on the agrarian communities show that flood destroy the crops livestock and reproductive land. Flood destroy the human capital such as health and education and it destroy the social network and ecosystem. Study of Pakistan in 2022 show that flood effected area in Pakistan show the major socio-economic damages. Around 42 % of people lost

their income. Most of the people lost their income and home. Lost the basic necessity of food and health care activity.

2.3 NATIONAL SCENARIO

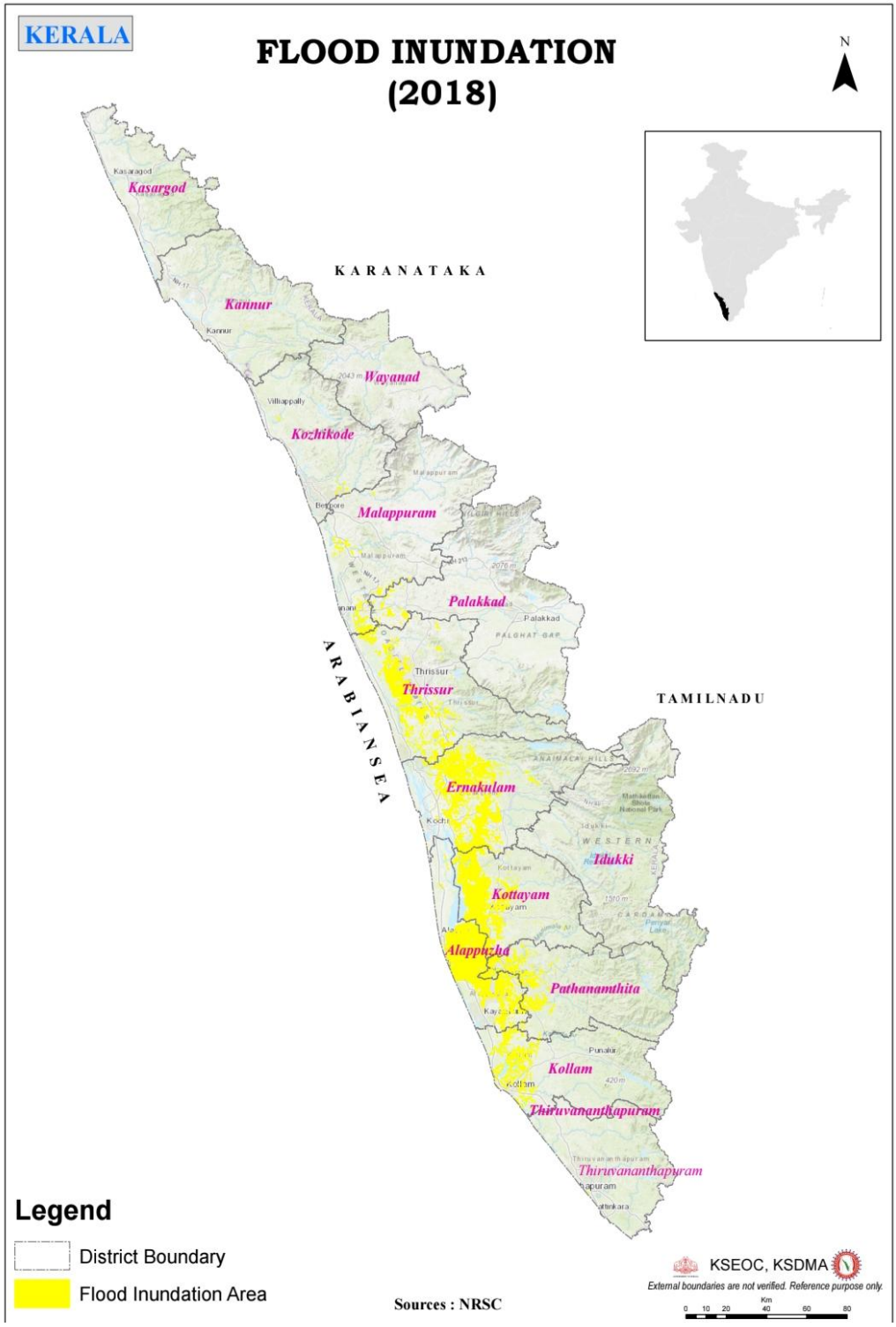
Floods are the most recurrent and devastating frequent natural disaster in India. It affects millions of people every year because of countries diverse climate condition. Diverse geomorphology, monsoon driven climate and dense river network caused India vulnerable to flooding. According to the National Disaster Management Authority (NDMA) out of total geographical areas 329 million hectare more than 40 million hectares of India's land are flood prone. Also, country lost 1600 lives on an average every year. Now there was an increasing trend in the flood related damages. On an average every year 75 hectares of land is affected. During 1977 there were 11316 people lost their lives. From 1969 to 2005 the average flood damage is RS 4745 crore compared to Rs 1805 crores. This was result from the rapid increase in the population, rapid urbanization and development and economic activities in flood plain with global warming. According to NDMA the annual rainfall estimated in India is 4,00,000 cubic centimeters. India is receiving maximum rainfall during the south west monsoon period over 100 days. Starting from 1st June to end of the September. In India 80% of the annual rainfall is occur during the south west monsoon season. 20% of rainfall by the pre monsoon period that is March and June in the form of local storm or cyclones and post monsoon cyclones. In India the worst effected regions are Brahmaputra River region, Ganga River region, the north west river region and central India and Deccan region.

There are several socioeconomic consequences of flood in India. In rural areas flood destroy crops, soil, livestock and agriculture livelihood.There are several infrastructure damages such as road, bridges, railways, public utilities which bring about the mass agriculture loss, business interruption and downwards the food security and rural livelihoods. Flood also bring about mass displacement of peoples and force them to leave in relief camp it led to the social distribution and badly impact the education and health crisis because of water borne diseases. The vulnerable populations especially the low income or marginalized communities also have a disproportionate effect.

2.4 STATE SCENARIO

Kerala is well known for his human development indicators, literacy rate, and abundance and variety of species. It experienced the worst climate natural disaster in the 2018 monsoon season. Kerala with its unique topography, dense river network, hilly terrains and monsoon dependent climate is highly vulnerable to flood. Kerala experiences several flood through its history but the 2018 flood consider the most severe natural disaster in the recent decades. Kerala experiences other natural disaster such as drought, landslides, tsunami, lightning, sea level rise, coastal erosion

Figure 2.1 Flood Inundation map of Kerala 2018



Source: KSDMA

From 1st June to 19th august 2018 Kerala experience the worst ever flood after 1924. Around 4.5 million people were affected by the flood that is around 1/6th of the total population. From 1st to 20th August Kerala receive highest rainfall during this period alone. State has an average rain fall of 3000 mm. according to the disaster report over 1.4 million people leave in relief camp. 5.4 million people lost their assets. 14% of state is affected by flood. For certain district the proportion of flood is more than 50%. Landslide is also the major disaster in the district like Wayanad, Kozhikode Kottayam and Idukki. Around 75 taluks effect the flood alone. The flood is severely hit by certain districts, Ernakulam, Alappuzha, Kottayam, Idukki, Pathanamthitta, Wayanad, Thrissur. Wayanad (Kabini sub basin), Idukki (Periyar sub basin) Ernakulam (Periyar and Chalakkudy sub basins) Alappuzha and Pathanamthitta (Pamba sub basin) 35 dams were open at that time and five shutter of Idukki dam were open in the 1st time after 26 years. According to IMD data Kerala received 2346.6mm of rainfall in contrast to the expected rainfall of 1649.5 mm. June July and august the representative rainfall was 15% 18% 184%. it was 42 % above the normal level. From 1st august to 19 august Kerala received 758.6mm as against 287.6mm that was 164% more. Around 1259 villages were affected by the 2018 flood over 14 district. According to NRSC national remote sensing center from 16 July to 28 august there was 65188 hectares of land effected by flood. The highest rainfall was received by Idukki around 92% and Palakkad 72% more rainfall. 474 people were died

2.4.1 Effects and impact

2018 flood extensively damage the lives, houses, bridges, railways, communication and network, education health, infrastructure and also washed away the crops and livestock and livelihood of millions of people. Flood causes large financial damages. PDNA estimates that the total damage of flood is around 10557 crores and the total loss is around 16163 crores. The sector wise effect can be written as social, productive, infrastructure, transport and cross cutting sector. the total effect of social sector was around INR 7191 crores, the productive sector around INR 7155 crores, the infrastructure around 1361, and the effect of cross cutting sector is around INR 11013 crores. the total effect is 26720 crores without including the damage estimate from JRDNA conducted by world bank and Asian development bank.

Kerala experiences huge economic loss during the 2018 flood. Around 2.6% of Kerala's gross domestic product GSDP has been washed away. There are several damages to agriculture and livelihoods, the primary sector has heavy losses. Around 1.75 lakh buildings were damaged and 1616 schools have been effected by the flood. 332 health sectors were fully damage and 61 Ayurveda institution and 59 homeopathy institution were destroyed. Several people are displaced from employment. The post disaster need assessment show that nearly 75.5 lakh workers, 22.8 lakh migrants, 35000 MSME have been displaced from employment. There are several damages to public infrastructure, around 10000 km of road were damaged, several bridges were collapsed, several agriculture crop destructions that is more than 10000 hectares of crops were ruined. The crop including paddy, spices, rubber, tea, and plantations. There was a huge loss in micro small and medium enterprise and the tourist department. Tourist sector is a mainstay of Kerala economy during the flood the main destinations is inaccessible.

Beyond the economic impacts there are several social and humanitarian impact that mainly the flood brings a humanitarian trauma on the population. The huge displacement lead to humanitarian crisis and the people leave in relief camp led to the emotional and psychological distress. The flood disproportionately affect the most vulnerable population especially the fisher folk and the marginalized communities. The people with disabilities and the migrant laborers also suffer more.

2.5 EFFECTS OF FLOOD IN ALUVA

Aluva is located in Ernakulam district of Kerala and it is known as historically commercial and cultural hub. Aluva is located in the northern side of Periyar River and it approximately 15 km north of the Kochi. Aluva municipality is lies at 10.1004 N latitude and 76.3570 E longitude. The most significant feature is the periyar river, the largest river in the state is passing through the town of Aluva. Periyar is the largest river in Kerala. Periyar is the major source of drinking water of Aluva. Aluva municipality has a total area of 7.18 square kilometerkm² from this 1.32 km² is river and remaining area is 5.84km² with population of 22,428. According to 2011 census there is a total population of 22428 out of these 11031 males and 11397 are female. The density of the population is 3358/sq km and the number of households is 5641.

Aluva is situated in the bank of periyar river. The town is characterized by a tropical monsoon climate with heavy rainfall during June July august September. Heavy monsoon rainfall and opening of many dams leads to the over flow of periyar river and the water level rose rapidly, many low lying and riverside area of Aluva got submerged. The low-lying topography with rivers seasonal fluctuation brings the location vulnerable to flooding. Historically Aluva experiences several flood events, but 2018 Kerala flood is one of the most sever disaster. During this time many wards especially those who live near to the Periyar River experienced extensive property loss, displacement. 2019 and 2020 monsoon season rainfall also bring about local flooding in Aluva, this bring Aluva as high risk flood zone. The recurrent nature of flood has lasting socioeconomic consequences for the town peoples especially people belong to low-income areas.

2.6 SOCIO ECONOMIC PROFILE OF ALUVA

The socioeconomic profile of Aluva reflects in diverse. Most of the population engaged primarily in informal and semi-formal livelihood sectors. A large proportion of low-income residents depend on daily wage labor, small-scale vending, and other informal occupations that are highly sensitive to climatic disruptions. Housing conditions within several pockets of Aluva, especially near riverbanks and drainage channels, range from semi-pucca to temporary structures, making them particularly susceptible to waterlogging and structural damage during floods. Limited savings, absence of insurance coverage, and low asset ownership further heighten the vulnerability of these communities.

2.7AREAS AFFECTED BY FLOODWATER IN ALUVA DURING THE 2018 DISASTER

Table 2.1 flood affected ward in Aluva

Flood affected wards in Aluva

Very High	High	Moderately	Low
1,2,3,4,5,6,7,8,9,12,22,23,24,25,26	14,15,16	17,20,21	10,11,13,18,19

Source: primary data

Aluva municipal area is highly vulnerable to flood. Aluva is highly vulnerable to flood due to the urban nature and close to the Periyar river. 2018 flood deeply effect than 2019 flood. The excess rainfall led to the over flow of Periyar river and it will lead to the heavy flooding in aluva municipal area. Aluva municipality is consisting 26 wards. Almost every ward is vulnerable to flood expect ward 13. The flood impact very high in ward 1,2,3,4,5,6,7,8,9,12,22,23,24,25,26 and high impact in ward 14 15 and 16. The flood was moderately effect by ward 17,20 and 21. Companypady, Kadungalloor, Thottakkattukara, Eloor, Thuruth, kalay, chowara and Paravoor lie near to the bank of periyar river thus these area making highly vulnerable to flood. Due to the heavy flow of periyar river during heavy rainfall and dam water release.

2.8 RELIEF MEASURES RECEIVED BY THE AFFECTED POPULATION IN ALUVA

The Kerala floods of 2018, regarded as one of the most devastating natural disasters in the state's history. Aluva Municipality being one of the severely affected urban local bodies in Ernakulam district. There is an extensive effect on the daily life of people, infrastructure, displaced thousands of people. Thus municipal administration effectively coordinate the immediate relief, ensuring public safety, and initiating post-disaster recovery.

This portion examines the various relief and rehabilitation measures undertaken by Ernakulam district and Aluva Municipality during and after the 2018 floods. It highlights the municipality's efforts in evacuation, temporary shelter management, distribution of essential supplies, health and sanitation interventions, restoration of civic amenities, and support for vulnerable groups.

Government established several relief camp in schools and colleges to provide shelter, food, medical care. There are several rescue teams including navy, coastguard, fire and rescue services. The list of families registered under the relief camp in Ernakulam district are classified as 7 taluk which are Kanayannur taluk, Kochi taluk, Kothamangalam taluk, Kunnathunad taluk, Muvattupuzha taluk, Paravoor taluk and Aluva taluk. There was 1059 people register in the relief camp in Aluva taluk alone.

Financial assistance

Government provide financial support to the people. Financial assistance such as emergency cash support, housing subsidies, compensation for lost of houses were also distributed through local administrative.

Assistance provided for the property damage are categorized on the basis of percentage of destruction

Table 2.2 Financial assistance provided by government

FINANCIAL ASSISTANCE FROM GOVERNMENT

Damage level	Percentage of destruction	Financial assistance
Fully destroyed	100%	₹4,00,000
Severely damaged	75%+	₹2,50,000
Moderately damaged	30%-59%	₹1,25,000
Partially damaged	15%-29%	₹60,000
Minor damage	<15%	₹10,000

Source: Aluva village

1. Immediate relief assistance: government provide 10,000 rupees as an immediate relief to the effected households.
2. Housing damage compensation: government provide financial assistance to the flood effected households based on the extend of house damage. 4 lakhs for fully damaged houses. Government provide financial assistance of amount 2,50,000, amt 1,25,000 amount 60,000 and amount 10,000 rupees based on the extend of flood damage
3. The government of Kerala provided rebuild Ernakulam, fully damaged house construction by the district collectorate.
4. Interest free loan: government provide Interest free loans up to ₹1 lakh for women in effected households through Kadambasree

5. Government also provided relief kits for flood effected households. The kits include kitchen utensils and the household essentials. 2,27,779 kits where distributed in Ernakulam

Table 2.3 completed households in Aluva

COMPLETED HOUSEHOLDS

	BENEFICIARY LED HOUSES	CARE HOUSES	NGO HOUSES	TOTAL COMPLETED HOUSES
ERNAKULAM	1625	336	91	2052
ALUVA	166	113	17	246

Source: Ernakulam district collectorate

Table 2.1 show the totally damaged and completed households in Ernakulam and Aluva

2.9 IMPACT OF FLOOD ON ALUVA

2018 Kerala flood had a long-term impact on lives and livelihoods of people in Aluva. Flood is one of the most severe natural disasters in the history of aluva.

- Social Impacts

2018 flood caused huge displacement in Aluva. Around 1059 families were evacuated from houses and move to relief camps in schools and colleges. Elder people, children's, and low-income families faced severeincluding limited access to food, clothing, and sanitation facilities during flood.

- Economic Impacts

The livelihoods of low-income communities were severely affected. Social institutions including schools, Anganwadi's, and religious centers were also disrupted. Many people lost their essential documents, household items, and personal belongings. Daily wage laborers, street vendors, small business owners, auto drivers, and informal workers experienced a complete loss of income for several days and even weeks. Business owners and the daily wage labors lose their assets.

- Damage to Infrastructure

Flooding occurred almost in all the area of Aluva. There is an extensive damage on the Infrastructure of Aluva. Roads, bridges and drainage system were overflow due to heavy rain and

flood. Electricity lines were destroyed and it will making mobility and communication difficult for many days. Houses in low-lying areas such as Thottakkattukara, and Bank Junction experienced severe structural damage. Public institutions such as Aluva railway station, KSRTC bus stand, private bus stand, small health centers and many educational institutions closed for several days. Water supply systems were blocked, leading to shortages of clean drinking water.

- Environmental Impacts

Large-scale soil erosion, silt deposition, and contamination of wells and groundwater were high in Aluva. Waste from industrial areas along the Periyar also mixed with floodwater leads to the contamination of flood water and water pollution. Several agricultural and vegetable cultivation mainly banana were washed away

- Health and Sanitation Issues

After 2018 flood Aluva faced several public health challenges such as contaminated water, leads to diarrhea, skin infections, and mosquito-borne diseases. Relief camps struggled with maintaining sanitation and hygiene. Mental health issues such as anxiety and post-traumatic stress are common among affected households, people who lost homes, assets, lives,or livelihoods.

- Long term economic impact

Flood effected people face several long term and short term economic impact. Most of the people lose their houses and livelihoods. Some people are still facing mental issues related to flood.

CHAPTER 3: ANALYSING SOCIO ECONOMIC IMPACT OF FLOOD ON ALUVA

3.1 Introduction

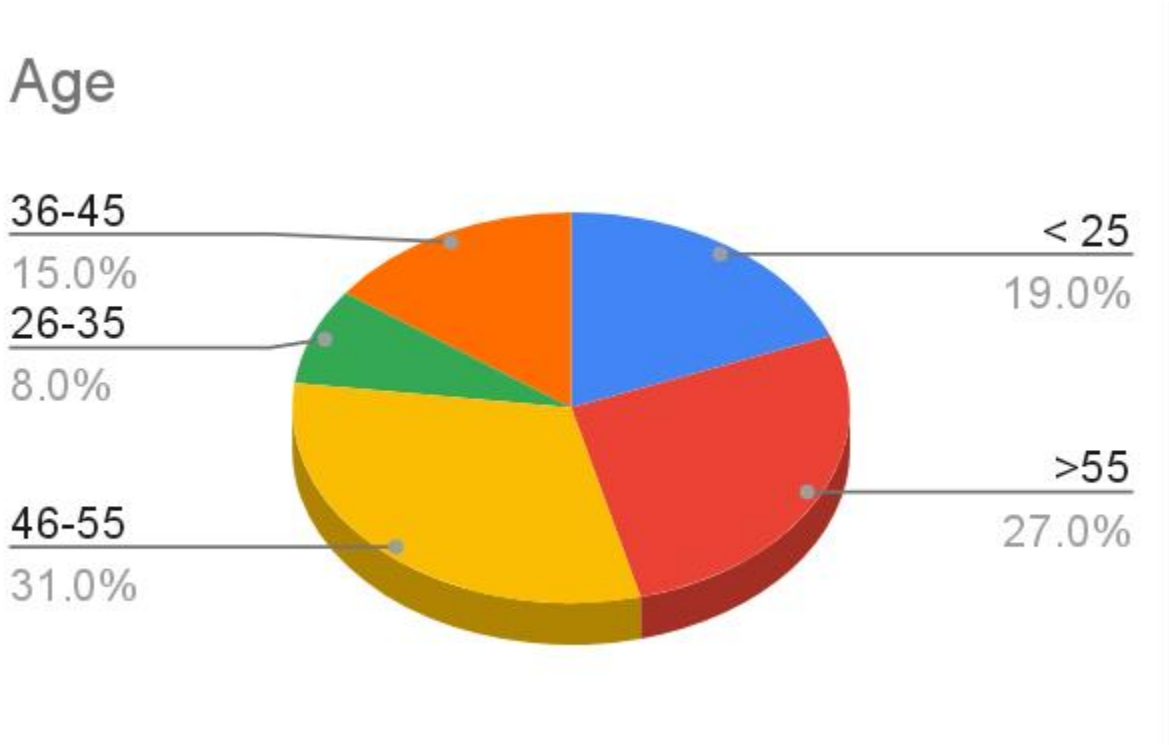
This chapter study the effect and impact of flood disaster on the livelihoods of people in aluva. Data is collected using demographic details through personal interviews, telephonic interview and sharing questionnaires through google forms. The total population effected by the flood in Aluva municipality is around 3200 Household. 100 Household sample were collected to study. The sample represent 31% of the total population.

This study is analyzed with help of graphical representation, frequency analysis, and valid percentage analysis.to find the relation between variables correlation analysis has been included. The study also represents hypothesis testing through a chi-square test to provide comprehensive analysis of trends and challenges.

3.2 Socio Economic profile

3.2.1. Age

Figure 3.1 Age of Respondents



Source: primary data

Figure 3.1 show the age category of the respondents. Most of the respondents are 46-55 age category. That is middle aged people are more presented in the study. Middle aged people are the house hold heads and they are the decision makers. The participation of middle age people are very important because they are making family income, property and major decisions. During the flood period these people bear the financial burden and they repair house, income and repaying loans. Thus, the response from these category are very important. Another significant category is age above 55 years. Older people are highly vulnerable to flood due to health issue, dependency on others and the limited mobility. They experiencedemotional difficulties during flood disaster. The respondents below 25 years are less than 19 %, the young perspective they experienced flood in different way by disruption of education, unemployment or displacement.

3.2.2 Gender

Table 3.1 Gender of respondent

Gender	Frequency	Valid percent
Male	56	56.0%
Female	44	44.0%
Total	100	100.0%

Source: primary data

Table 3.1 represents the gender difference of the respondents. Gender frequency table show that there is slightly high number of males compared to female. There is also a significant portion of female also around 44% of the respondent are female. Males are more reported the issues related to income loss, financial burden and the property loss also. The presence of women in study play an important role that they are mostly caring children, elder members, and the family safety. By including both males and females the study strengthens the analysis because flood create impact economic, social and emotional impact. By including men and women we can understand about the income and property loss, emotional stress, etc. Thus gender response provide multiple perspective.

3.2.3. Educational level

Table 3.2 Educational Qualification

Educational level	Frequency	Valid percent
No formal education	2	2.0%
Primary	2	2.0%
Secondary	23	23.0%
Higher secondary	39	39.0%
Graduate/ above	34	34.0%
Total	100	100.0%

Source: primary data

Table 3.2 show the education level of the respondents. The education distribution show that majority of the respondents have higher level of education or most of the respondent completed higher secondary education. 73% of the people have completed secondary education. The education attainment may influence awareness level, access to information and capacity to respond. The educated people can understand disaster related information, government schemes. They are much aware about the food risk and the preparedness measures. The people who are graduate and above consist 34 percentage and these people have better information regarding flood and the awareness of disaster and communication with the authorities. A small number of respondents have only primary education. They may face high difficulty during flood because they are less aware about the disaster, poor access to information and they want to depend on other people for official documentation.

Over all education play an important role. Education influence awareness level, preparedness, recovery and the coping strategy

3.2.4. Occupation before flood

Table 3.3 Occupation of the respondent before flood

Occupation category	Frequency	Valid percent
Salaried Employment (Govt/Private)	30	30.0%
Small business owner	38	38.0%
Daily wage labor	24	23.0%
Self-employed professionals	1	1.0%
Other	7	7.0%
Total	100	100.0%

Source: primary data

Table 3.3 represent the occupation of the people before flood. Among the 100 respondent majority of the workers are small business owners, this suggest that a largest portion of the respondents depend on the business activities for their livelihoods. Small business owners may include street vendors, auto drivers, workshop owners ect. They are highly vulnerable to flood because their income depend on the assets such as shops, stocks, equipment, machinery and buildings there is greater chance to effect the flood and it will create great financial loss. There is also large proportion of salaried employment (government or private sector) indicating that this segment have relatively stable monthly income. They are less sensitive to flood because their income is relatively stable. Around 24% of the respondents are daily wage laborers. The income of these people was sensitive and irregular, and highly vulnerable to disruption.

The distribution highlights the fact that large share of the respondents are business owners and the daily wage labors are highly sensitive to flood disruption such as damage to equipment, shops, machinery, and reduced the working days.

3.2.5 Occupation After flood

Table 3.4 Occupation of the respondent After flood

Occupation category	Frequency	Valid percent
Salaried Employment (Govt/Private	34	34.0%
Small business owner	34	34.0%
Daily wage labor	30	30.0%
Self-employed professional	2	2.0%
Total	100	100.0%

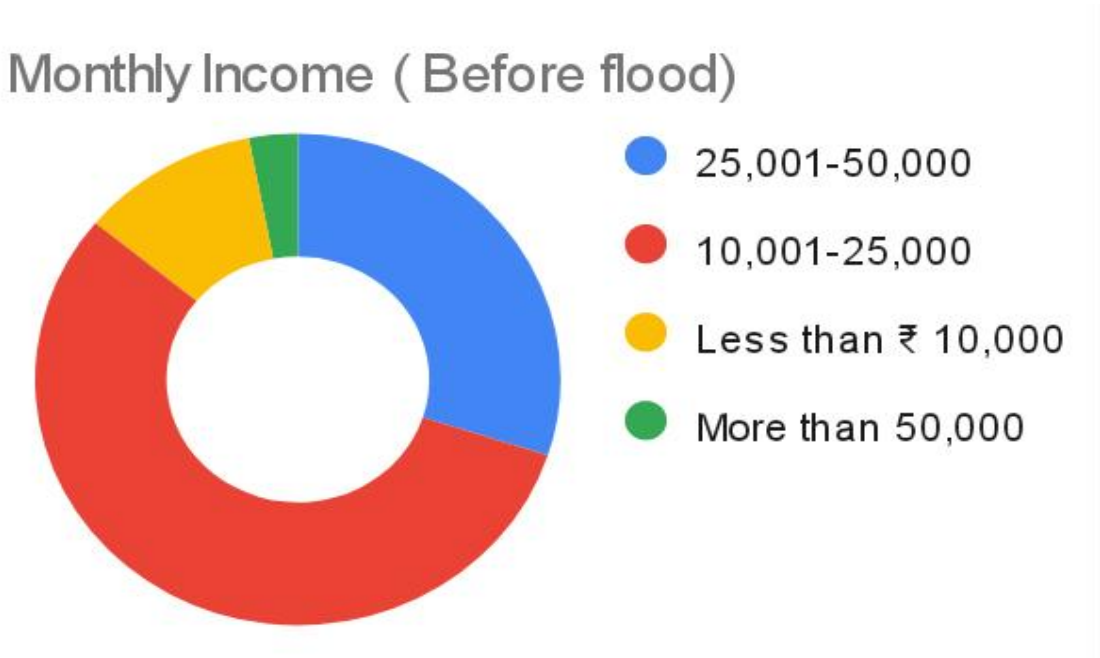
Source: primary data

Table 3.4 represent the primary occupation of the household after flood. The data show an noticeable change in the occupation after flood. The proportion of salaried employment increased from 30 to 34%, the daily wage laborers increased from 24 to 30 %, while the small business owner decreased from 38 to 34%.

Compared to the pre flood occupation there is an noticeable change in the structure. There is a reduction in the small business owners indicates the possible business loss or destruction and inability to resume operations after the flood. The increase in the daily wage labor show that some of the respondents may shifted the occupation from business or stable to more informal occupation following the flood. The overall shift in the occupation shows the economic impact of flood on the business owners and the temporary workers in Aluva municipality.

3.2.6 Monthly Income (before)

Figure 3.2 Monthly income before flood



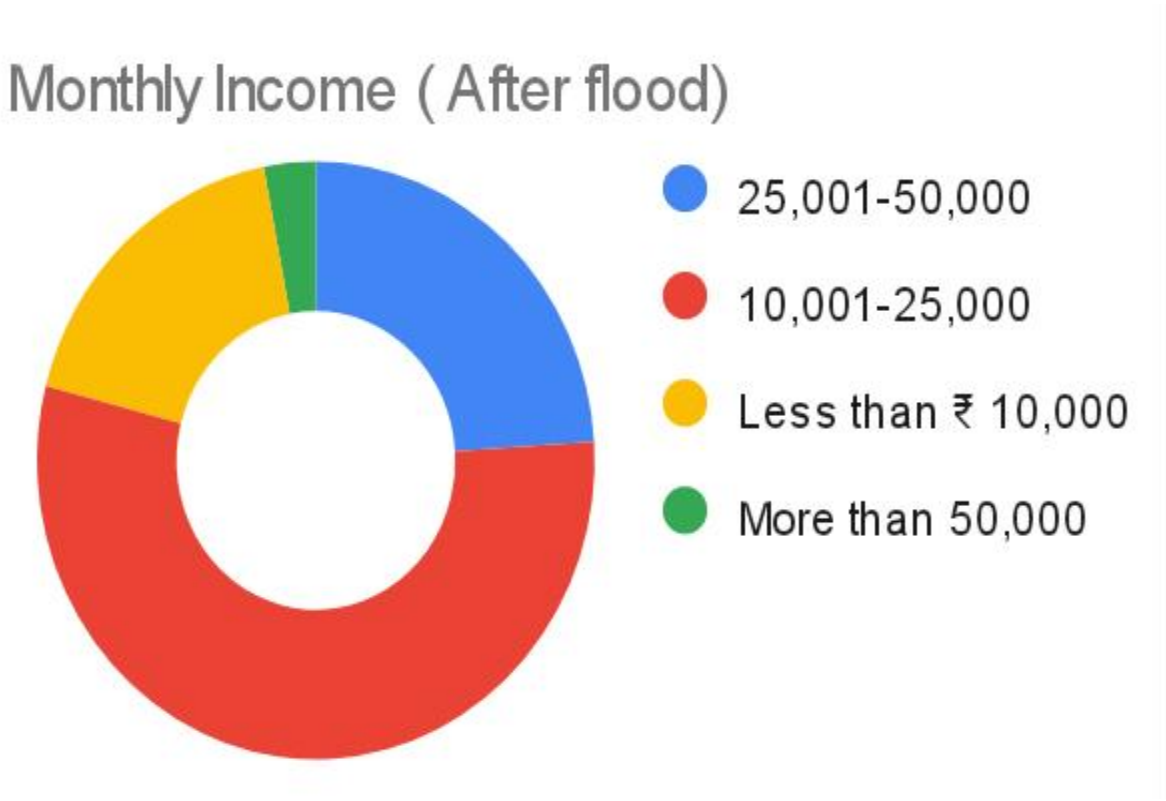
Source: primary data

Figure 3.2represent the monthly income of the respondent before the flood. The income distribution show that majority of the respondent belong to the lower to middle income group. Making the largest income groups. Around 66% of the household have income less than 25,000. There is a moderate level of monthly income. And they can only manage the basic expenses such as food, education, health, rent etc. And they may not have a sustainable savings. Thus when an flood occur the disruption in income create huge financial stress. As many of the people are low income category, their recovery process become more challenging. Most household are economically moderate with limited high income. This indicate that moderately earning capacity but there is a limit to financial resilience. The people with income 25,001-50,000 per month are more stable than the low income people. They faced high losses through business loss and property damage.

The income distribution of the household is very important because income level directly influence. Cope with immediate loss and recover after disaster

3.2.7 Monthly Income (After flood)

Figure 3.3 Monthly Income After flood



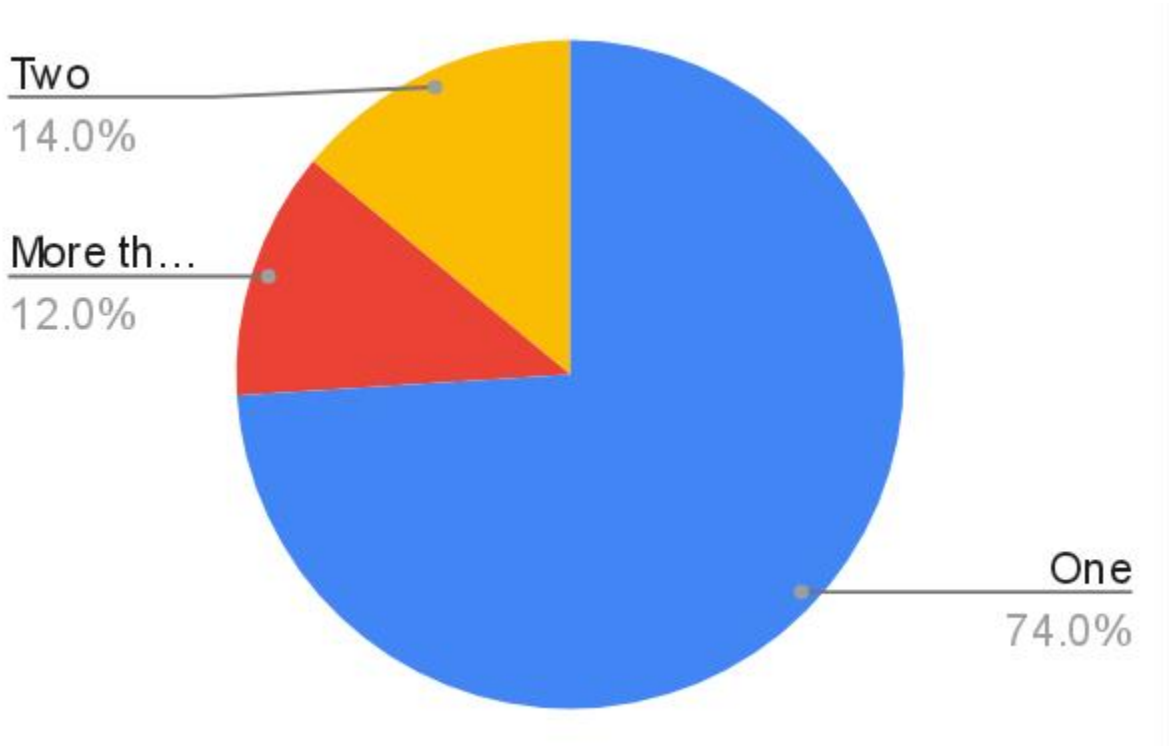
Source: primary data

Figure 3.3 represent the monthly income of the respondent after flood. The distribution of income shows a downward trend in earnings. There is an increase in the lower income group from 11% to 18%. This indicates the low income house hold effect the flood badly. The income group 10,001-25,000 decreased from 58% to 55%, while the income category 250001-50,000 decrease slightly from 30% to 24%. And the income category more than 50,000 remain unchanged.

The increase in the lower income groups show that flood impact the people negatively. There is a reduction in the income of middle-income households. Flood impact the low-income people negatively and impact the earning capacity of the people. Flood significantly reduce the earning capacity especially in the vulnerable groups.

3.2.8 Experience of flood

Figure 3.4 Major flood experienced

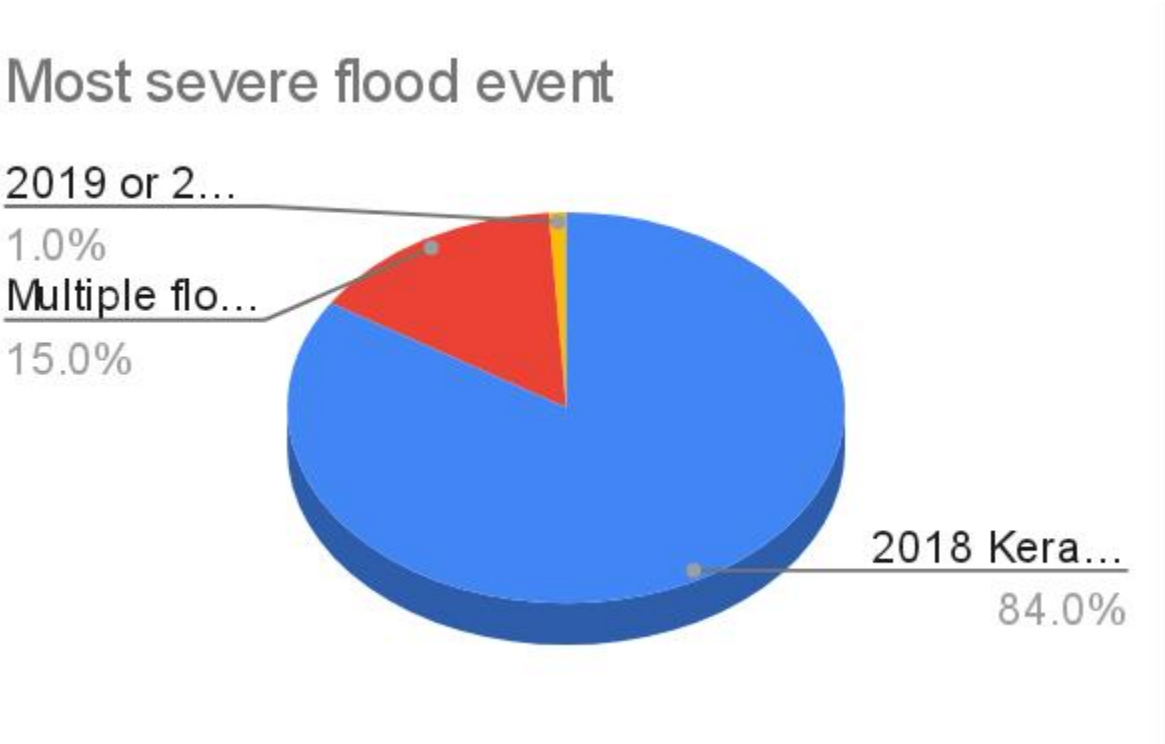


Source: primary data

Figure 3.4 represent the number of major floods experienced by the households. This analysis show the extent of flood exposure among the households. Most of the household experience at least one flood. 74% of the people experience one flood, two or more flood was experienced by 26% of the respondents. 26% experienced repeated flooding. The repeated flood exposure bring the people more backward and they may struggle to rebuild home, maintaining the stable income. Repeater flood created damage to property, reduce savings and disrupt children's education. The multiple flood effect reduces the savings, damage the asset, instability in income and psychological distress. When the household experienced several floods, the recovery becomes more difficult. It shows that flood risk in Aluva is not a one-time disaster rather it is recurring.

3.2.9 Major flood

Figure 3.5 Most Severe flood experienced



Source: primary data

Figure 3.5 show the analysis of which major flood experience most by the people. And the analysis show that most of the people experienced 2018 flood and it is more severe than other flood events. 2018 flood bring a lasting impact on the effected people. A Small group reported that there is multiple flood event, while 15% of the people effect this. Thus 2018 flood had a widespread impact on the people of Aluva and being the most prominent flood in the recent years. It caused extensive damage to property, livelihoods, and houses. There is a dominance in the 2018 flood and the most destructive and memorable flood in Aluva, despite social and economic impact on livelihoods.

3.210 Displacement of house due to flood

Table 3.5 Displacement of household due to flood

Response	Frequency	Percentage
Yes	97	97.0%
No	3	3.0%
Total	100	100.0%

Source: primary data

The Table 3.5 represent the displacement of household due to flood. The above table clearly show that 97% of the respondents are displaced due to flooding. The high percentage of displacement show the severity of flood impact. The flood water enter into the home and thick layers of mud and dirty things are accumulated in inside the home. Furniture and home appliances are destroyed or extremely damaged and becomes unusable. So the flood effected households are displaced to relief camp or relatives house. Sudden movement create psychological stress, emotional damage and financial burden. Displacement also effect physical damage to home, disruption of education and social disruption. Families lost financial documents, personal belongings and house hold items during the evacuation period. The low income people struggle more during recovery time. Temporary relocates staying in relief camps and the relatives' home also bring stress and financial instability. The high proportion of displacement show the intensity and the direct impact on the residential

3.2.11 Duration of displacement due to flooding

Table 3.6 Duration of displacement

Duration of displacement	Frequency	Percentage
1–3 days	10	10.0%
4-7 days	17	17.0%
8-14 days	24	24.0%
More than 14 days	49	49.0%
Total	100	100.0%

Source: primary data

Table 3.6 shows the duration of displacement of the households. It examine the extent of flood damage on house. Most of the respondents are moved more than 14 days that is more than two weak. This shows the prolonged displacement of the households and the severity of flood damage on the home. This indicate flood causes serious damage to house. The extent of the damage show the disruption of the daily life. Flood water entered the house and created thick level of mud and dirt inside the house. The effected households cannot shift back to home immediately Furniture and the home appliances are damaged or destroyed completely. As a result the effected families had to clean, repair and renovate the home, this led to more time to shift back to home. Muds were accumulated, walls were damaged, and water was contaminated lost the essential household items which their delayed return. Some people lost their home completely. Over all the findings show that there is high level of displacement and sever damage to home.

3.2.12Damage of home due to flood

Table 3.7 Damage of house

Extend of damage	Frequency	Valid percent
Severely damage	68	68.0%
Completely damage	17	17.0%
Moderately damage	13	13.0%
No impact	2	2.0%
Total	100	100.0%

Source: primary source

Table 3.7 show the extent of flood damage on the home. Large percentage of the respondent experience severe damage to home. The analysis show that 85% of the household experiences severe or completely damage to home. The high percentage indicating the severity and extend of house damage. Thus, there is a high structural and asset loss to the house hold. The severe damage suggest that the water level is high and remained for long time and it led to weakening the wall, floor, structure of house and the foundation. Mud deposition and contaminated water stagnation led to the worsened situation. The kitchen appliances, furniture and documents were damaged. It required high financial resources for reconstruction and repairing the home. This

brought heavy financial burden to the effected population. It was difficult to restore for low and middle income families. Due to severe damage many had to move to different homes and had to stay away for several days, even some people return back home after 1 months, because their house was unsafe and filled with mud and sand. Flood effect the long term security and stability of house hold.

3.2.13 Impact on earning ability

Table 3.2.8 Impact of earning ability

Impact on Earning Ability	Frequency	Valid percent
Loss of daily wages for few days	47	47.0%
Permanent job loss / business shutdown	23	23.0%
No impacts	17	17.0%
Temporary job loss	13	13.0%
Total	100	100.0%

Source: primary data

The table 3.8 represent the impact of flood on earning ability of the House hold. It explain the different type of income losses experienced by the households. Most of the household lost daily wage for few days, showing that flood directly affect the daily wage earners. The high percentage of daily wage loss show that many people depend on the daily income and they were highly vulnerable to disaster. During flood time the economy was stagnant, due to waterlogging, transportation disruption, damage of infrastructure thus people were unable to go work for several days.

Around 23% of the respondent's reported the permanent job loss or business shutdown which indicated the long-term economic consequences. For the small business owners they lost their tools equipment, the self-employed people lost their shop, grocery, tools. The serious economic consequences were mainly affected by the small business owners and informal sector workers. Around 13% of the respondent had temporary job loss and their income was lost for short period

and later resumed .overall it created financial loss to low income people. There was negative impact on the earning ability and livelihoods of people in Aluva

3.2.14 Damage to work place

Table 3.9 Damage of work place due to flood

Damage level	Frequency	Valid percent
Severely damage	29	29.0%
Moderately damaged	28	28.0%
No damage	26	26.0%
Completely damage	17	17.0%
Total	100	100.0%

Source: primary data

The table 3.9 represent the damage to work place. Many of the respondent experienced damage to work place. Flood had a widespread impact not only on home but also on income. Workplace damage directly affected the earning ability of the people, effected the shop, machinery, tools and the stock etc. Daily wage labors, small business owners and the self-employed workers are severely affected during flood. Most of the people's income generation became difficult or destroyed completely. Damage to workplace directly increase the financial instability and delayed economic stability.

3.2.16 Recovery Time of Primary Income After Flood

Table 3.10 Time Taken to recover the Income After Flood

Time recovery	Frequency	Valid percent
Less than one month	20	20.2%
1-3 months	34	34.3%
4-6 months	6	6.1%
More than 6 months	25	25.3%
Has not returned to pre-flood level	6	6.1%
None	8	8.1%
Total	99	100.0%

Source: primary data

The table 3. 10 show that recovery time of income after flood. Some of the Household were able to recover within a short period of time, one to three months as these households had a better coping mechanism, savings, or alternative income source. Around 54% of the people have better resilience. While a significant proportion of the household took more than 6 months or 4-6 months to return the previous income level. They had to face financial hardship and economic instability. They faced continued economic vulnerability of flood, and the long term economic impact of flood. Flood created not only immediate damage but also it created long term consequences for small business owners, daily wage labors and low income families.

3.2.17 Estimated Total Financial Losses

Table 3.11 Total financial loss and damage due to flood

Estimated total loss	Frequency	Valid percent
Less than ₹50,000	15	15.0%
₹50,001 – 1,00,000	23	23.0%
₹1,00,001 – 3,00,000	38	38.0%
More than ₹3,00,000	24	24.0%
Total	100	100.0%

Source: primary data

The table 3.11 represent the total estimated financial loss due to flood. The distribution table showing that majority of the household around 62% suffered huge loss which exceeded to ₹10,00,00. This indicates the substantial financial damage due to flood. The largest proportion of the respondent 38% is between I lakh to 3 lakh had to face high financial damage. There is serious impact on the property, livelihood, asset and damage on furniture and home appliances. Around 24% of the people reported more than 3 lakh loss where they had to face severe damage. They lost their furniture, house structure, household equipment's, some of them lost their home completely. The house wall was collapsed or completely destroyed. The household who has financial loss between ₹1 lakh to ₹3 lakh and above 3 lakh categories reflect the severe economic impacts.Most of the families had to experience severe economic impact and financial destruction and long term economic loss.

3.2.18 Access to Government-Provided Financial Compensation/Relief

Table 3.12 Access to government financial reliefs

Response	Frequency	Valid percent
No	8	8.0%
Yes partially	72	72.0%
Yes fully	20	20.0%
Total	100	100.0%

Source: primary data

Table 3.12 represent the access to financial assistance received by government. The table indicates that most of the effected families received some kind of financial assistance from Government. But most of the people received only partial assistance that means they cannot cover the full damage with the assistance received. The compensation received is not adequate to recover the full extent of losses. Relatively small percentage of respondent able to access full compensation. There was a huge gap between the damage and actual financial support

3.2.19 Sources of Financial Assistance Received After Flood

Table 3.13 represent the sources of financial assistance received after flood

Source of assistance	Frequency	Valid percent
Government (State/Central)	90	90.0%
NGO's / Charitable Organizations	18	18.0%
Family / Friends / Community	15	15.0%
Insurance Payout	3	3.0%
Bank / Microfinance Loan	5	5.0%

Source: primary Data

Table 3.13 represent the different kind of financial assistance received by the people in Aluva. The response indicate that people depend on the multiple support system, including government support system, NGO's, charitable trust, friends, community, bank or micro finance, and insurance payout. The analysis show that 90% of the people received government assistance. Government recovery support is the most primary source of support. It played a central role in post recovery process in Aluva. Government provided financial assistance based on the extent of damage on house, rebuild houses, also provide short term loans through kudumbasree.

There is only limited insurance coverage among the households this show lower risk protection mechanism. A small share of the respondent received help from charitable trust and NGOs. Through Community network, the social welfare and informal support during disaster recovery time. People also received basic kitchen appliances and kits and other form of assistance during post recovery time. Small percentage of the people borrowed money from informal sector. Over all the government support play a central role in the recovery time other source such as NGO's community etc. also provided financial support to affected people.

3.2.19 Sufficiency of Assistance Received to Enable Full Recovery

3.14 sufficiency of assistance received to recovery

Sufficiency Level	Frequency	Valid percent
Not at all sufficient	8	8.1%
Not very sufficient	34	34?3%
Sufficient	51	51.5%
Very sufficient	6	6.1%
Total	99	99%

Source: primary data

The table 3.14 represent sufficiency of assistance received to recovery. More than half of the respondent considered the assistance as sufficient- government support and other form of support were sufficient for the recovery. Most of the household were able to manage their basic recovery needs with the support received .around 42% of the people expressed as dissatisfied that it was not very sufficient, they receive some level of assistance but it is not sufficient for the recovery as they are highly vulnerable to flood. This indicates a gap between the actual and received financial assistance. This suggest that while the relief efforts were helpful but it can't fully meet their needs. Only a small percentage of respondent are very sufficient this indicate that for only a limited section of people experience a smooth and comfortable recovery.

It indicated that the government support and other form of supports play important role in the recovery periods, financial assistance received was moderately sufficient but it is not highly satisfied. Comfort recovery was not experienced by the vulnerable households. Some people still face difficulty due to the limited financial aid.

3.2.20 Source of Income After the Flood

Table 3.15 New or extra source of income after flood

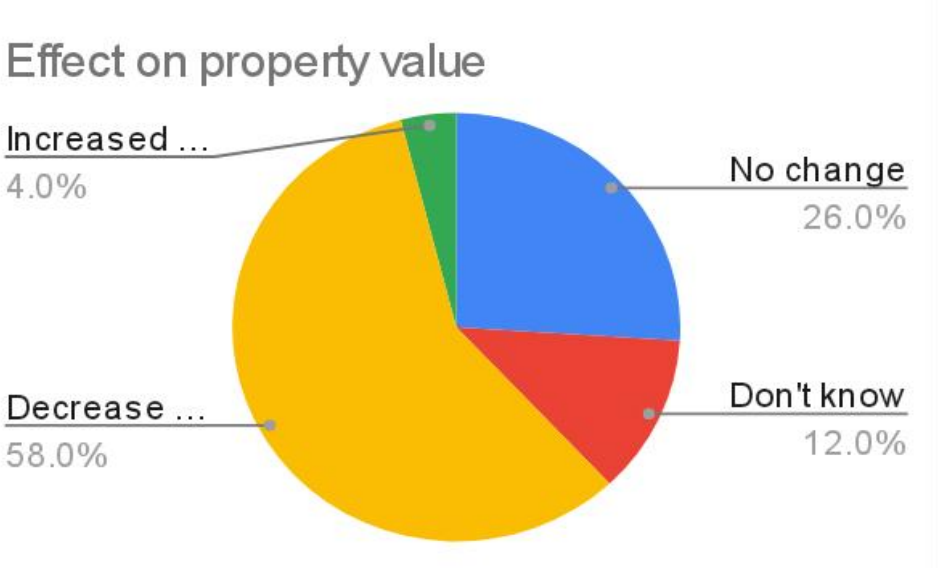
Response Category	Frequency	Valid percent
Returned to original occupation	58	58.0%
Secondary side-income	11	11.0%
Completely new occupation	31	31.0%
Total	100	100.0%

Source: primary data

Table 3.15 show the distribution whether the people switch their income or change their occupation after flood. More than half of the respondents return to their original occupation and the people restored their pre livelihood rather than staring a new source of income. A significant portion of the household were shifted to new occupation that is around 31% of the respondents, as the flood caused permanent damage to their livelihoods source such as small business owners and the daily wage laborers, as they lost their stocks, assets. They faced huge financial loss and reduced the opportunity in the earlier work. They didn't have capital to restart their earlier income source so they had to find an alternative job. Some of the people started a secondary side income and they diversified their income to reduce the future risk.

3.2.21 Effect of Flood on Market Value of Property/Land

Figure 3.6 Market value of property



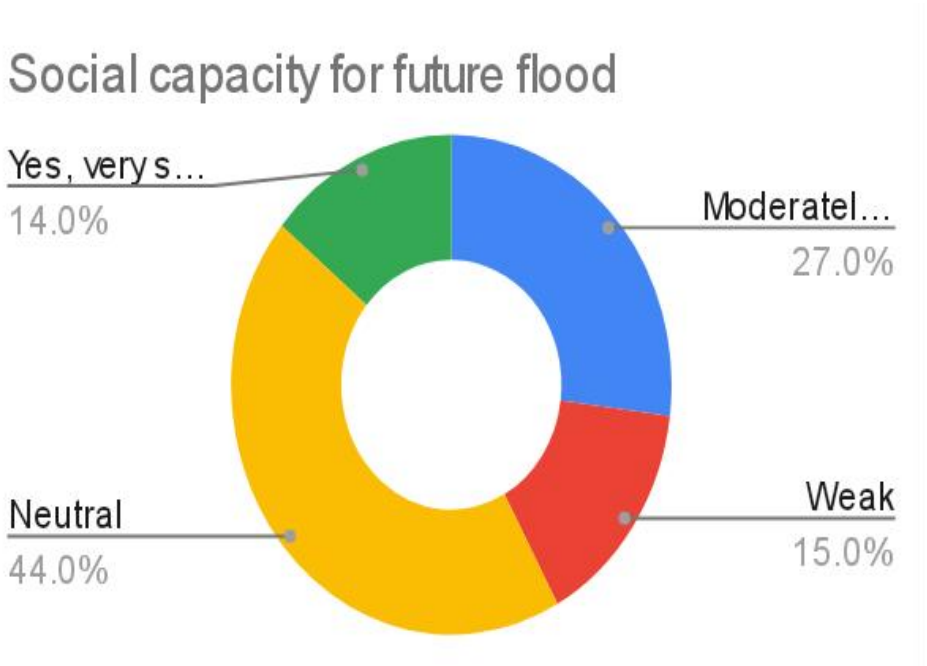
source: primary data

Figure 3.6 represent the effect of flood on the market value of property. More than half of the respondent reported decrease in the market value of property due to flood. Flood had a negative impact on the value of property. This show that flood reduced the confidence of buying property, increased the risk and possibility of physical damage to land and buildings. The area identified as flood prone have low demand led to low price .people hesitated to invest in the flood prone area. Repeated flooding further discourage investment.

Some people reported as there is no change in the value or increase in the value. The main reason for this was either the flood impact is less or the recovery effort of that area was high, rebuild activities and the government support may stabilize the market. Some area will always valuable due to the location advantage such as near to market, metro and hospitals. Some people not know about the value because they did not involve in the real estate matters.

3.2.22 Perceived Community Capacity to Respond to Future Floods

Figure 3.7 Social capacity to respond the future flood



Source: primary data

Figure 3.7 represent the perception of social capacity to respond the future food. The response show that people have a mixed feeling for the community preparedness for future flood. The large neutral group indicates the uncertainty regarding the future flood. 44 percentage of the respondent are uncertain about the community's preparedness. Uncertainty in the preparedness measures is caused by the inconsistent disaster management and the gap in coordination and collective action. Some of the people reported as moderate, this indicate some kind of mutual support, communication and coordination or unity. A lower percentage of people beliefs the perceived community capacity as weak reflecting the concern about the coordination and the insufficient disaster preparedness initiatives by community. Respondents feel that community network system or the institutional system are not strong to face another flood, lack of trust in the society, inadequate disaster training and the limited preparedness measure for future flood bring this concern. There is a need to strengthen the community-based disaster measures and community network.

3.2.23 speed of the recover

Table 3.16 Satisfaction of the overall speed of the recovery

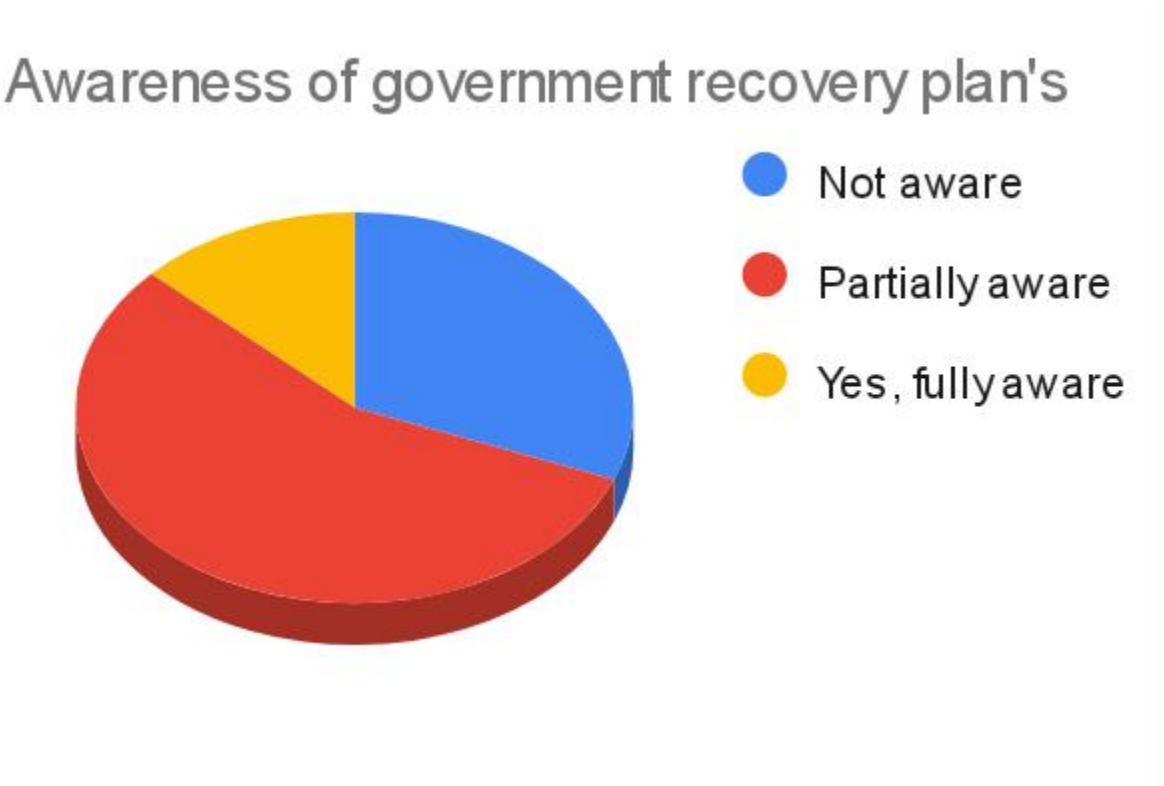
Satisfaction Level	Frequency	Valid percent
Very satisfied	9	9.0%
Satisfied	31	31.0%
Neutral	30	30.%
Dissatisfied	30	30.%
Total	100	100.0%

Source: primary data

Table 2.16 show the satisfaction of the people for overall speed of the recovery after the flood. There is a mixed opinion regarding the satisfaction. Around 31% of the people are satisfied with the speed of recovery. Showing that the government measures and the rebuild efforts are carried with a reasonable time. While a small percentage expressed as very satisfied that recovery process is very quick and effective. At the same time 30% of the people are dissatisfied and 30% of the people are neutral this represent that recovery efforts were delayed or very slow, delay in compensation distribution, slow in rebuilding homes and delay in government actions. Although the recovery measures are implemented but there is a need of improvement in speed and efficiency.

3.2.24 Awareness of long-term government plan

figure 3.8 Awareness of long-term plan

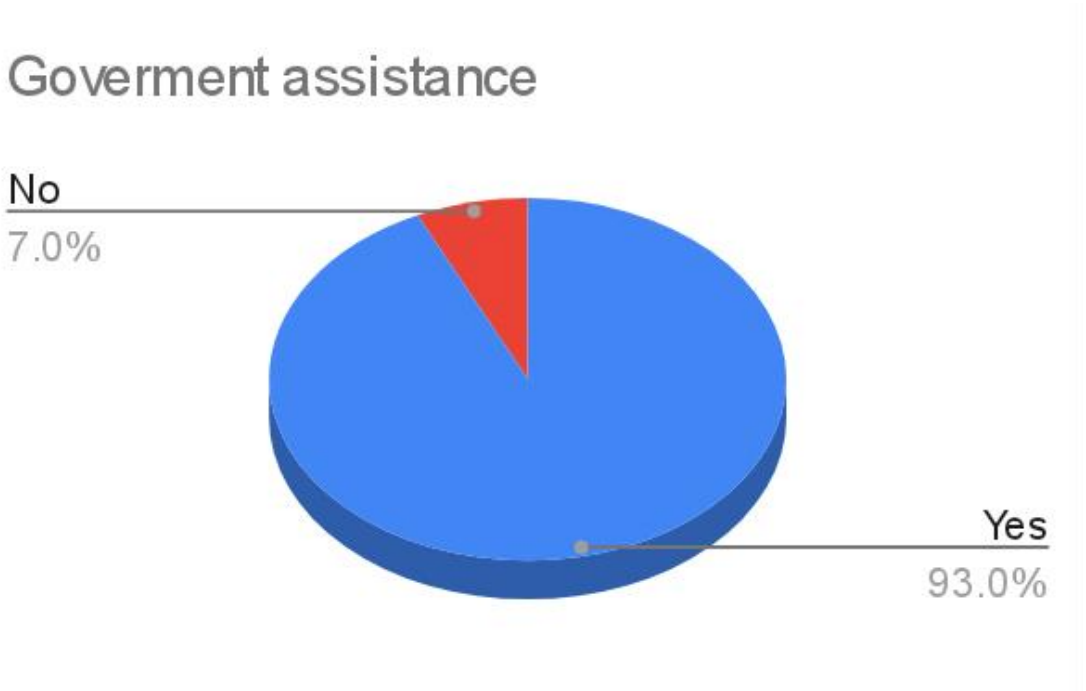


source: primary data

Table 3.8 reveal the awareness of people regarding the long-term plan of government. Majority of the people were partially aware. People had heard about the government policies and reconstruction programs but they are not fully aware or they do not have complete or clear information about the details or procedure. A small portion of the respondent (13%) are fully aware about the government plans, there is only small number of people know clearly about government recovery plan. They have better information access through media, meeting and local authorities. A significant number of the respondent 31% of people are not aware about government plan. This showsa communication gap between effected people and authorities. Lack of awareness, low participation in public meeting or low education make them unaware about the plans. Overall the analysis reveal that the government recover plan and long term plan are not fully developed among the effected population.

3.2.24 Received government recovery assistance during 2018 flood

Figure 3.9 Government Assistance during 2018 flood



Source: primary data

Figure 3.9 show how many households receive government recovery assistance during 2018 flood. Majority of the respondent received financial assistance during 2018 flood. This indicates active participation of the government during the recovery time. There is a high level of government intervention. The assistance may be financial, house repairing, or restoration of livelihoods

3.2.25 financial coping mechanism after flood

Table 3.17 financial coping mechanism

Response recovery	Frequency	Valid percent
Yes took a new loan	29.3	29.3%
Used savings	22.2	22.2%
Used both savings and loan	48.5	48.5%
Total	100	100.0%

Source: primary data

Table 3.17 show the financial coping mechanism after flood by the Household. Large portion of the respondents utilized both savings and loan. Savings alone was not sufficient for the recovery of the household to restore the damage. The household took savingsand loans to rebuild house, repair assets and restored the livelihood back

A significant portion of the house hold took only loans from kudumbasree micro credit societies. micro finance loan provided short term relief. A small proportion of the household had a stable income or fewer loss compared to others. Most of the household depended on external borrowing for restoring their livelihood

3.2.26 amount of government recovery assistance received

Table 3.18 Amount of government recovery assistance

Amount ₹	Frequency	Valid percent
0	8	8.0%
10,000	37	37.0%
60,000	26	26.0%
1,25,000	10	10.0%
2,25,000	5	5.0%
4,00,000	14	14.0%
Total	100	100.0%

Source: primary data

Table3.18 show the amount of recovery assistance received by the household. The most common amount received by the people are 10,000 and 60,000. This show that the most people receive the modest financial support from government. Some people get huge amount as assistance (10%) got 1,25,000 and 14% of household got 4,00,000. The amount received was based on the extent of flood damage on the house. Government assistance was based on the extent of flood damage and it was calculated based on the percentage. Only a small number of household reported that they didn't receive any assistance. The difference in the amount shows the difference in the damage assessment and eligibility criteria.

3.2.27 Government response during flood

Table 3.19represent the government response during flood

Response	Frequency	Valid percent
Very Effective	16	16.0%
Effective	62	62.0%
Less effective	17	17.0%
Not effective	5	5.0%
Total	100	100.0%

Source: primary data

Table 3.19 show the government response during flood. The table reveal that around 78% of the respondent had positive perception about government response. Most of them rated effective that is people are satisfied with the action of government. The rescue operation, relief camp, food supply, and the medical assistance provide by government are effective and efficient. Relatively small percentage show dissatisfaction. This highlights delay of disaster management such as sped management and coordination and gap in the management. Over all there is a positive impacts regarding government recovery.

3.3 chi square test analysis

Chi-square test is a statistical method used primarily to analyse the categorical data to determine if there is any significance between observed frequency and expected frequency. This study uses

to test whether there is any significant associations between different variables. By using hypothesis testing taking the null hypothesis (H0) and alternative hypothesis (H1).

3.3.1 Occupation vs Impact on earning ability

Hypothesis

- Null hypothesis (Ho): Occupation and impact on earning ability are independent
- Alternative hypothesis (H1): Occupation and impact on earning ability are not independent

To Examine whether the primary occupation of households is significantly associated with the extend of livelihood disruption caused by floods in Aluva

Count

		Impact on earning ability				Total
Occupation		Loss of daily wage	No impact	Permanent job loss/ Business shutdown	Temporary job loss	
	Daily wage labor	19	2	8	1	30
	Salaried employment	13	14	3	4	34
	Self-employed professional	1			1	2
	Small business owner	14	1	13	7	34
Total		47	17	23	13	100

Chi square test

Chi square value	Degree of freedom (df)	Critical value at 5 %	P value
20.64	9	16.92	0.0027

- Chi-square test value = 20.64
- Degree of freedom = 9
- Critical value at 5 % interval = 16.92
- P value = 0.0027

Since then. Value is 0.0027 is less than significance level 0.05, the result is statistically significant

Thus we reject the null hypothesis. There are statistically significant associations between the occupation of the households and the impact of earning ability of the household.

3.3.2Income vs Damage

Hypothesis

- Null hypothesis (Ho): income level and flood damage are independent
- Alternative hypothesis (H1): Income level and flood damage are not independent

To examine whether there is a significant association between income level and the severity of flood damage in the study area (Aluva).

Count

		Level of damage		
Income		No/minor damage	Severe damage	Total
	Low	6	67	73
	Medium/ high	9	18	27
Total		15	85	100

Chi-square test

Chi square value	Degree of freedom (df)	Critical value	P value
9.75	1	3.84	0.0017

- Chi-square value = 9.75
- Degree of freedom= 1
- Critical value at 5% interval= 3.84
- P value = 0.0017

Since the p value is 0.0017 is less than the significance level 0.05, the result is statically significant

Thus we reject the number hypothesis

There is statistically significant associations between the level of damage and the income level

3.3.3 Damage vs Government Assistance

Hypothesis

- Null hypothesis (Ho): Level of Damage and Government Assistance are dependent
- Alternative hypothesis (H1): Level of damage and Government Assistance are not dependent

To examine whether there is a significant association between government assistance and the level of damage

Count

	Access to government recovery assistance		Total
		No	Yes	
Level of damage	No/ minor damage	4	11	15
	Severe damage	3	82	85
	Total	7	93	100

Chi-square test

Chi square value	Degree of freedom (df)	Critical value	P value
10.48	1	3.84	0.0012

- Chi-square value= 10.48
- Degree of freedom = 1
- Critical value = 3.84
- P value = 0.0012

Since the p value is 0.0012 is less than the significance level 0.05, the result is statistically significant thus we reject the null hypothesis

There is significant relation between the level of damage and the government recovery assistance

CHAPTER 4

FINDINGS, RECOMMENDATIONS AND CONCLUSION

4.1 Introduction

The study analyzed the social and economic impact and effect of flood on the livelihoods of people in Aluva. To assess the impact of flooding on income, occupation, housing condition, displacement and recovery capacity. The study conducted in the vulnerable wards of Aluva municipality.

4.2 Findings

Objective 1. To analyse the socio economic impact of flood damage on household and livelihoods of people in Aluva.

- Aluva is highly vulnerable to flood it is located on the banks of periyar river. Flood was occurred during monsoon season and dam release.
- One of the most significant findings of the study is there was a huge displacement during flood. All most 97 percentage of people are displaced due to flood and 49% of the people are stay away from home more than two weak.
- Households are move to relatives' home and relief camps. Prolonged displacementcreates psychological stress, financial instability, disruption of employment
- This indicate extend of flood damage to home. The houses were filled with contaminated water and mud.
- Most of the respondents suffered severe or complete structural damage to home. Common damage is structural damage, damage to vehicles, loss of financial documents and destroyed furniture and home appliances. And there is thick layer of mud deposit in the home, structural cracks, contaminated water and damage to walls and floors.
- Flood has a negative impact on the earning ability. There is an increase in the lowest income groups after flood and a decrease in the middle-income group. That is flood reduced the financial stability and pushed into low-income category

- Flood effect the livelihoods of people negatively. Informal sector workers are more vulnerable compared to formal sector workers. Small business and daily wage workers are more effected.
- The chi square test result showsa significant relationship among the occupation and earning ability, livelihood disruption varied significantly across occupation. Salariesemployees are less vulnerable to flood
- Most of the people take more than 1 month to restore the income back. Some people are still not return to pre flood level. This represents the long-term consequences.
- There is high level of financial loss 62 percentage of the people suffered loss above rupees 1,00,000 and 24 percentage of household had more than 3,00,000 losses, the damage to property, structure of house, disruption of furniture, home appliances and collapse of house create the financial loss

Objective 2: To identify the most vulnerable occupation and income groups effected by flooding

- The most vulnerable occupation are small business owners and daily wage labors. The chi-square test result show that there is statistically significant relationship between occupation and earning ability of the respondents. The livelihood disruption varies across the occupation.
- Before flood a significant portion of the respondents are worked in informal sector like business owners and daily wage laborers. After flood the business owners are reduced and increase the daily wage labor. The change in occupation shows that business owners are unable to fully recover. That is asset depending occupation such as shop, tools and stocks are highly vulnerable to flood
- Salaried employees are less vulnerable to flood compared to business and daily wage workers. Their income loss was temporary and not permanent. They can restore their financial stability faster.
- Most of the people in aluva belonged to middle income category before flood. They had limited savings. After flood the most of the middle-income people are pushed to low-

income groups that is rupees 10,000. There is decrease in the middle-income category and reduced the financial stability.

- Flood had immediate and direct income loss that many daily wage labourers lost job for days or weeks. Business owners faced temporary closure and some workers experience permanent job loss.
- Some of the people take more than 3 months to return back their income back and dome are not yet return back to pre-flood level that show the long-term economic impact.
- Most of the household use savings for recovery purpose and to manage the daily living experience after flood, savings alone are not enough for some families. And they borrowed money from banks, kudumbashree, and informal sectors.
- There is also a significant association between the level of income and the flood damage. Low-income people are highly vulnerable to flood rather than high income people. Majority of the low-income household experience the severe damage and take more time to recover. Out of 73 low-income households 67 household experience severe damage
- Stability of occupation played significant role in the recovery time, more fixed or stable income people are more financially stable compared to others.

Other major findings

- Flood impact is not a one-time disaster it is a recurrent natural disaster in Aluva, 26% of the population experience recurrent flooding.
- Market value of property decreased due to flooding, reduced the buyers confident and investment in flood prone area. The repeated flooding furtherlowers the demand for property.
- Government plays significant role during the recovery period. The primary source of financial support was government.
- Government provides immediate cash relief as 10,000, loans through kudumbashree, rebuilding compensation and housing compensation s, relief kits. NGO’s and community also play a significant role in the recovery time.

- Government assistance reduces the immediate suffering but it cannot completely restore livelihoods and damages.
- The study also finds that there is delay in the compensation received and people are unaware about the government schemes regarding flood.
- Government provides 40,00,00 for the people who lost their home fully and provide 1,25,000 and 2,25,000 based on the extend of flood damage and 10,000 rupees for maintains

4.3 RECOMMENDATIONS

4.3.1 disaster preparedness measures based on the community

- Provide community based measures : community participation should be encourage in the ward and local level
- provide proper communication and avoid miscommunication regarding the preparedness measures
- Establishing local disaster response committees and make proper measures and solving the problems in the local communities. Take mitigation measures, preventive measures, properly through the community or local level
- Strengthen the local network through disaster preparedness training and awareness program,
- Make some local volunteers and provide them training for the sudden disaster and promote youth volunteer network for faster rescue operation and post flood clean activities
- Diversify the livelihoods of people by providing training programs or encourage skill development programs. Thus, the people can diversity income when there is a disaster.
- Clean the drainage properly, by doing daily cleaning and maintenance of drainage system reduce the overflow of drainage
- River management should be strengthened in vulnerable areas

4.3.2 Improvement of government support

- Government should consider the low-income people who didn't have an alternative livelihood
- Government should provide adequate and timely recovery assistance to the effected people. Provide faster distribution of financial aid with amount equal to the actual damage
- Compensation should provide for the Household according to their damage
- By introducing digital transaction system people can access the compensation without delay. A clear and transparent system should be introduced to avoid the delay and fair distribution.
- Conduct awareness campaigns about the government disaster relief and rehabilitation programs
- Provide psychological support to the families experiencing trauma and stress after disaster
- Provide long term livelihood rehabilitation to small business owners, daily wage workers and the low-income households through skill training

4.3.2 Policy recommendation

- Strengthening the early warning system, advance warning system and SMS alert should reach all the households timely.
- Protect the riverbank and control sand mining through strict regulation and prevent the environmental degradation
- Environmental protection through afforestation and wetland protection by planting trees we can reduce the flood.
- Provide timely mock drills in the flood zone areas and local flood alert system in the flood prone areas
- Authorities should ensure timely and controlled release of water from dams during heavy rainfall periods. Ensure effective warning system regarding release of water from dam in vulnerable areas.

4.4 Conclusion

The study analyses the impact of flood disaster on the selected households of Aluva. The Findings reveal that flood not only caused the physical damage to house and property but also brought serious economic and social challenges to the effected families. Most of the people were affected severely. There is severe disruption in the lives of people particularly for low income people. Many household experience financial loss, damage to home, infrastructure and livelihoods and damage to assets. the Kerala flood 2018 make long term and short-term impact. Flood effect severely on the house, employment, and income of the people. The study highlight that business owners, daily wage laborers, and small scale traders are more vulnerable to flood. Recovery was challenging for low income peoples. Government assistance and recovery measures played an important role in the recovery time. Flood not only create short term impact, it had a long last impact on the livelihood of the people.

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Questionnaire

1. Name
2. Age
    - <25
    - 26-35
    - 36-45
    - 46-55
    - >55
3. Gender
    - Male
    - Female
4. Educational Level
    - No formal education
    - Primary
    - Secondary
    - Higher Secondary
    - Graduate / Above
5. Primary Occupation of Household Head (Before the flood)
    - Daily Wage Labor (Construction, etc.)
    - Small Business Owner/Trader (Shop, Auto/Taxi, etc.)
    - Salaried Employment (Govt./Private Sector)
    - Self-Employed Professional (e.g., Doctor, Lawyer, Engineer)
    - Other
6. Average Monthly Household Income (Before the flood)
    - Less than ₹10,000
    - ₹10,001 - ₹25,000
    - ₹25,001 - ₹50,000
    - More than ₹50,001
7. Average Monthly Household Income (After the flood)

- less than ₹10,000
- ₹10,001 - ₹25,000
- ₹25,001 - ₹50,000
- More than ₹50,001

8. Type of Housing
    - Own
    - Rent
- Temporary / Informal settlement

9. Total Number of Earning Members in Household:
    - 1-2
    - 3-4
    - 5-6
    - Above 7

B: Flood Event and Immediate Impact

11. How many major floods have you experienced?
    - One
    - Two
    - More than two

13. Was your household displaced due to flood
    - Yes
    - No

14. If yes, for approximately how many days where you displaced?
    - 1-3 days
    - 4-7 days
    - 8-14 days
    - More than 15 days

15. Which major flood event are you primarily referring to?
    - 2018 Kerala Flood
    - 2019 0r 2020
    - Multiple flood event

C: Impact on Livelihood and Assets

16. Did the flood damage or destroy your primary source of income/workplace?
    - Yes, completely destroyed
    - Yes, severely damaged
    - Yes, moderately damaged
    - No, minimal/no damage
17. Did the floods cause damage to your home/property?
    - No damage
    - Minor damage
    - moderate
    - Severe damage
18. Impact on your earning ability:
    - No impact
    - Loss of daily wage for few days
    - Temporary job loss
    - Permanent job loss / business shutdown

19. Was your children's education affected by the flood

- Yes
- No

21. If you are a small business owner/trader, what was the estimated financial loss due to business interruption and stock/asset damage
    - None
    - Less than ₹50,000
    - ₹50,001 - ₹1,00,000
    - More than ₹1,00,001
    - Not applicable

22. After the flood, did you have to take on an additional loan or draw from savings to recover or rebuild?
    - Yes, took a new loan
    - Yes, used savings
    - Use both loan and savings

23. Do you still feel the financial effects of the most recent flood disaster on your household income?

- Yes, severely
- Yes, moderately
- Yes, slightly /
- not anymore

24. How many days of work/income did the head of the household lose immediately after the flood

- None
- 1-7 days
- 8-30 days (up to 1 month)
- More than 30 days

25. Which of the following household assets were significantly damaged/lost

- House structure
- Household goods/furniture
- Vehicles (Car, Bike, Auto)
- Tools/Equipment related to work (e.g., fishing nets, machinery)
- Financial documents/records
- None of the above

26. What is the approximate estimated total financial value of all your damages and losses (livelihood and assets)

- Less than ₹50,000,
- ₹50k-₹1L
- ₹1L-₹3L
- Over ₹3L

D: Recovery, Assistance, and Resilience

27. How long did it take for your primary source of income/work to return to its pre-flood level

- Less than 1 month

- 1-3 months
- 4-6 months
- More than 6 months
- Has not returned to pre-flood level

28. Did your household receive financial assistance from any of the following sources for flood recovery?
    a. Government (State/Central)
    b. NGOs/Charitable Organizations
    c. Family/Friends/Community
    - Insurance Payout
    - Bank/Microfinance Loan
    - None
29. To what extent was the assistance received sufficient for full recovery?
    - Very sufficient
    - Sufficient
    - Not very sufficient
    - Not at all sufficient
30. Has your household had to adopt a new or secondary source of income since the flood?
    - Yes, a completely new occupation
    - Yes, a secondary side-income
    - No, we returned to our original occupation
31. Do you feel your community has a strong collective capacity (social capital) to respond to future floods? Yes, very strong / Moderately strong / Neutral / Weak / Very weak
32. Do you take loans or borrow money due to the flooding?
    - Yes
    - No
32. How did the flood affect the market value of your property/land?
    - Increased significantly
    - Decreased slightly
    - No change

- Don't know

33. Were you able to access government-provided financial compensation/relief for your losses?
    - Yes, fully
    - Yes, partially /
    - No

34. Did the flood result in the loss or damage of important official documents (Aadhaar, property papers, educational certificates, etc.)?

- Yes
- No

35. Did you or any household member experience psychological distress (e.g., anxiety, insomnia, fear) following the flood?
    - yes, severely
    - Yes, moderately
    - No, not really
    - Already had a condition

36. How satisfied are you with the overall speed of recovery in your area?
    - Very satisfied
    - Satisfied
    - Neutral
    - Dissatisfied
    - Very dissatisfied

37. Do you feel your community has a strong collective capacity (social capital) to respond to future floods?
    - Yes, very strong
    - Moderately strong
    - Neutral
    - Weak
    - Very weak

38. How worried are you about the possibility of future floods impacting your livelihood?

- Very worried
- Moderately worried
- Slightly worried
- Not worried

39. Are you aware of the government's long-term plan (e.g., Rebuild Kerala Development Program) to reduce flood risk in Aluva?

- Yes, fully aware
- Partially aware
- Not aware

40. Dis you receive government recovery assistance during 2018 flood

- Yes
- No

41. If yes, which amount did you receive as a government recovery assistance?

- 10,000
- 60,000
- 1,25,000
- 2,25,000
- 4,00,000

42. Government response during flood:

- Very effective
- Effective
- Somewhat effective
- Not effective

43. Do you think flood preparedness measures in your area are sufficient?

- Yes
- N0

44. What was the biggest challenge your family faced in rebuilding your livelihood after the flood?

45. If no, what improvements are needed?

46. What support would help your community withstand future floods better?