A STUDY ON THE SOCIAL AND ENVIRONMENT IMPACT OF EDAYAR INDUSTRIAL UNITS IN ERNAKULAM

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I certify that the thesis entitled **"A STUDY ON THE SOCIAL AND ENVIRONMENTAL IMPACT OF EDAYAR INDUSTRIAL UNITS IN ERNAKULAM"** is a record of bonafide research work carried out by Arunima Ajay, under my guidance and supervision. The thesis is worth submitting in fulfillment of the requirements for the award of the degree of Master of Arts in Sociology.

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DECLARATION

I ARUNIMA AJAY hereby declare that the thesis entitled "A STUDY ON THE SOCIAL AND ENVIRONMENTAL IMPACT OF EDAYAR INDUSTRIAL UNITS IN ERNAKULAM" is a bonafide record of independent research work carried out by me under the supervision and guidance of ELIZABETH ABRAHAM I further declare that this thesis has not been previously submitted for the award of any degree, diploma, associateship or other similar title.

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CHAPTER-1: INTRODUCTION

1.1 Background

Industrial units have both positive and negative impacts on the societal and environmental levels of a country. According to the researchers, the establishment of an industrial unit generates income and contributes to the economic development of a region while there is worldwide evidence of destruction of natural habitats from the waste materials of factories (Purchase *et al.* 2021). The Edayar Industry of Ernakulam district of Kerala is not an exception in this case. This current research will highlight both the positive and negative effects of the industry through stakeholder interaction and analysis of secondary data. The Ernakulam district of Kerala is widely known as an agriculture-based district in the southern part of India. According to the researchers, more than 0.25 lakh hectares of paddy cultivation fields are present in this district. However, Ernakulam is also famous for the cultivation of huge amounts of rubber (Kerala, 2023). Due to industrialization in areas like Edayar, the dependency on an agriculture-based economy has decreased as more than 47 heavy industries and 12619 micro-manufacturing plants are present in this district (Kerala, 2023). With the presence of heavy industrial units in regions like Edayar, the per capita income of Ernakulum has reached 94392 INR which has a significant contribution in increasing the overall per capita income of Kerala up to 1,74,214 INR in the 2022-23 financial year. According to the data of the government portal, one of the biggest industrial townships in Kerala, the Edayar Industrial Area directly employs close to 5000 people, and it is home to the company that outputs "Aranmula Kannadi," a product that is a representation of Keralan workmanship (Msmedithrissur, 2019). From polymer processing to chemical manufacturing and aluminum processing to wood seasoning, petroleum refining, and Steel plants, the Edayar industry provides huge employment to the local people and other people from different states of India. Therefore, from the social perspective like employment generation and economic development, the Edayar industry has a huge impact in Kerala.

However, the Edayar industrial units are infamous for environmental destruction too. According to the data, a strong stench emanated from twenty meat and rubber production facilities in the Edayar industrial district in Eloor, as a result of greater emissions of "volatile organic compound (VOC)". The NIIST research, which was reviewed by the "Pollution Control Board (PCB)", assessed gas turbine biological filters and found that the filters placed in businesses were inefficient. The study also mentioned that the bio filters' effectiveness was below the required

levels, which resulted in smell emission. On the other hand, The Periyar river turned discolored on September 7 as a result of unlawful pollutants being released by "Sud-Chemie India Pvt Ltd" in the Edayar industrial region, according to the PCB on December 7 of 2023 (Satheesh, 2020). After activists and locals told board officials about the colour change, samples were taken. Chromium was found in the tests done at the board's central lab in Ernakulam. This showed that the flow came from the industrial unit. The illegal flow took place through the stormwater drain, which is only supposed to let rainwater out.

On the other hand, according to the expert panels of environmentalists, the wastewater and chemical hazards of Edayar industrial units are destroying the local agricultural fields too. The high presence of metals like Chromium is getting dissolved in the water bodies adjacent to the company premises (Thehindu, 2023). As a result, the companies in this particular region are responsible for the violation of environmental protection laws and waste management laws of the Indian government. The situation is also alarming as the pesticide manufacturing plants in the Edayar industry are also exerting a huge negative impact on the overall health of the people in the Ernakulam district of Kerala. According to the data more than 5000 people have already become victims of the endosulfan pesticide used in the paddy fields of Ernakulam (Downtoearth, 2017). In the previous section, it has been seen that the Edayar industrial units are generating income for local people but the data also shows that it is not an unmixed blessing like other industrial units of the world. The pesticides produced in the companies of Ernakulam are responsible for mental and psychological disorders due to their decade-long spraying in cashew fields. Pollution has become a daily burden for the residents of Edayar township and the Eloor region of Ernakulum. Reports also indicate the incidents of acid rain in this region in 2016 which placed this region as one of the most critically polluted areas of India (Cpcb, 2023). However, the lack of strict implementation of the laws, corruption in higher authorities like state pollution control boards, and lack of alternative employment are deteriorating the situation more. Despite continuous alarm calls, necessary steps are yet to be taken to stop the emission of harmful greenhouse gasses, volatile organic compounds and unplanned disposal of chemical hazards. The current research will try to provide different aspects of the Edayar industry through interaction with local people and collecting data from government portals and archives. It will be helpful to provide the necessary recommendations to stop the negative environmental impacts of those industrial units with alternative employment opportunities.

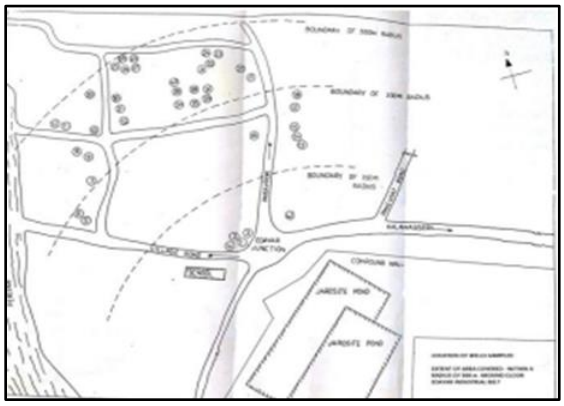
1.2 Rationale

1.2.1 *Overall problem statement*

India uses about 230 cubic kilometres of groundwater every year, more than any other country in the world. However, because of high rates of mining, groundwater replenishment hasn't been able to keep many aquifers full. India's water security, food security, health, and people's ability to make a living are all severely affected by this loss. India's groundwater resources are getting worse because of pollution from cities, factories, and other things that people have made, which are growing quickly. The race against time has turned into a race against growing population and water management. Groundwater and water in the river Periyar are getting worse because of how non-scientific industrial waste is dumped in Eloor, which is Kerala's biggest industrial belt. It is very scary, and Kerala is now known as a "toxic hot spot" because of it. People are trying to look into how to clean up the polluted groundwater in an area 500 meters around the Industrial Zone (Aditya *et al.* 2023).

Eloor –Edayar Industrial Belt: Eloor is the industrial centre of Kerala. It is an island in the Ernakulam district that is home to more than 40,000 people. The Idukki hydropower project, which is the state's biggest, is located in the Eloor-Edayar industrial belt, which is on the banks of the Periyar River. This area is very important to the state's economy because it provides drinking water for many major cities. On the banks of the Periyar, there are chemical businesses that make petrochemical products, rare-earth elements, pesticides, fertilizers, chemicals for processing rubber, zinc and chrome products, and leather goods. The river is used by factories to get processed water and get rid of wastewater that contains DDT, Endosulfan, heavy metals, water nutrients, and more than one hundred other chemical compounds. With these pollutants, Eloor is the 35th most dangerous hotspot in the world, and it's more than 5 mg/l, which is the limit allowed by drinking water guidelines (Aditya *et al.* 2023). The study discovered that effluents stored in dumping yards and ponds got into the groundwater table through infiltration and rainwater. The pollution control board sent a letter to the suspected companies asking them to explain the illegal release and what would be done to stop it from happening again. A report made by the PCB in June 2022 revealed that untreated wastewater had been illegally dumped into Edayar's stormwater drains through about 15 of them (The Hindu, 2023). It was also said by the board that the water near the "Kadavu" across from where the discolouration was found was cloudy when samples were taken, which could have caused the colour change.

Figure 1.1: Index map of Eloor Edayar Industrial belt



(Source: Aditya *et al.* 2023)

1.2.2 *Industrial pollution and its aftermaths*

Ernakulam district is infamous for its poor quality of air due to continuous industrial emissions, poor planning of housing complexes and lack of screening of waste disposal activities of industrial units. For example, like other industrial units of Ambalamugal, Edayar industrial units have also been accused of deterioration of air quality. The data collected from the government portal shows that from 2001 to 2008, the emission of Sulphur dioxide, and nitrous oxide increased from 2 ug/m3 and 6.49 µg/ m3 to 4.1 and 18.8 µg/ m3 (Krishnan and Firoz, 2021).

Fig 1.2: Comparison of air quality degradation from 2001 to 2008 in different regions of Kerala

Name of Station	Annual average in 2001-02(µg/m^3)				Annual average in 2007-08 (µg/m^3)			
	SO_2	NOx	RSPM	SPM	SO_2	NOx	RSPM	SPM
Ernakulam South (Residential)	2	6.49	-	96.44	4.1	18.8	41	80
Eloor (Industrial)	42.06	14.88	-	116.13	3.9	5.2	47	82
Irumpanam (Industrial)	2.64	11.88	-	108.88	4.2	10.1	38	60
M.G.Road (Commercial)	-	-	-	-	4.9	17.7	35	60
Vytilla (Commercial)	-	-	-	-	4.2	13.1	38	63
Kalamassery (Industrial)	-	-	-	-	5.2	11.4	44	70
Udyogamandal (Industrial)	-	-	-	-	3.1	6.4	49	92
Max. Limit	60	60	60	140	60	60	60	140

(Source: Krishnan and Firoz, 2021)

On the other hand, the amount of suspended particulate matter has also increased in air which is one of the main reasons for air quality degradation in Ernakulam district. Electric utilities, particularly those that burn coal, are primarily responsible for the majority of sulphur dioxide emissions into the environment in the Ernakulum region (Finkelman *et al.* 2021). Other factories that produce sulfur dioxide include those that process and smelt metal, make cement, make paper pulp, and refine petroleum. On the other hand, due to industrial activities, the number of vehicles has increased enormously in the Edayar industrial units. According to the data, from 1998 to 2004, the number of vehicles increased from 1.5 lakhs to 4.5 lakhs and most of them were commercial vehicles used in the export and import of goods. The data also revealed that by burning fossil fuels due to increased vehicle activities, 1l0 tonnes of CO are released every year in Ernakulum district.

Fig 1.3: Increased vehicular emissions in Ernakulum region of Kerala

VEHICULAR EMISSION (Tonnes/day)					
CO	HC	NO_X	SO_2	TSP	Pb
170.63	42.90	40.42	7.04	6.12	0.07

(Source: Krishnan and Firoz, 2021)

Due to increased industrial activities and vehicle activities, the noise pollution of Ernakulam is also beyond the safety level. According to the survey of 26 different regions of Ernakulam, it has been found that especially in commercial zones, the noise level is approximately 78.5 decibels and, in some regions, it is 76.55 decibels which is quite higher than the permissible level. As a result, the workers and residents of the commercial township of Ernakulam are affected by auditory dysfunctions (Scaria *et al.* 2023). The lack of necessary interventions from the pollution control board is present in the above-presented data. Not only the degradation of air quality but also the degradation of the overall health of the people in the Ernakulum region is one of the main problems of the Kerala government. Immediate steps must be taken to control the emission to save the next generation from having airborne and auditory diseases.

1.2.3 *Water pollution*

The central lab board of Ernakulam has recently surveyed the overall quality of groundwater in the Ernakulam region. The board emphasized the groundwater sources which are presented closely to the commercial zones. The central lab has found that due to the discharge of hazardous chemicals from chemical manufacturing units in Edayar industrial units, the groundwater sources are getting heavily polluted by high levels of chromium. As a result, the Periyar River, the lifeline

of Ernakulam has recently been discoloured from a high level of pollutants. On the other hand, groundwater sources near Kadavu have also been found to be affected by chemical discharge from nearby companies. The presence of pollutants has also been found in almost 15 stormwater sources in Ernakulam too. High levels of biological oxygen in water bodies are resulting in eutrophication which is deteriorating the quality of drinking water sources. On the other hand, the discharge of volatile organic compounds from meat processing industries in Edayar is destroying the biodiversity of water bodies. As a result, due to the contamination of freshwater sources, local people are getting affected by water-borne diseases. Researchers have also found that the unplanned drainage system of Ernakulam city is resulting in the disposal of organic loads of approximately 34820 kg per day in the freshwater bodies (Krishnan and Firoz, 2021). The increasing population of the city from industrial activities have also been found to be responsible for water pollution.

According to the report, the community's ecology and health are severely impacted by drinking water contamination in the "Eloor-Edayar industrial area". When wastes are kept in ponds or piles, they frequently leak into surface waters during the monsoon season or combine with rainfall that seeps through and reaches the groundwater table, seriously compromising its quality (Mishra, 2023). Periyar's water is slow and has a deep black, crimson, or yellow tint due to decades of uncontrolled or inadequately treated wastewater discharge. The presence of these contaminants in groundwater and surface water has led to an outbreak of a variety of systemic problems as well as an increase in the prevalence of illnesses such as asthma, bronchitis, infections of the skin, and even cancer among users (Ambily and Jailakshmi Menon, 2019). Children in the area are more likely to experience malformations as a result of chromosomal and congenital abnormalities brought on by pollution. The environment is severely impacted by the area's levels of pollution. Vegetables, eggs, and cow's milk are all exhibiting concerning levels of chemical contamination. Numerous investigations have demonstrated that the region's aquatic biodiversity has suffered greatly as a result of wastewater discharge. Huge In the contaminated sections of the Periyar River, fish deaths of both bigger and smaller species are frequent occurrences. Similarly, in the case of air pollution, the lack of effective steps from the pollution control boards is worsening the situation. As a result, despite decade-long contamination, a monitoring system to check the quality of groundwater water is yet to be established. Without proper interventions of the government, the people of Ernakulam and adjacent people will not get relieved from the evil of the pollution.

Aditya et al.'s study from 2023 looked at five wells that were within 150 meters of an industrial zone. The pH of the water was lower than what was allowed, which means that acidity from industry pollutants was present. The amount of zinc and sulphate in well 41 was higher than what was allowed. It was discovered that the water was slightly acidic and high in sulphates, which means that pollution was moving through the groundwater. The water was also a little salty and full of sulphates. It was found that the water was dirty because filthy water from the Periyar River got into it. Most of the wells weren't good for drinking or cooking with, and about half of the people who lived there treated the water in some way, like by adding lime and potassium permanganate. If the flow of pollutants in the northeast direction is not properly managed, things could get worse. Pollution of the groundwater in the Eloor-Edayar industrial belt is very bad for both people and the environment. During the monsoons, trash from ponds or heaps mixes with rain and enters surface water, which changes the groundwater table. The Periyar River flows slowly and turns black, red, or yellow because of effluents that have not been treated or have only been partly treated. This pollution makes it more likely for people to get bronchitis, asthma, skin diseases, cancer, and other systemic illnesses (Divya *et al.* 2021). Children in the area are more likely to be malformed because of birth defects and genetic problems. Foods like eggs, vegetables, and cow's milk that are contaminated also hurt the environment. The release of effluents has been terrible for marine life, killing a lot of fish and lowering the number of fish in the area. In 1980, there were 35 different kinds of fish in the Periyar, but now there are only 12.

Fig 4: Polluted Periyar River from the industrial activities

(Source: Ambily and Jailakshmi Menon,2019)

1.2.4 *Lack of control over odour spreading*

Twenty meat and rubber processing units in the Edayar industrial area near Eloor are putting out more volatile organic compounds (VOCs), which make the area smell bad. A study by the National Institute of Interdisciplinary Science and Technology (NIIST) found that the industrial gas biofilters that were put in place in the companies were not working well, which caused smelly fumes. The study also said that there was no Indian standard on the emission of smells. The report was made public by the Pollution Control Board (PCB) after Eloor Municipality councillors asked them not to. VOC should not be more than 0.25 ppm, but most businesses have more than 80 ppm. According to the Rhodium Group, US greenhouse gas emissions went down 1.9% in 2023, mostly because the power sector cut its emissions by 8% (The Times of India, 2024). On the other hand, despite several urges from environmentalists, the local authority has not implemented protective liners to stop the disposal of chemical wastes from the companies in freshwater ponds. The government must establish an eco-friendly green zone to protect the natural flora and fauna of the Ernakulum region.

1.2.5 *Air-borne diseases*

Air is a part of man's immediate surroundings and is necessary for all living. Health issues and even mortality result from breathing in air contaminated by smoke, dust, hazardous gases, and chemical vapours. Air pollution has both immediate and long-term health effects on the inhabitants of the Ernakulum region. The long-term consequences that are most frequently associated with air pollution include respiratory allergies, bronchial asthma, and chronic bronchitis.

CHAPTER 2: LITERATURE REVIEW

Understanding Industrialization and Its Impact on Ernakulam District

Industrialization is a significant force that has transformed markets, states, and locations globally. In the Ernakulam district of Kerala, examining its history reveals the profound changes that industry has brought to society, the economy, and the environment, particularly in the Eloor region. This paper aims to synthesize various research findings to present a comprehensive view of industrialization's impact on Ernakulam's social and economic landscapes.

Historical perspectives on industrialization offer valuable insights into how societies and economies evolve. Scholars like Hobsbawm (1962) and Landes (2003) provide foundational knowledge about the origins, drivers, and consequences of industrialization. Their work illuminates how the interplay of new technologies, changing work habits, and capital accumulation spurred industrial growth, drawing on case studies and long-term trends to enhance our understanding of industry's historical and ongoing influence worldwide.

Kerala's industrial narrative is distinct, shaped by unique historical, political, and geographical factors. Visionary leaders like His Highness Sri Chitira Tirunal Balarama Varma and Diwan Sir C.P. Ramaswamy Ayyar catalyzed industrial activity by establishing manufacturing enterprises, paving the way for further industrial development. Eloor, once a rural village, has emerged as an industrial hub, reflecting Kerala's broader industrial evolution marked by pivotal establishments like the Fertilizers and Chemicals Travancore Ltd (FACT) and the Indian Aluminium Company (IAC).

Studying various industries over time offers deep insights into development dynamics and impacts. By examining specific case studies, researchers can explore factors driving industrial growth, economic shifts, and the societal effects of industrial changes. Such analyses reveal the complexities of industrial expansion and its implications, shedding light on the interplay between local communities, government policies, and global economic forces.

Industrialization often entails significant environmental costs, including pollution and habitat destruction. The rapid expansion of industries leads to increased emissions and resource depletion, adversely affecting ecosystems, human health, and community well-being. Addressing these environmental challenges necessitates stringent regulations, cleaner technologies, and sustainable resource management strategies.

Social and cultural shifts are another dimension of industrialization, as studies by Rajan (2005) and Menon (2012) in Kerala illustrate. These researchers examine the transformation of work organization, community identity, and cultural norms within industrial settings, highlighting the profound social changes induced by industrial activities.

Government policies play a crucial role in shaping the environmental and developmental trajectory of industrialization. Research by Mathew (2016) and Thomas (2008) emphasizes the importance of effective governance in facilitating sustainable industrial growth in Kerala, demonstrating how policy interventions can address the multifaceted challenges posed by industrial development.

For smaller communities, industrialization presents both opportunities and challenges. Discussions on Kerala's development often focus on equitable benefit distribution and long-term viability amidst industrial growth. Scholarly investigations into the intricate relationships between industry, society, and the environment contribute valuable perspectives to debates on sustainable development and inclusive progress.

Environmental Degradation from Edayar Industrial Units

Edayar, a serene locale in Kerala, India, surrounded by lush greenery, presents a paradoxical narrative of development marred by environmental degradation. This text delves into the environmental challenges posed by the industrial activities in Edayar, emphasizing pollution, deforestation, and land degradation, and their adverse effects on human health and the natural environment.

The primary source of environmental issues in Edayar is industrial pollution. Factories discharge untreated wastewater into rivers and streams, transforming them into polluted and hazardous water bodies. The Kerala State Pollution Control Board (KSPCB) has released alarming data indicating that the Periyar River contains heavy metals like lead, mercury, and chromium at levels far exceeding safe limits, posing significant risks to human health and marine life.

Air pollution is another grave consequence of industrial activity in Edayar. The emission of toxic gases and particulates has severely deteriorated air quality, leading to smog and high concentrations of sulfur dioxide (SO2) and nitrogen oxides (NOx) in the atmosphere, which pose serious health risks to the local population.

The industrial expansion has also inflicted substantial damage on the natural landscape and biodiversity. Deforestation to accommodate industrial infrastructure has led to significant habitat loss and ecological imbalance. Satellite imagery over the past decade reveals a stark reduction in

forest cover, replaced by concrete structures, disrupting water cycles, soil fertility, and carbon storage, and exacerbating climate change impacts.

Soil contamination is another critical issue, with improper disposal of industrial waste introducing heavy metals and toxic chemicals into agricultural lands, rendering them infertile and hazardous. Such soil degradation not only affects crop production but also disrupts the soil's ecosystem, water retention ability, and increases susceptibility to erosion.

The local population in Edayar is experiencing deteriorating health outcomes due to the worsening environmental conditions. Studies have established a correlation between industrial pollution exposure and increased incidences of respiratory, cardiovascular diseases, and cancer. Vulnerable groups such as children, the elderly, and marginalized communities are disproportionately affected by these environmental health risks.

The environmental degradation in Edayar underscores the urgent need for sustainable resource management and development. Addressing these challenges requires a collaborative approach, involving strict regulations, innovative technologies, community engagement, and multisectoral cooperation to mitigate pollution, protect public health, conserve biodiversity, rehabilitate damaged ecosystems, and ensure equitable and sustainable development.

This analysis underscores the imperative for a holistic strategy to resolve Edayar's environmental dilemmas, advocating for a future where economic growth harmoniously coexists with ecological stewardship, thereby securing a sustainable legacy for future generations.

Socio-Economic Impacts of Industrialization in Ernakulam

Industrialization in Ernakulam has significantly transformed the region's economic landscape, employment patterns, and social fabric. Transitioning from an agriculture-centric economy to an industrial stronghold, Ernakulam has seen a surge in opportunities and challenges for its residents. Government data highlight the district's industrial boom, with numerous factories, including the notable Edayar Industrial Units, contributing to a substantial increase in per capita income. In the 2022–23 fiscal year, Ernakulam's per capita income reached 94,392 INR, a significant contribution to Kerala's overall per capita income of 1,74,214 INR. The Edayar Industrial Area alone employs around 5,000 individuals, providing livelihoods and economic stability to the local population. Industrialization has also enhanced the region's infrastructure, attracting investments and facilitating business expansion.

However, these economic gains come with socio-economic and environmental challenges that require careful consideration. The shift in employment from agriculture to industry has altered the social and economic dynamics of Ernakulam's residents. While industrial jobs have increased, they do not always offer stable income or job security, potentially exacerbating income inequality and vulnerability among certain groups. Urbanization, driven by rural-to-urban migration in search of employment, has put pressure on city infrastructure and services, leading to housing shortages, healthcare challenges, and increased strain on public spaces.

Industrialization has also impacted environmental health in Ernakulam. The proliferation of industrial units, including those in Edayar, has led to increased pollution, affecting air and water quality. Pollutants such as sulfur dioxide, nitrous oxide, and volatile organic compounds have degraded air quality, posing health risks, particularly to respiratory health. Water bodies have been contaminated with harmful chemicals, raising concerns about water quality and public health. The link between industrial pollution and health issues, including respiratory diseases, skin infections, and cancer, underscores the environmental costs of industrial activity.

These environmental issues not only affect individuals reliant on agriculture and aquaculture but also pose long-term risks to the region's economic sustainability. The healthcare system faces additional burdens due to the health impacts of industrial pollution, increasing healthcare costs for individuals and the government.

Community Perception of Environmental Risks:

Understanding how communities perceive environmental risks is crucial for effective risk management and decision-making. Community perceptions influence their engagement with and response to environmental issues, shaping their willingness to mitigate or adapt to such challenges. However, these perceptions are diverse and complex, influenced by social, emotional, cultural, and socioeconomic factors.

Research indicates that knowledge about science plays a significant role in shaping people's perceptions of environmental risks. Tsai et al. (2021) highlight that individuals informed about scientific matters are more aware of environmental risks and more prepared to address them, while those with limited access to scientific information may not perceive natural dangers as readily.

Cultural and social contexts also play a vital role in how environmental risks are perceived. Smith et al. (2017) note that communities with higher education levels are more proactive about climate change. Long et al. (2020) illustrate that Native Americans' perceptions of environmental risks can

vary based on spiritual beliefs and folklore, a phenomenon that can extend to other culturally diverse settings like Indian cities.

Social networks and local conditions influence perceptions too. Brown et al. (2018) found that environmentalists with strong community ties and positive views of local leadership are more likely to collaborate on environmental initiatives. Economic conditions also affect risk perceptions; communities in resource-rich areas may view environmental risks differently from those in diverse economic environments.

Bocken and Short (2021) discuss how governments in regions dependent on environmentally harmful industries might disseminate misleading information about associated risks, complicating the relationship between economic development and environmental stewardship.

Psychological aspects, including fear, anxiety, and risk perception, also influence how individuals view environmental dangers. Cognitive biases, such as underestimating known risks compared to unknown ones, can lead to the dismissal of environmental threats (McDonald-Harker et al. 2022).

Community perceptions of environmental risks are dynamic, evolving with changes in environmental, societal, or external circumstances. Effective risk communication that involves community engagement is essential for accurate risk perception and fostering proactive responses.

In conclusion, a multitude of factors, including scientific understanding, cultural background, social dynamics, economic conditions, and psychological influences, shape community perceptions of environmental risks. Recognizing these factors is essential for developing effective strategies to address environmental challenges and promote sustainable development. Policymakers and stakeholders can enhance community involvement and environmental protection by incorporating local knowledge, cultural norms, and socioeconomic considerations into risk management approaches. Encouraging awareness, dialogue, and community participation is vital for sustainable development and effective environmental risk management (Imperiale, A.J. and Vanclay, F., 2021).

Chapter 3: Methodology

3.1 Statement of The Problem

The topic " A study on the environmental impact of Edayar industrial units in Ernakulam" delves into the profound impact on social and environmental impacts of Edayar industrial units on the lives of the people living nearby. This includes both the positive and negative impacts. When we analyze Edayar industrial belt is one of the largest industrial belts in Kerala. So it has a high amount of impact on the environmental aspects of the area. This study tries to explore the socio–economic profile of the residents, its impact on the health of the residents, and the measures adopted to overcome the issues of the industrial belt.

3.2 Objectives

General Objective

To study the environmental impacts caused by the functioning of the Edayar industrial units in Ernakulam

Specific Objective

- To examine the socio-economic profile of the residents in Ernakulam
- To understand the various health issues caused by working of Edayar industrial units among the natives.
- To understand the opinion of the residents concerning the environmental impact caused by the Edayar industrial units.
- To find out the suggestions from the residents about measures adopted to overcome the issues created by Edayar industrial units.

3.3 Clarification of Concepts

Theoretical Definition

- **Environmental impact** refers to the effects that human activities have on the natural world. These impacts can be both positive and negative, and they can affect various aspects of the environment including air pollution, water pollution, climate change, biodiversity loss, etc…

Operational Definition

"Environmental impact" in this research particularly refers to the observable effects of industrial activity in the Edayar industrial belt. These includes the following

- Health problems among the residents residing in the nearby area of Edayar industrial belt
- Environmental issues like air pollution and water pollution

3.4 Variables

Dependent Variable

The environmental effect of industrial activity in the Edayar region is the dependent variable in this study, with an emphasis on health difficulties among the local population as well as environmental problems such as pollution of the air and water.

Independent Variable

- Age
- Marital status
- Income
- Education

3.5 Pilot Study

In September 2023, a pilot study was conducted to check the feasibility of the study.

3.6 Universe

The universe to which the study is conducted is people living in Eloor Municipality and Kadangaloor Panchayath. It refers to everyone irrespective of age, gender, socioeconomic status, and other demographic characteristics living within the official borders of Eloor Municipality.

3.7 Sample

From the wards of Eloor Municipality and Kadungalloor panchayath, one or two wards that are closest to the Edayar industrial unit will be selected through purposive sampling. From the selected wards 100 respondents will be selected through a simple random sampling method.

3.8 Sampling Method

An important measure incorporated in this study is the purposive selection of the one or two wards closest to the Edayar industrial unit. This sampling strategy is necessary to ensure that the most

affected people from the industrial activities are included in the sample (Campbell *et al.* 2020). A random selection of 100 respondents will be drawn from these two wards. This technique strikes a balance between accuracy and randomness in addition to the proximity of the industrial zone to the opinions under study. This technique captures the views of the locals who have been directly affected by the industries, which still enables the generalization of the results to other settings. It makes it easier to understand the dimensions of the social and environmental issues within the study area.

3.9 Tool of Data Collection

In this study interview schedule is selected as the tool for data collection.

3.10 Limitations of the Study

Every research has its flaws and it is also limited. This study has the following limitations :

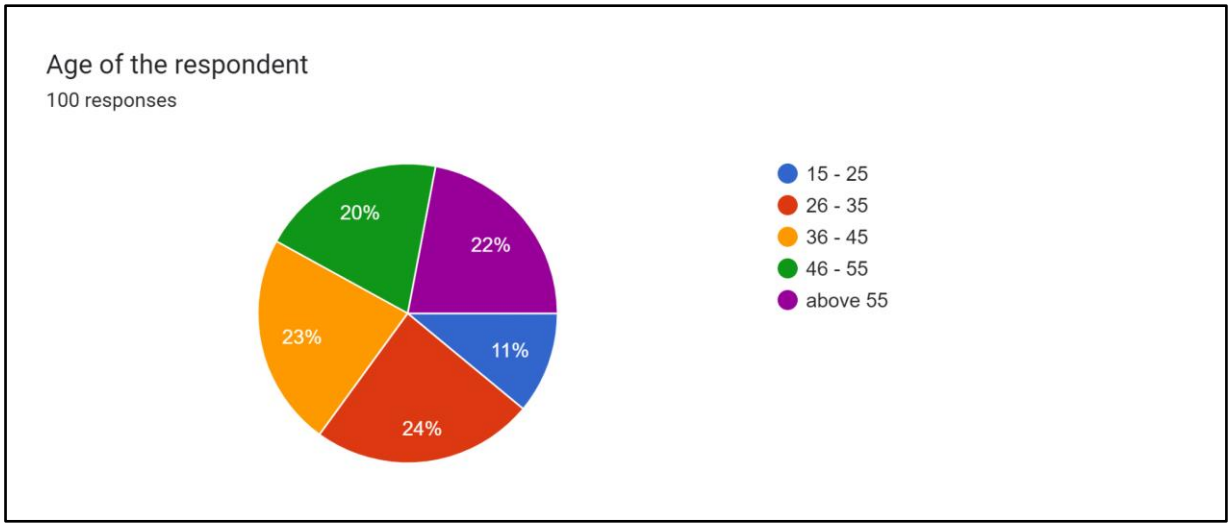
- Many respondents were hesitant to respond
- The study was conducted in a short period
- Demerits of the sampling might affect the study

Chapter 4: Data analysis and interpretation

Introduction

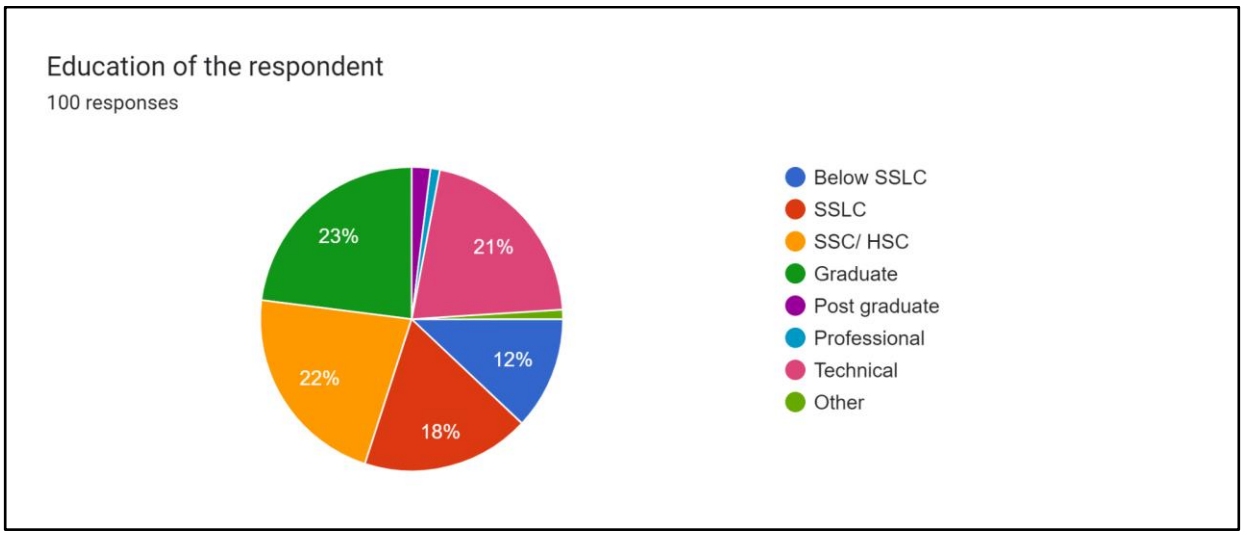
The survey responses are going to be evaluated in the data analysis chapter of this study. It helps to learn more about how the socio-economic activities in Edayar, Ernakulam affect people and the environment as a whole. The objective of the study is going to be achieved through this extensive data analysis section which enables researchers to identify patterns in the collected data set and make necessary conclusions from the research.

Figure 4.1 Age of the Respondents



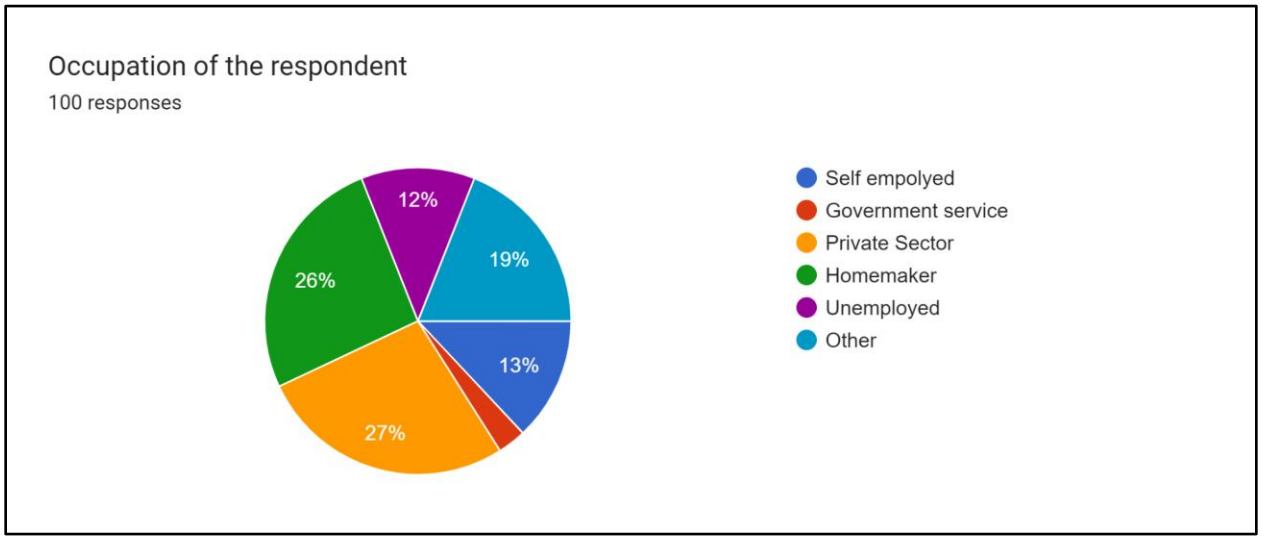
According to the figure, we can understand that the respondents include a diverse range of age groups, with 24% falling within the 26-35 age range, 23% within the 36-45 age range, and 11% each between the 15-25 and 55+ age categories. The presence of a broad distribution in Edayar allows a full examination of the social and environmental consequences associated with industrial activity.

Figure 4.2 Education of the respondents



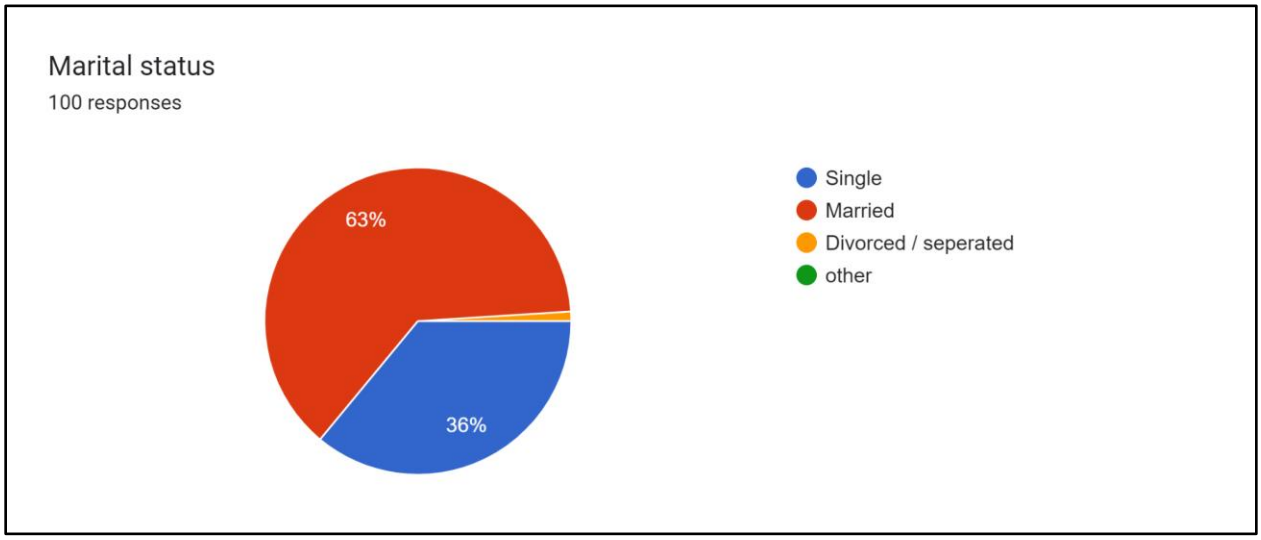
According to the figure, the respondents exhibit a range of educational attainment, with a significant proportion having attained technical education (21%) and undertaken Graduate courses (23%). Nevertheless, the data reveals a much lower proportion of participants possessing Postgraduate degrees (2%) and Professional credentials (1%). Significantly, none of the participants indicated possessing "Other" knowledge. The inclusion of individuals with diverse educational backgrounds enhances the study's viewpoint on the effects of industrial activities in Edayar.

Figure 4.3 Occupation of the respondent



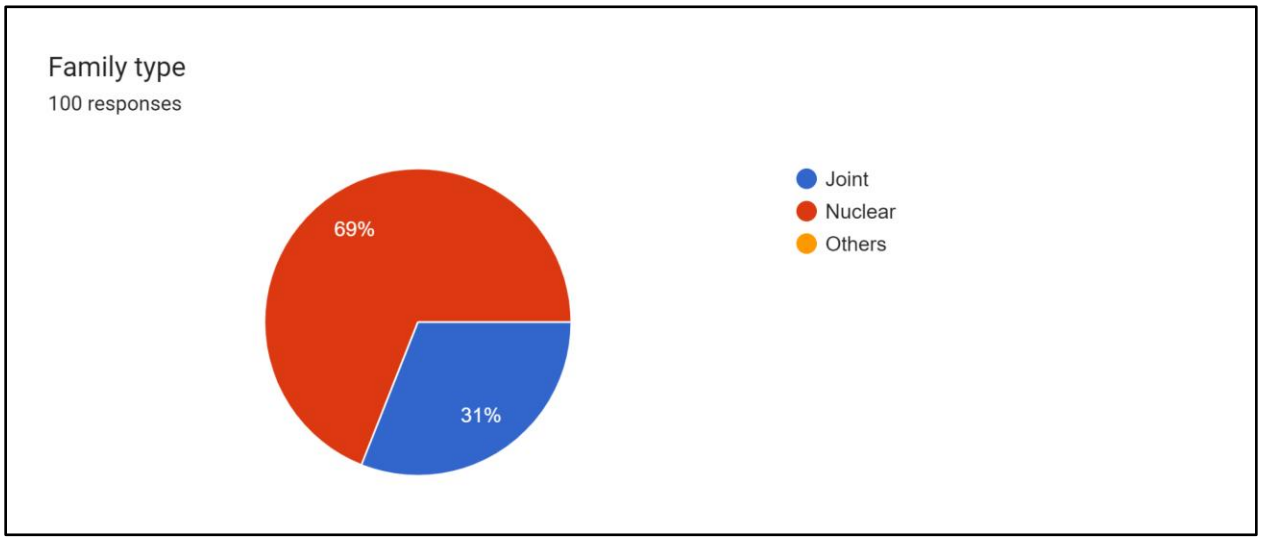
In this figure the analysis of respondents' occupation distribution reveals a diverse workforce, characterized by notable participation from the Private Sector (27%) and Homemakers (26%). Furthermore, there is a significant presence of technical positions (21%) and Self-employed workers (13%). Nevertheless, the Government Service (3%) and Unemployed (12%) groups have a restricted presence. Different elements present in Edayar provide valuable insights into the socio-economic composition and employment patterns influenced by industrial operations, which is valuable for the current research.

Figure 4.4 Marital status of the respondent



According to this figure the responses about marital status indicate that the majority of the people who answered were married (63%), while only 36% of the participants were single. Notably, a single individual who was by themselves said they were divorced or separated, but there was no one in the "other" category. The study's goal of looking into the socioeconomic profile and how it affects the economy in Edayar fits with what is known about the interviewees' marital status.

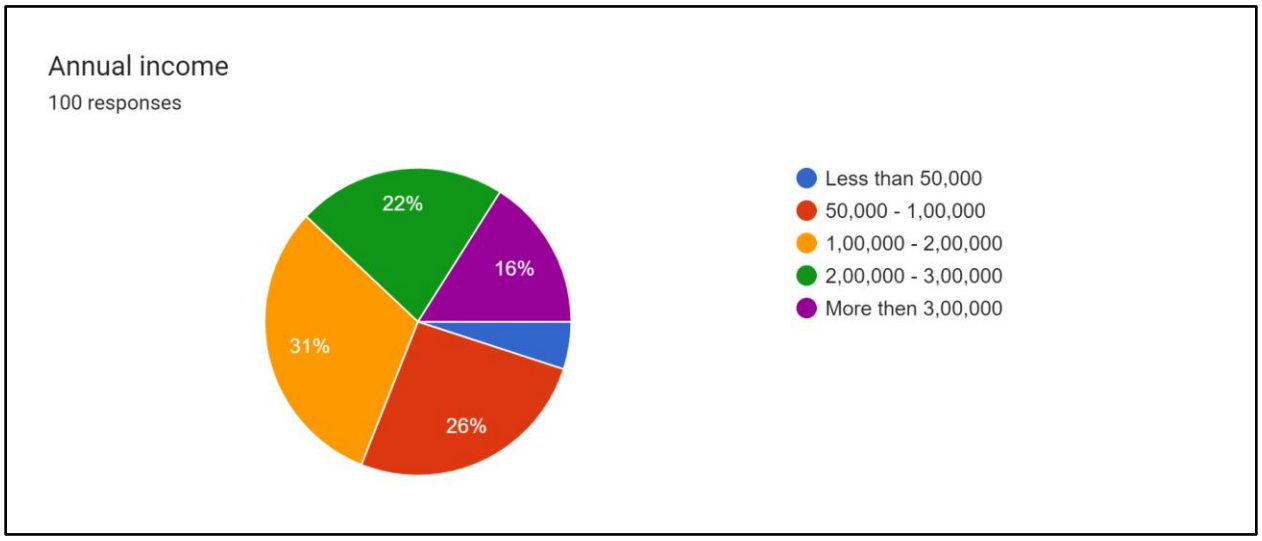
Figure 4.5 Family type of the respondents



By analyzing this figure, we can understand that the survey findings also indicate that a major section of households in Edayar are nuclear families, which is exactly 69% of the respondents.

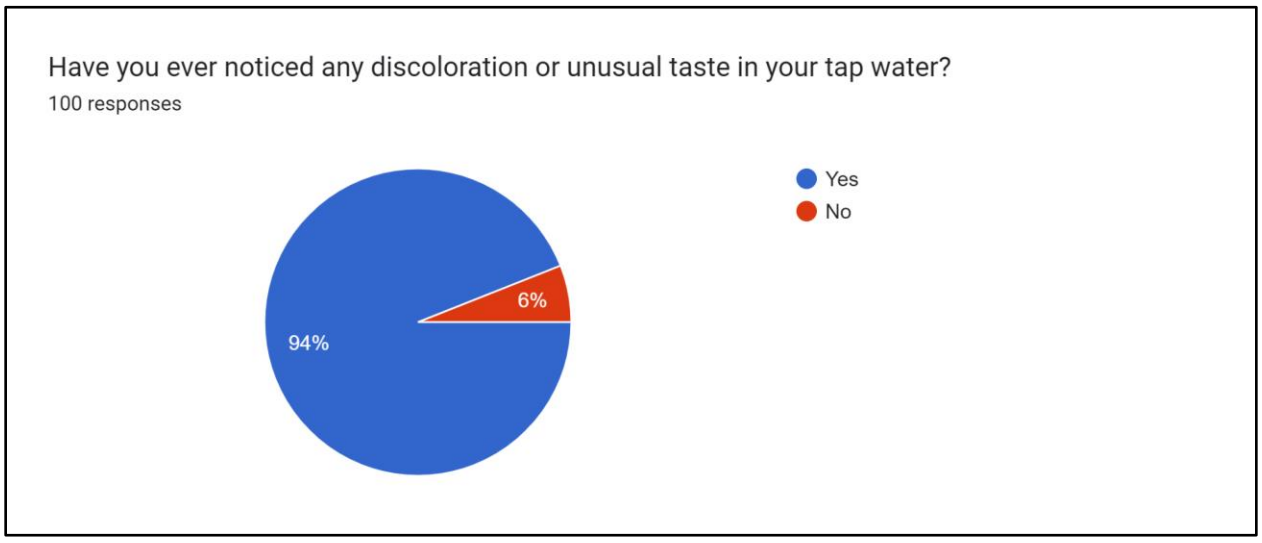
This data indicates that there is a presence of a dominant family structure that is also valuable to understanding the socio-economic structure of a particular region.

Figure 4.6 Annual income



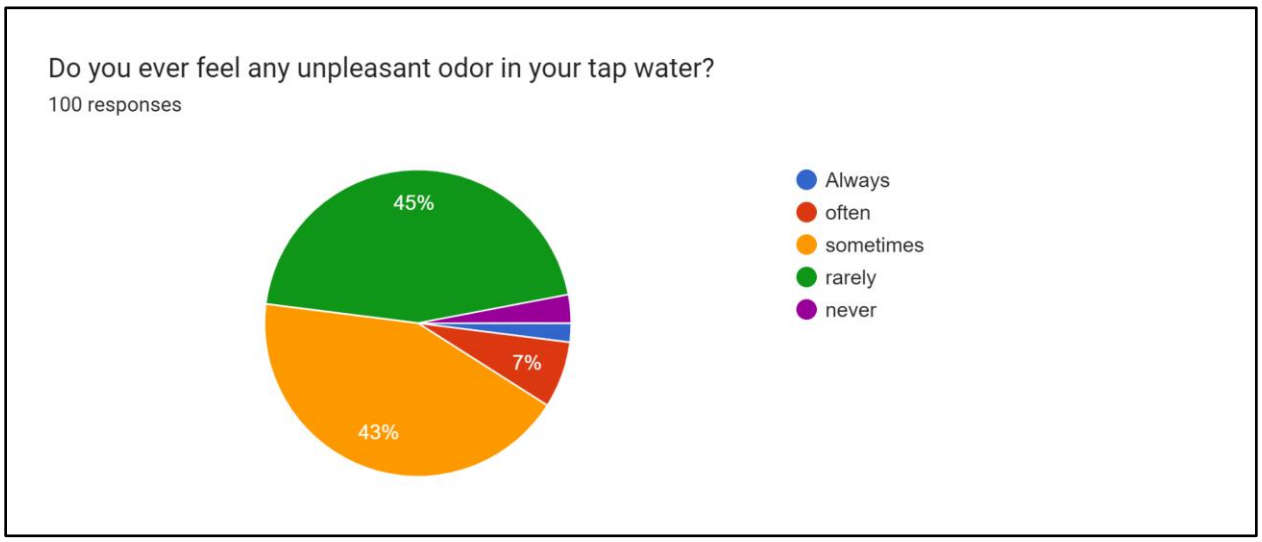
The results in the figure show that a major proportion of individuals falls within the income range of 50,000 - 2,000,000 which suggests that the middle-income group is most impacted by industrial activities. It is necessary to comprehend the socio-economic inequalities that arise as a consequence of industrialization to evaluate the wider social and environmental consequences.

Figure 4.7 Respondents who noticed any discoloration or unusual taste in tap water



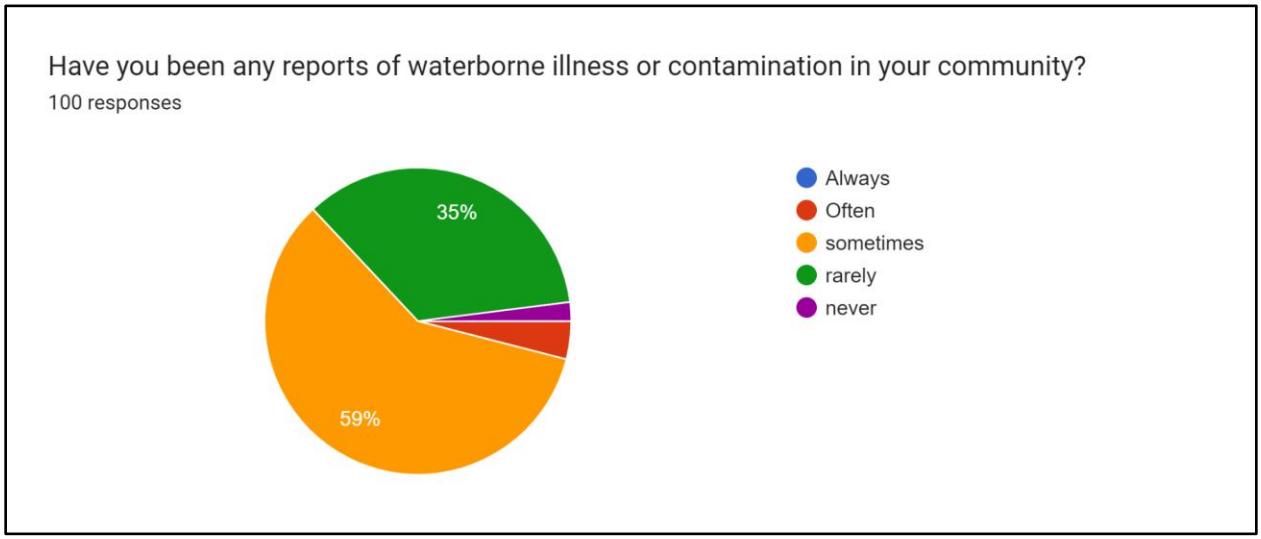
The result obtained the figure also indicates that a large number of participants have personally experienced changes in the color and taste of tap water (94%), and this problem is extremely serious and, apparently, directly connected with the activities of local industry in Edayar. Consequently, these problems with water quality should be addressed to maintain public health and a sustainable environment in Edayar.

Figure 4.8 Respondents who felt unpleasant odor in their tap water



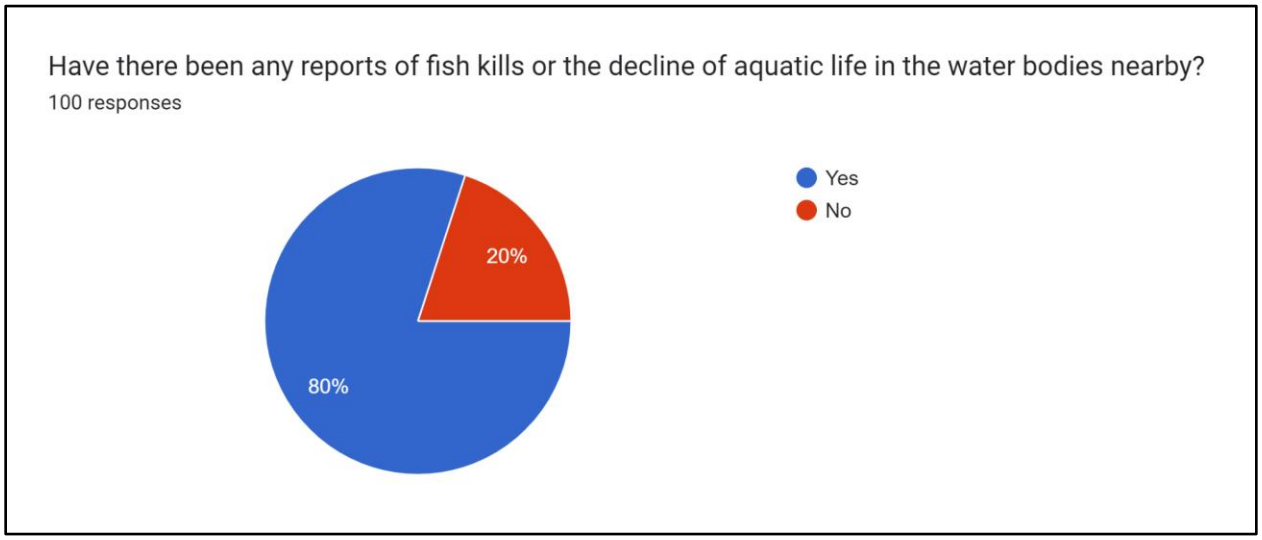
The outcomes from the above figure show that there are highly different reports of experiencing a foul smell in tap water. While a negligible number of people permanently complain about smelling all the time and a low proportion although consistently experience it often, a considerable part claim it happens sometimes. The vast majority of participants with rare one-time complaints and the minority, who never complained about smelling, characterized this way. Thus, the problem is prevalent but sporadic, and the concern about water quality is complicated and fluctuating due to its reception from the production operations in Edayar.

Figure 4.9



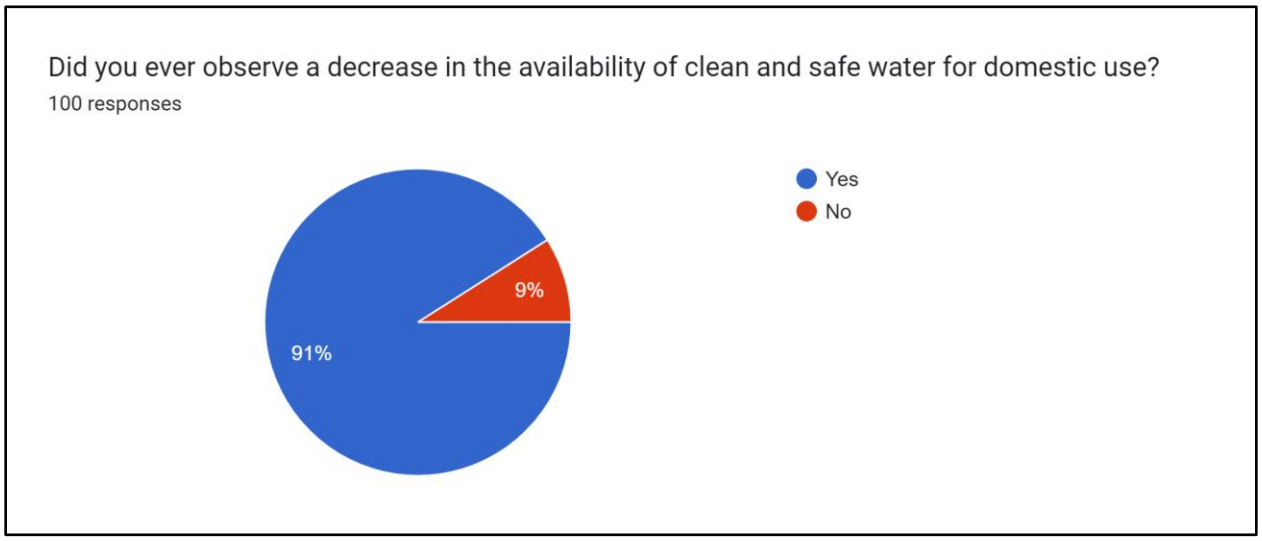
From the figure, we can understand that the study reveals that although a significant number of respondents (59%) have occasionally come with waterborne sickness or problems with contamination, there are no common instances of these in their community. The result indicates a correlation between the industrial activities in Edayar and the sporadic but pervasive concerns about the water's quality and possible adverse health effects. The sporadic nature of these occurrences is shown by the large number of people (35%) who report a few instances and the small proportion (2%) who never experience such complaints. This highlights the necessity of ongoing monitoring and corrective action.

Figure 4.10 Respondents who observed reports of fish kills or the decline of aquatic life in the water bodies nearby



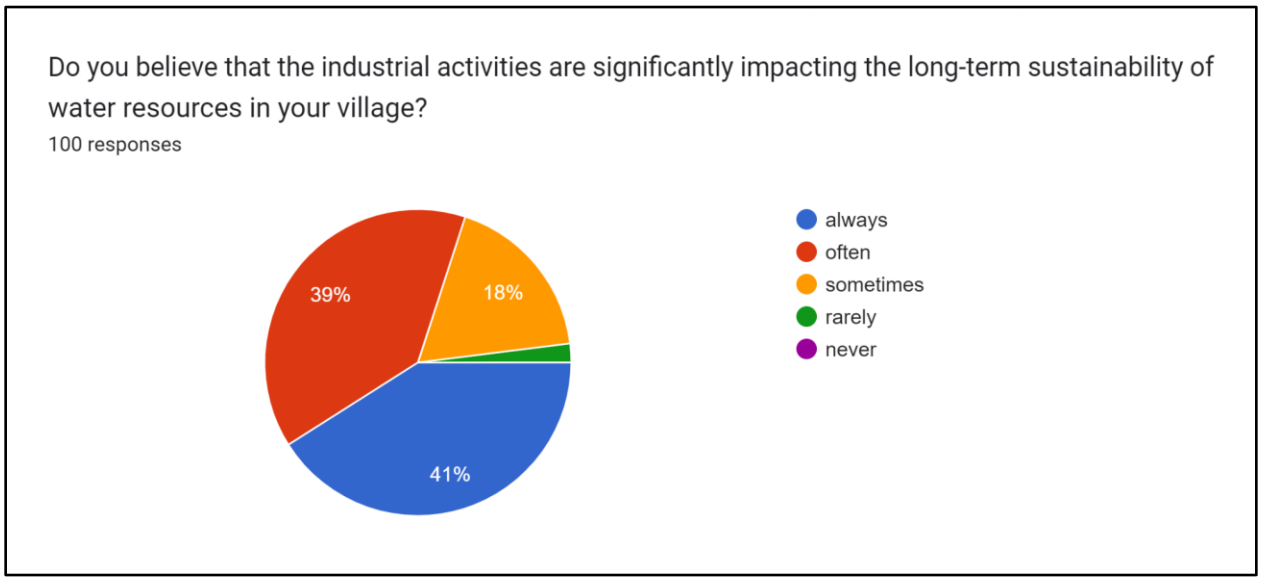
The above figure also reveals that a huge number of participants (80%) recognize the existence of fish deaths or a decrease in aquatic life, which can be a major concern from an environmental point of view. It is crucial to tackle these issues to safeguard aquatic habitats and guarantee environmental sustainability in the area.

Figure 4.11 Respondents who observed a decrease in the availability of clean and safe water for domestic use



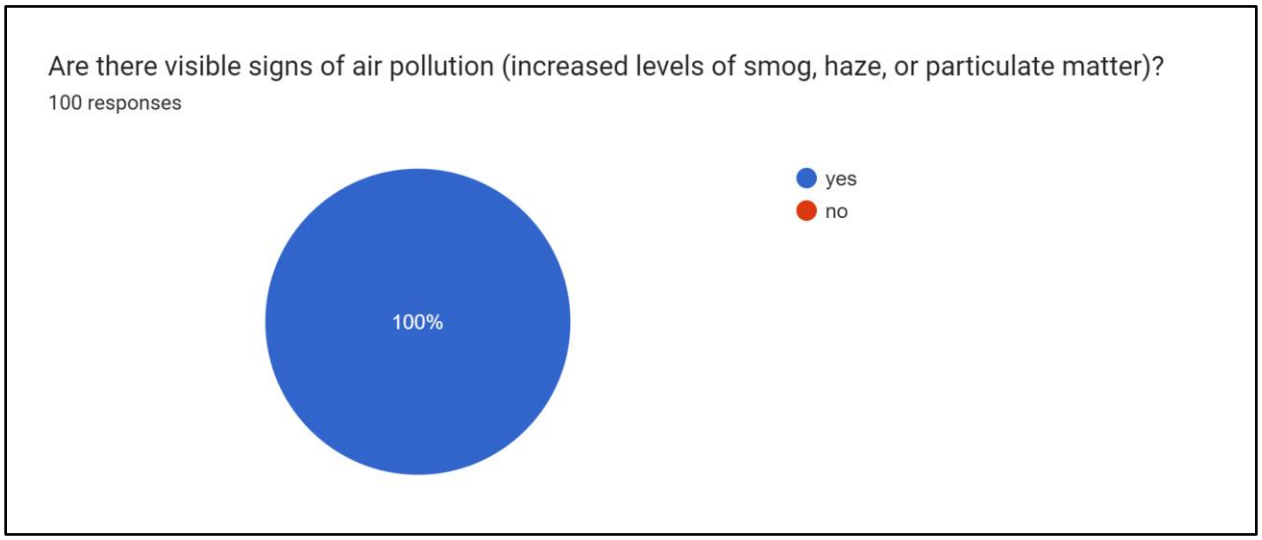
According to the figure nearly all of the people who took the poll had seen a decrease in the availability of safe drinking water for their homes (91%). What this means is that industrial activity in Edayar is probably influencing a large-scale worry. It is essential to guarantee a supply of clean water, which can be necessary to give people a healthy lifestyle.

Figure 4.12 Respondents who believe that industrial activities are significantly impacting the long–term sustainability of water resources in their village



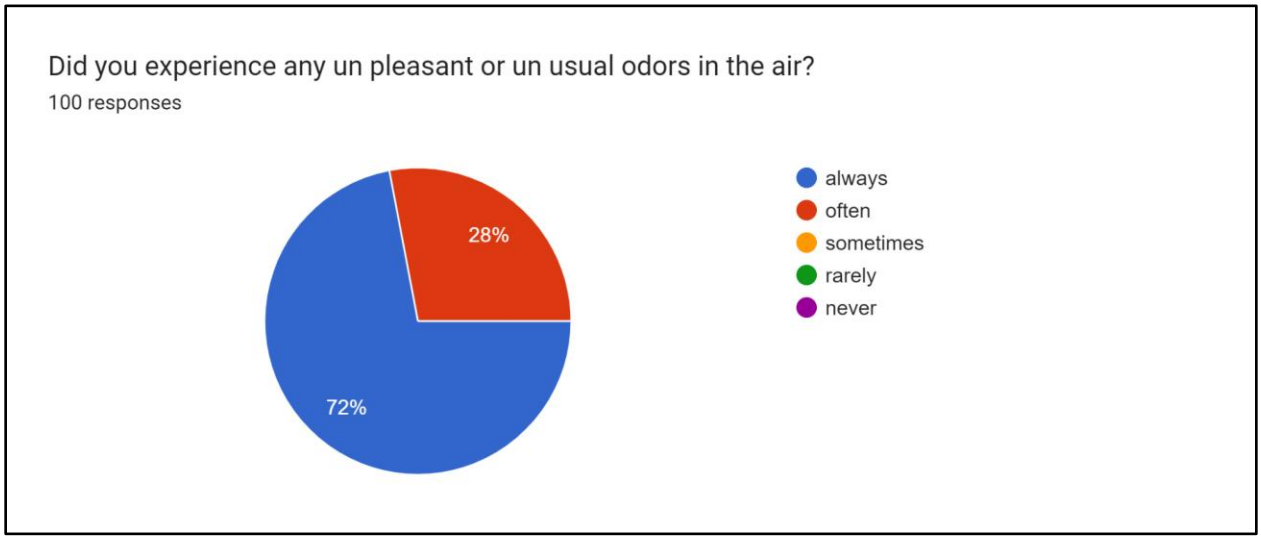
By analyzing the figure, a considerable percentage of participants express notable apprehension regarding the enduring viability of water resources as a result of industrial operations in their village. Specifically, 41% consistently hold the belief that industrial activities have an impact on the sustainability of water resources, while an additional 39% frequently hold this belief. This highlights the perceived gravity of the problem.

Figure 4.13 Respondents who observed visible signs of air pollution



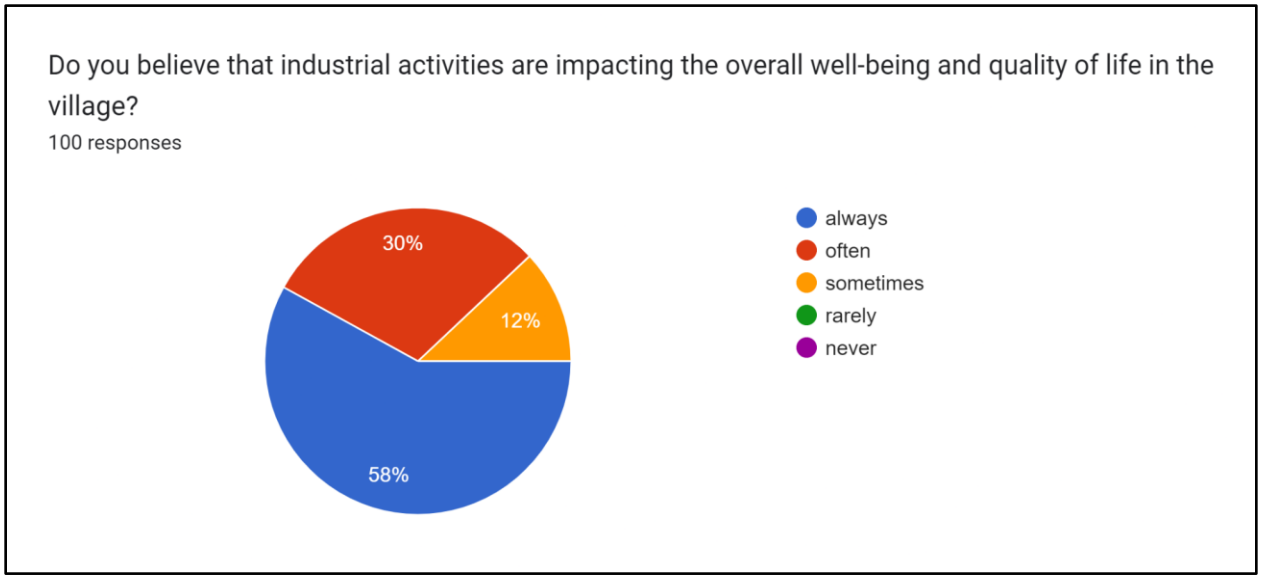
According to this figure, in Edayar, 100% of respondents reported air pollution, including fog, haze, or particulate matter, which shows a prominent environmental concern. The overwhelming consensus shows that industrial activity significantly impacts air quality. Reducing visible pollution indicators protects community health and the environment. This requires quick industrial reductions in emissions and air quality regulations.

Figure 4.14 Respondents who experienced any unpleasant or unusual odors in the air



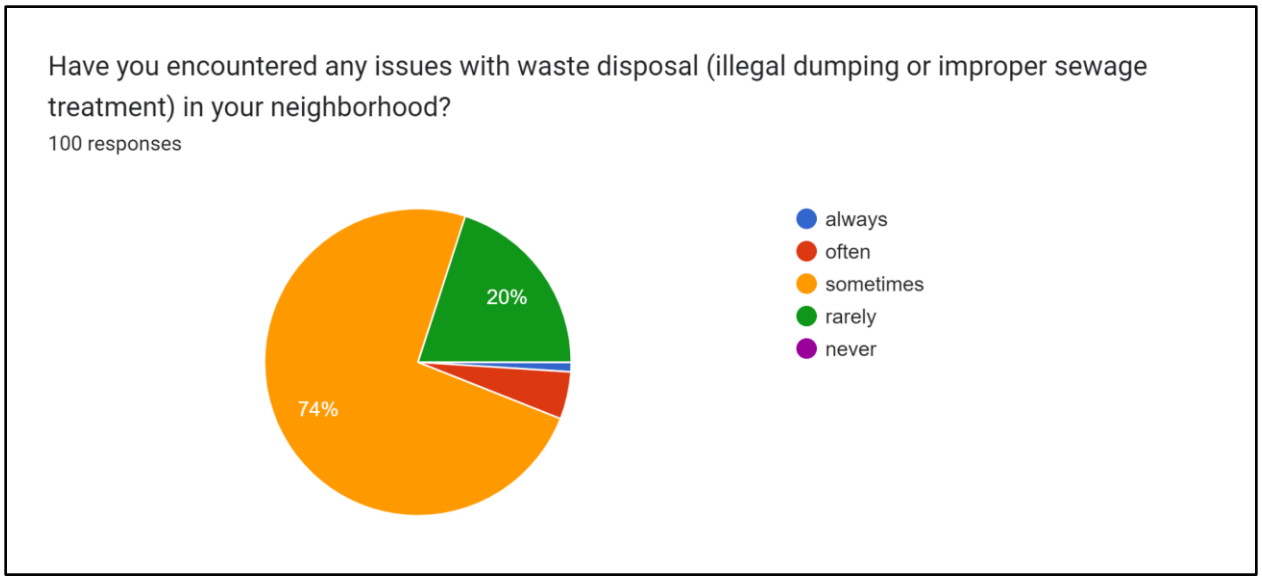
By analyzing the above figure, we can understand that among 72 percent of people is the often occurrence of bad smells, which is likely to be a result of the industrial activity in Edayar. It indicates the high level of air contamination and associated health threats to the population. The elimination of Odors and significant improvement of the air quality remains one of the points to target to enhance the people's health and life in an industrial emission-affected area.

Figure 4.15 Respondents who believes that industrial activities are impacting the overall well-being and quality of life in the village



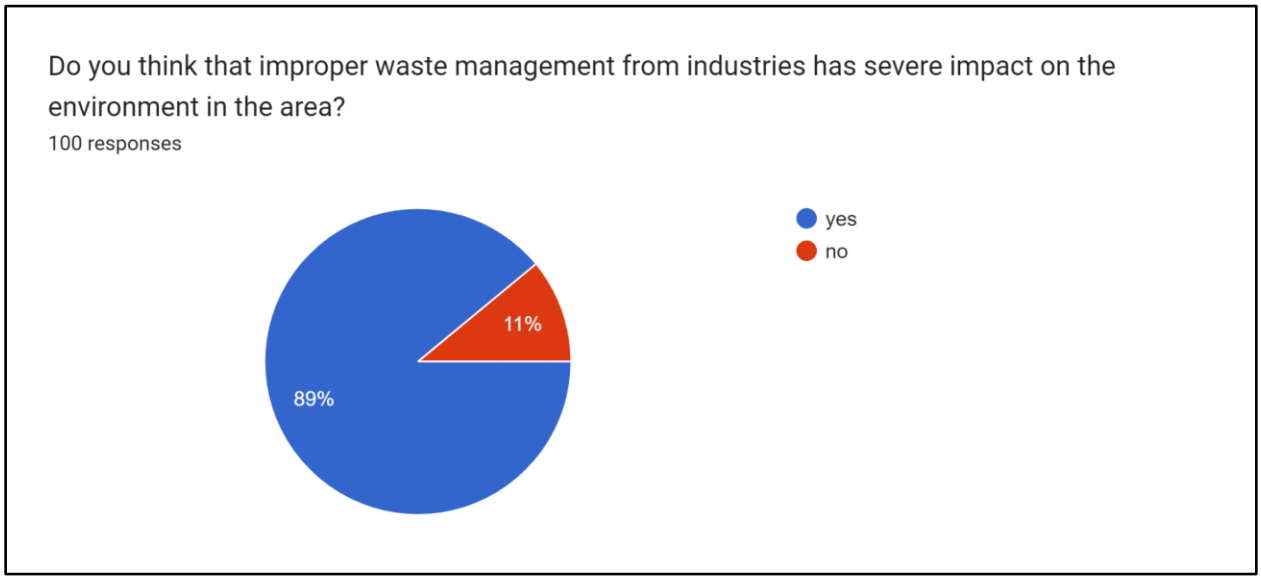
Furthermore, the above figure reveals that the people generally feel that the industry significantly affects the overall welfare levels and lifestyle quality in the area. The obtained survey data indicate that 58% of the participants feel that this is always the case and 20% state that it often happens. This accounts for the significant influence industrialization has on the communities' welfare.

Figure 4.16 Respondents who observed any issues with waste disposal in their neighborhood



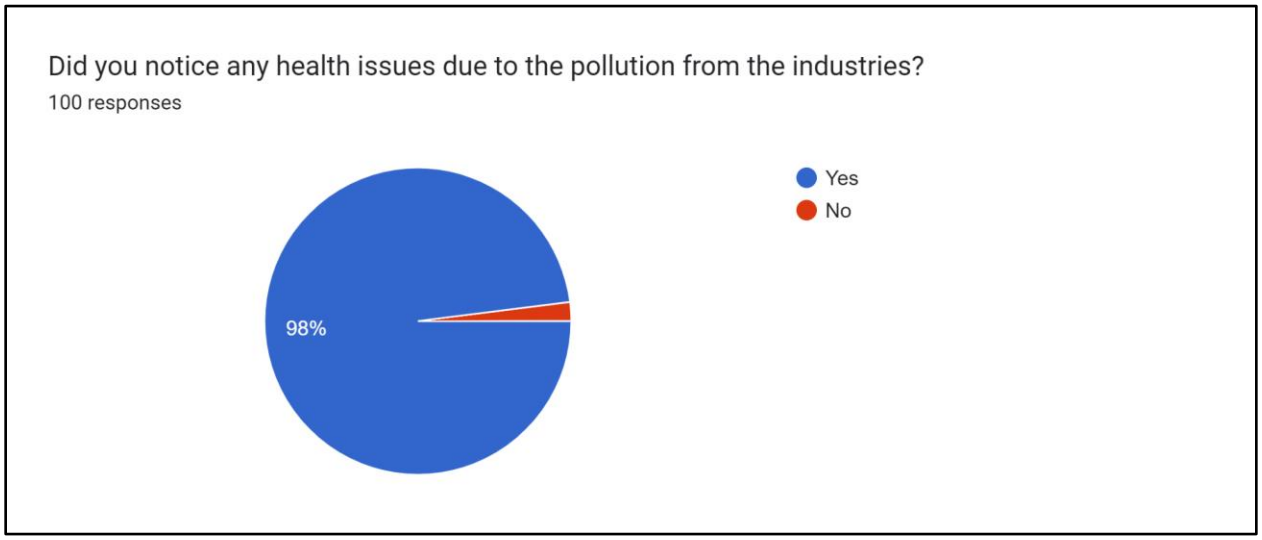
According to the findings of the study, a high percentage of participants, 74 percent, suffer from occasional issues linked to waste management in the community. Very few participants always experience the lack of proper disposal methods or witness the unauthorized dumping of sewage, and around 1 percent or 5 percent often do. However, such a considerable percentage indicates a widespread concern. Such problems need to be addressed to ensure environmental sanitation remains clean and can ensure the local community's health.

Figure 4.17 Respondents who think that improper waste management from industries has severe impact on the environment in the area



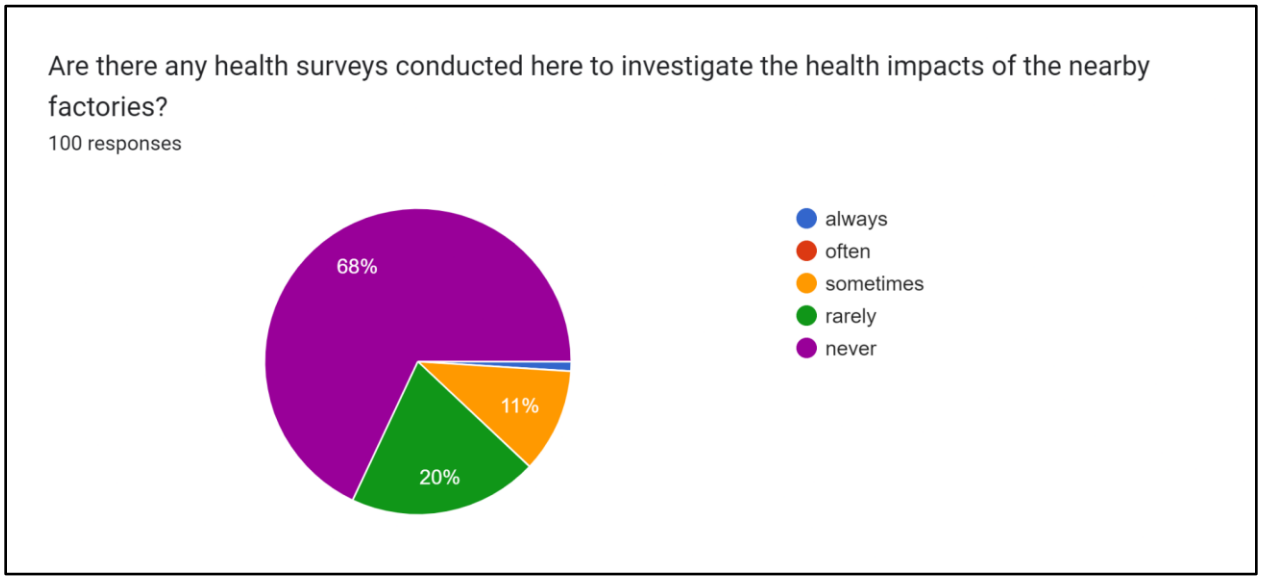
The above figure reveals that a significant majority of participants (89%) hold the belief that inadequate waste management practices originating from industrial activities have a substantial adverse influence on the local ecosystem. This observation suggests a prevalent apprehension among inhabitants about the ecological ramifications of industrial waste, underscoring the need for enhanced waste management strategies to alleviate detrimental effects on the surrounding ecosystem.

Figure 4.18 Respondents who noticed any health issues due to the pollution from the industries



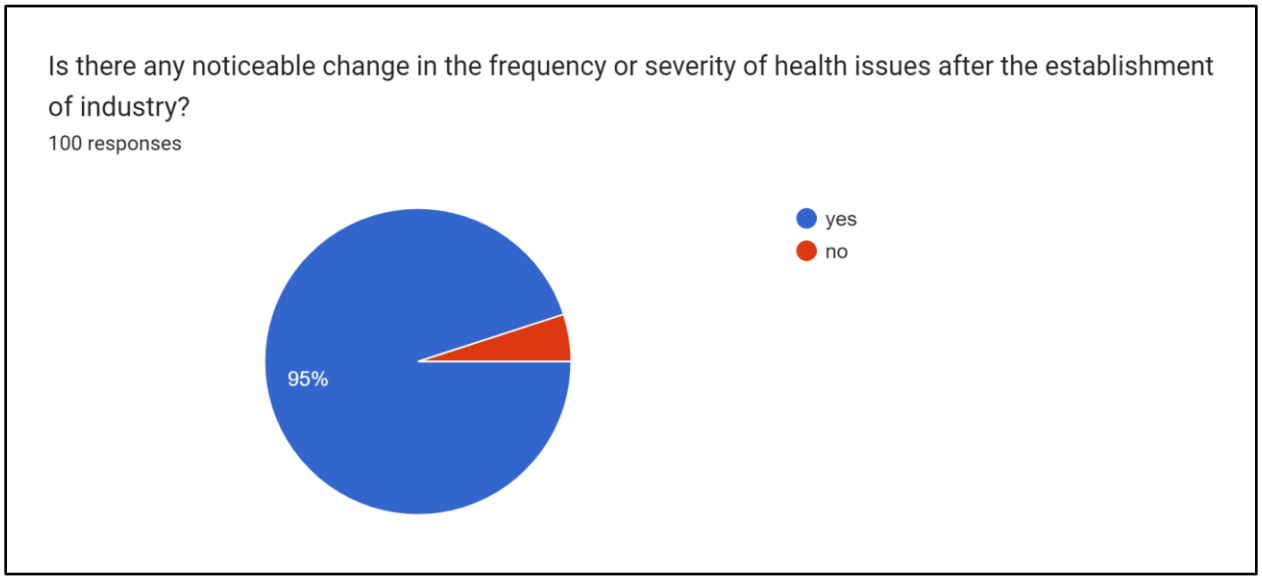
The figure shows that conclusively finds that a significant percentage of participants, comprising 98% of the sampled population, consider health problems will be witnessed due to pollution caused by the operations of industries. It confirms the urgency of addressing the pollution levels in the nonhuman setting to salvage an already deteriorating condition in human settlements near industries.

Figure 4.19 Respondents who observed health surveys conducted to investigate the health impacts of nearby industries



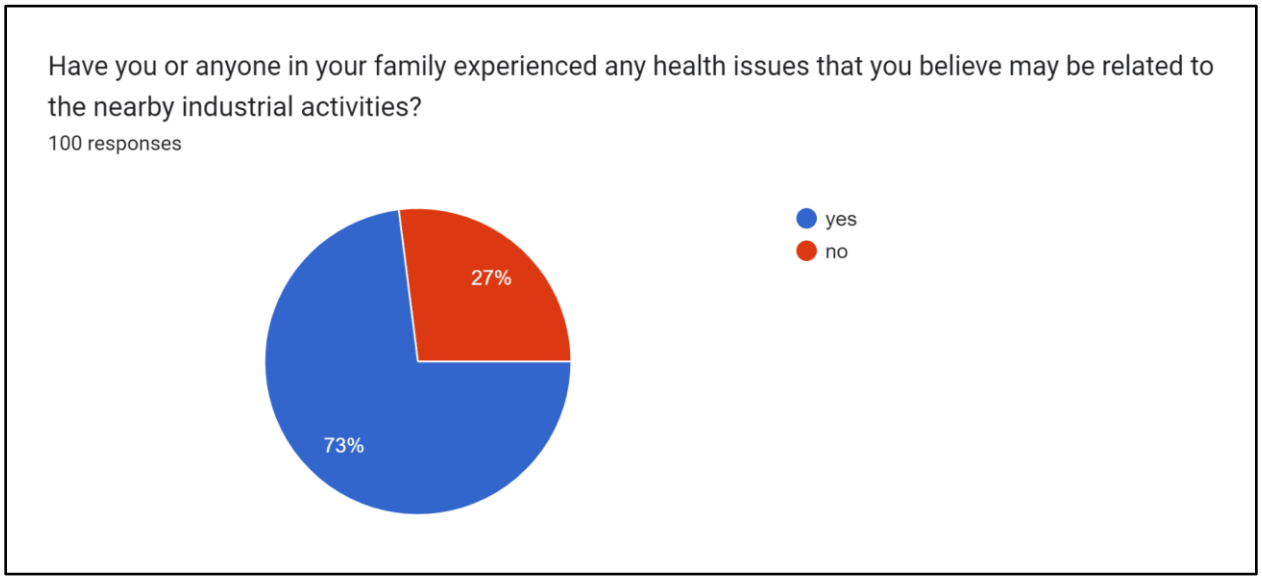
The figure reveals a harsh truth about health surveys in the region affected by the presence of local enterprises. Only 1% of participants claim that these surveys are consistently carried out, while none mention their frequent frequency. Only a minority (11%) of respondents acknowledge the occurrence of occasional surveys, while a substantial majority (68%) assert that these surveys are never carried out. These findings underscore a significant deficiency in the surveillance of health effects, underscoring the need for immediate action to safeguard the welfare of the population.

Figure 4.20 Respondents who observed a noticeable change in the frequency or severity of health issues after the establishment of industry



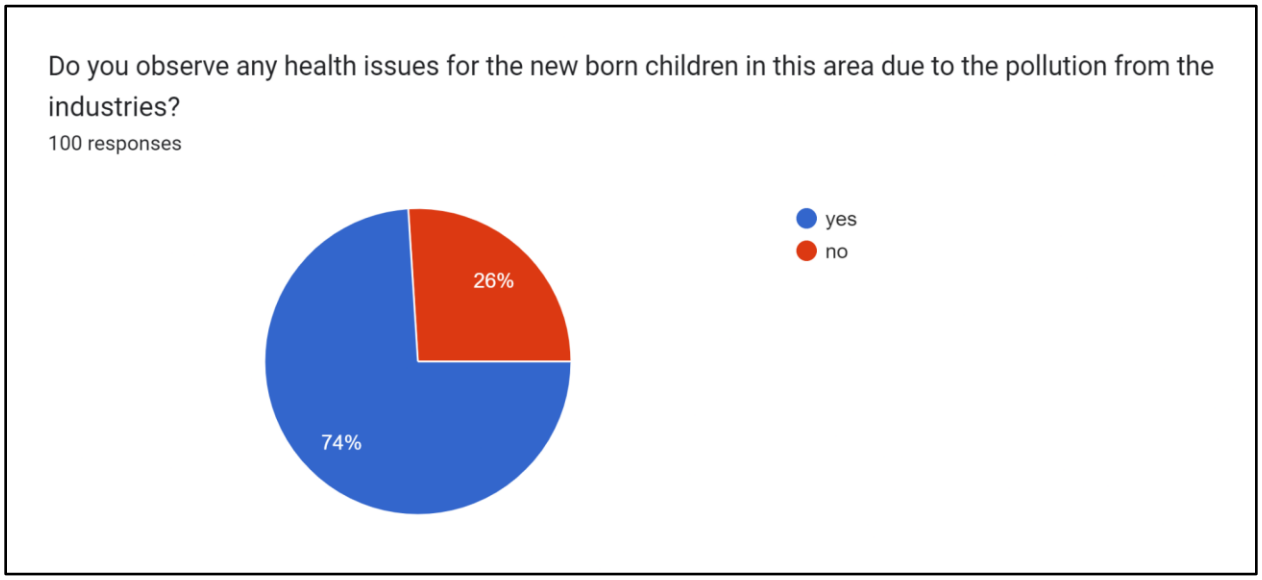
Moreover, the figure shows that a large share of the respondents describes changes in the frequency or severity of the health problems they experience within the region after the industry-related activities have started, which encompasses 95%. This indicates a strong correlation between industrial practices and the trends of residents' deteriorating health. Therefore, addressing these issues is one of the most critical steps in preventing the negative health effects related to industrialization and preserving the general well-being of the community.

Figure 4.21 Respondents who observed health issues for their family members which they believe because of the nearby industrial activities



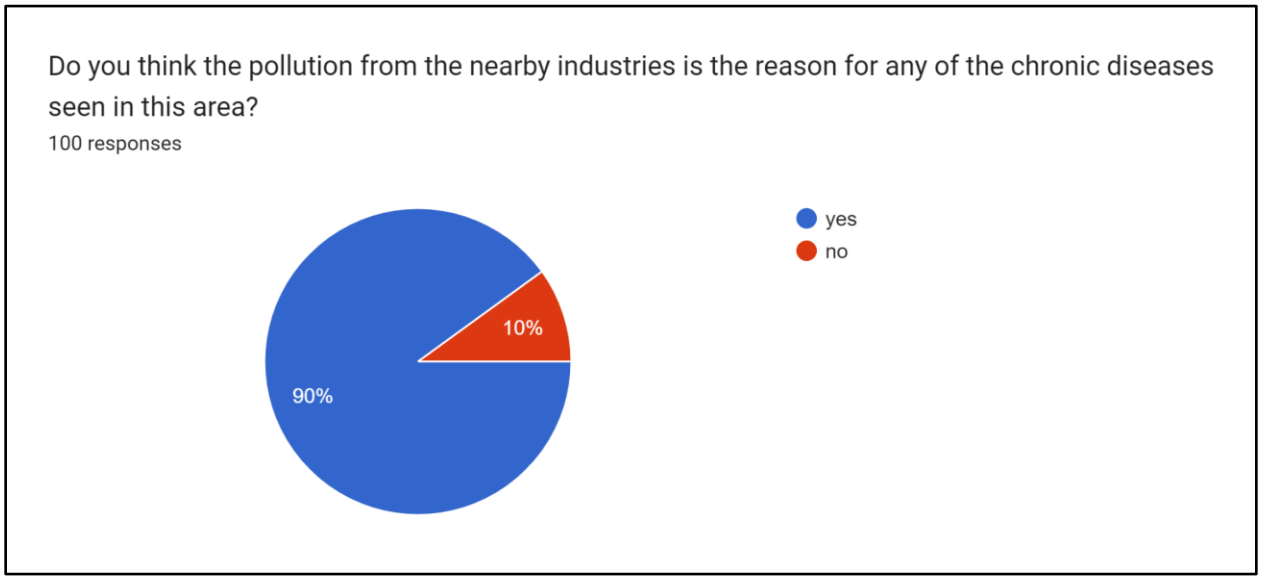
By analyzing this figure, it is also worrying that many people in the community fear the negative consequences of industrial activity that are followed by severe health problems. The people in the community suffer from various health issues and illnesses and most of them reported 73% that their health conditions are/ were caused by nearby industrial activities. Hence, it is important to alleviate the risk related to industrial pollution and protect the local population.

Figure 4.22 Respondents who observed health issues for the new-born children in the area due to pollution from the industries



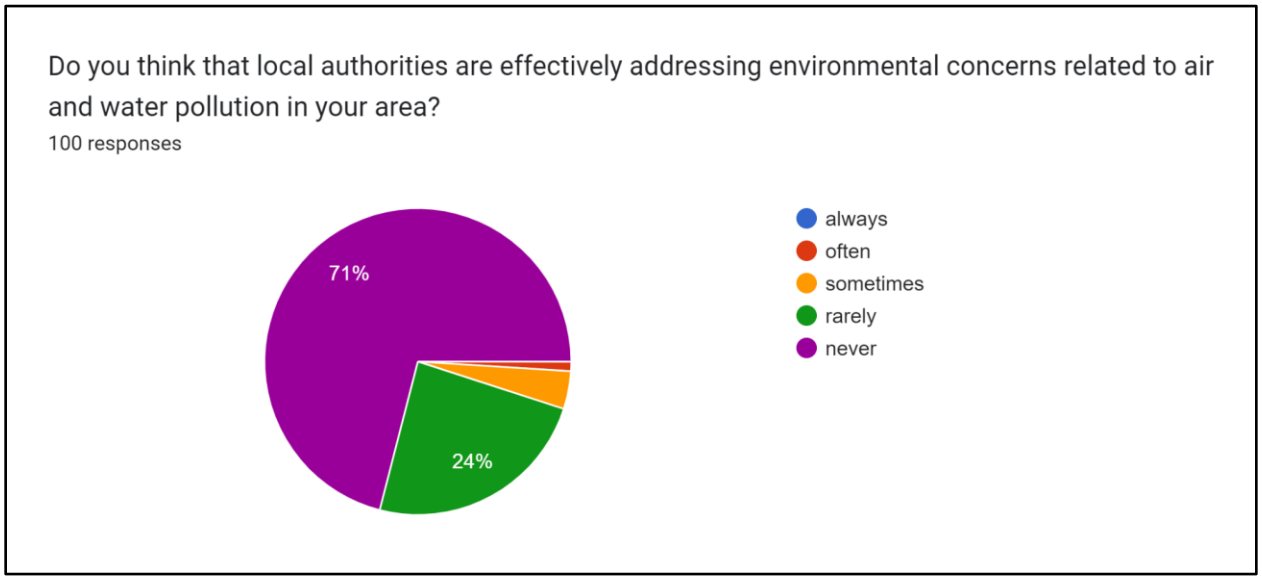
This figure shows that the pollution from nearby industry is the root cause of health problems in infants, according to 74% of respondents to the study. The negative effects of industrial pollution on the health of infants are a major problem, as this shows. It is very necessary to take immediate action to reduce industrial pollution in the neighbourhood to address these health concerns and ensure the safety of at-risk groups.

Figure 4.23 Respondents who think pollution from the industries is the reason for any of the chronic diseases seen in this area.



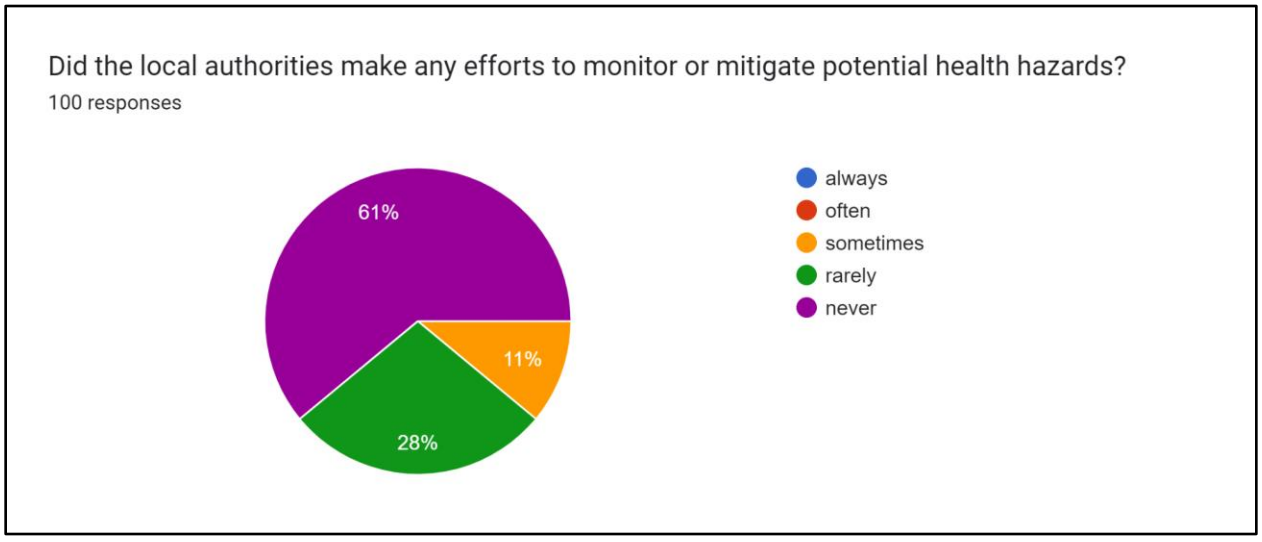
The above figure shows that most people agree that pollution from adjacent industries is a major cause of chronic illnesses in the region. 90% of respondents made this assumption. All the more reason to worry about the correlation between industrial pollution and people's health. A reduction in the incidence of chronic illnesses and an improvement in the general health of the community's inhabitants as a whole can only be achieved if these issues are adequately addressed.

Figure 4.24 Opinion of respondents about how local authorities address environmental related concerns



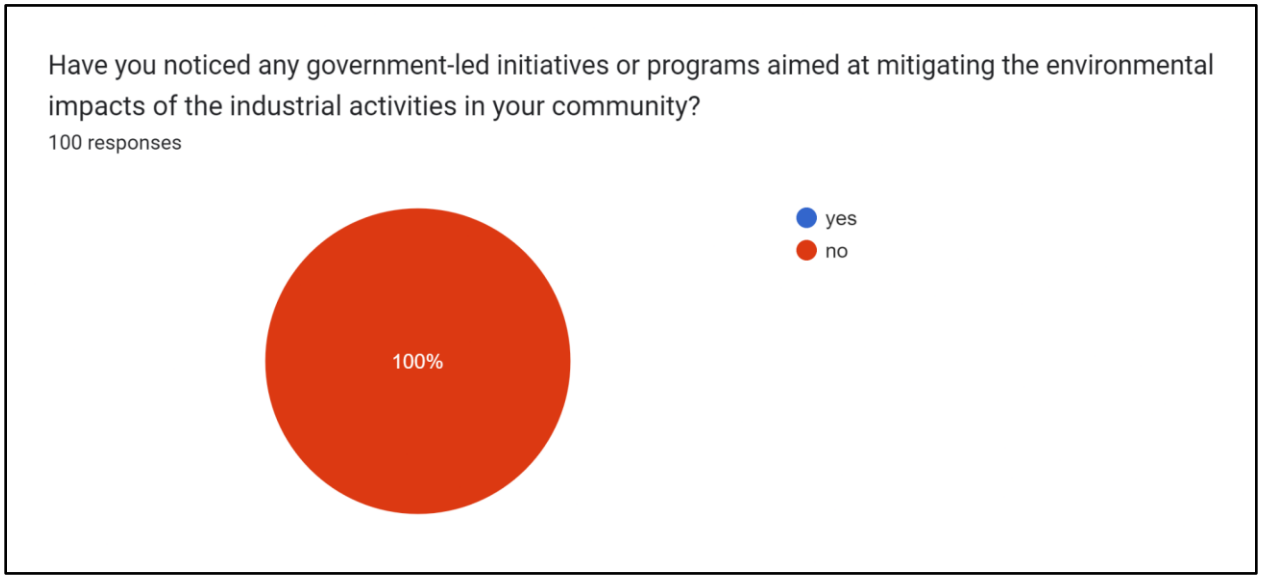
The data from the above figure presented suggests a notable deficiency in trust about the efficacy of local authorities in tackling environmental issues about air and water pollution. Only 1% of respondents indicate that authorities often tackle these concerns, while a substantial majority (71%) assert that they never do. Furthermore, 4% of respondents indicate that their solutions are sometimes efficacious, while 24% report often addressing these problems.

Figure 4.25 Respondents who think local authorities made any efforts to monitor or mitigate potential health hazards



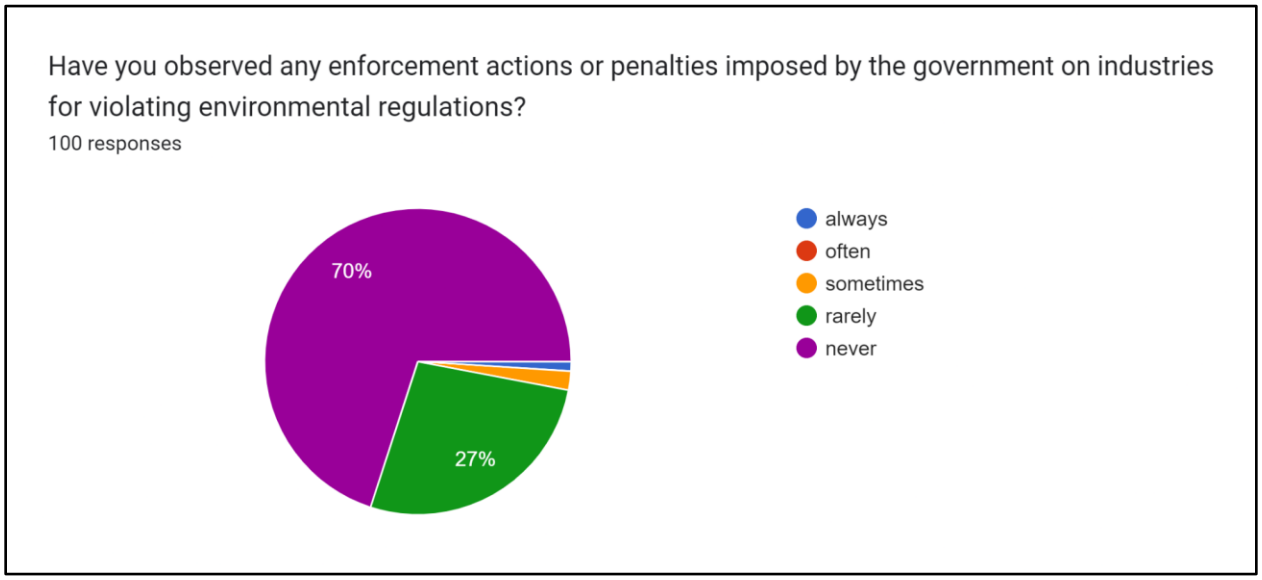
The data obtained from the above figure emphasizes how little local government is seen to be doing to prevent or monitor any health risks in the neighbourhood. There seems to be a large gap in governance and public health measures, since the majority of respondents (61%) state that authorities never make such attempts. There is an urgent need for authorities to prioritize health hazard mitigation to protect the well-being of the population since just 11% mentioned occasional attempts and none reported continuous initiatives.

Figure 4.26 respondents who noticed any government-led initiatives or programs aimed at the environmental impact of the industrial activities in their community



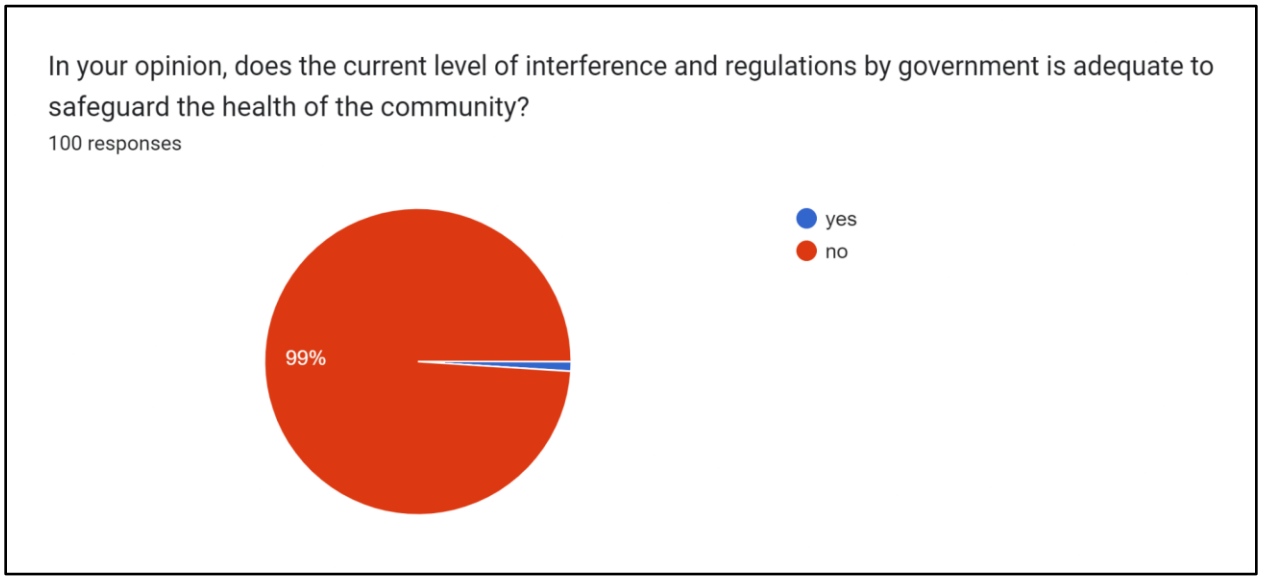
According to the findings, all respondents (100%) stated that there are no government-led programs or efforts in place to mitigate the negative environmental effects caused by local industries. This implies that government agencies are not taking an active role in resolving environmental issues brought on by industrialization.

Figure 4.27 Respondents who observed any enforcement actions or penalties imposed by government on industries for violating environmental regulations



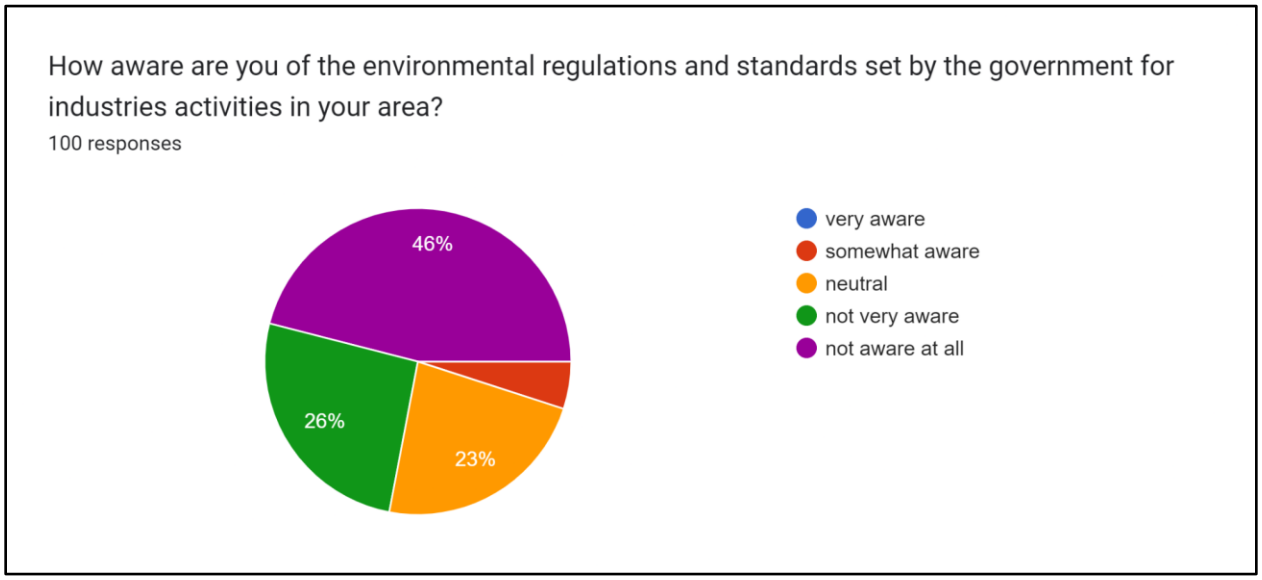
The data from the above figure demonstrates that the public does not trust the government to punish or enforce those breaking environmental rules. Rather, 70% of the respondents to the survey, have never seen or heard of such things happening. However, few people, only 1%, claim to, "always follow law enforcement steps," meaning that more enforcement is necessary to ensure businesses attain environmental rules and decrease the environmental damage in the community.

Figure 4.28 Opinion of respondents about the current level of interference and regulations by the government is adequate to safeguard the health of the community or not



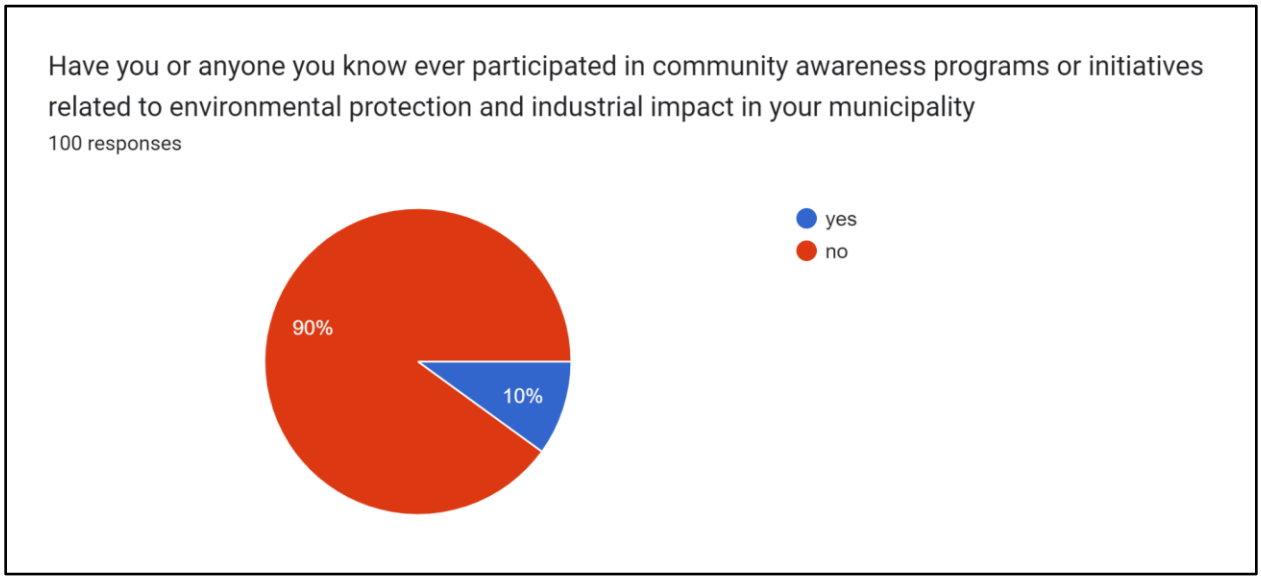
According to the above figure, an overwhelming majority of respondents (99%) believe that the current level of government involvement and regulations is insufficient to protect public health. The lack of trust in the government's regulatory actions and measures to address health issues caused by industrial activities is a concerning issue. By analyzing these findings, we can conclude that more intervention and regulations are necessary to ensure the safety and well-being of the people living in and around the Edayar industrial belt.

Figure 4.29 Awareness of Respondents about the environmental regulations and standards set by the government for industrial activities in your area



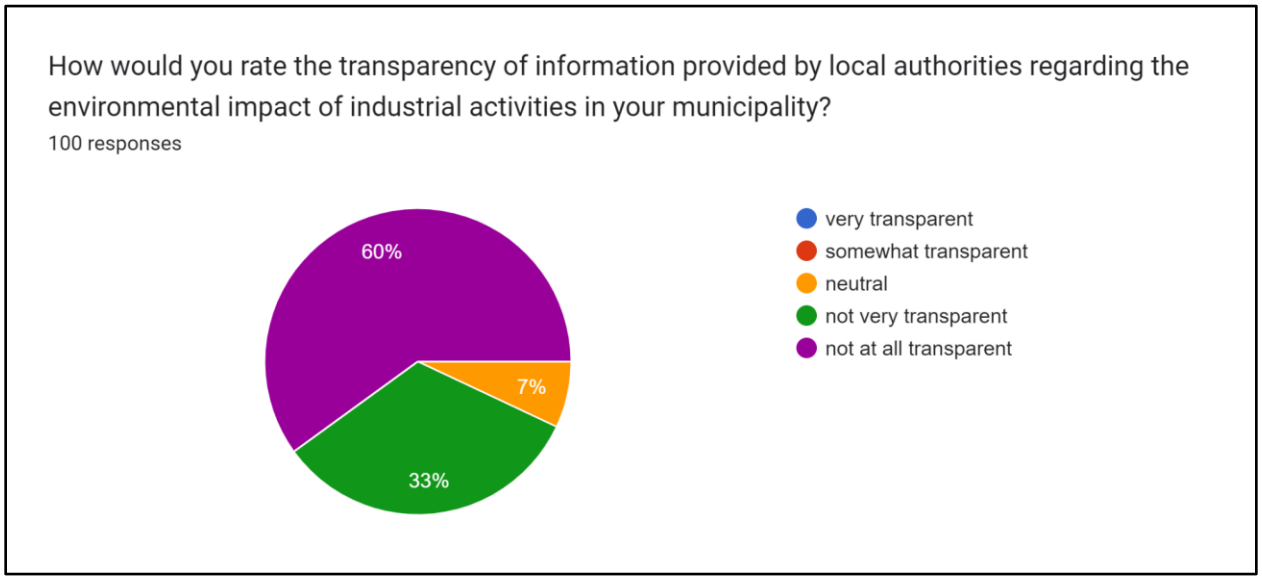
The data from the above figure indicates that respondents are not well-informed about the environmental rules and regulations regarding the government's regulations on businesses in the area. 72% of individuals agree they are somewhat informed, while 46% report being unaware. The data illustrates that most people know little about environmental laws. Therefore, it needs to be more informed and educate people about these laws to ensure that people obey the rules and save the environment.

Figure 4.30 Participation of respondents in the community awareness programs or initiatives related to the environmental protection and industrial impact in their area.



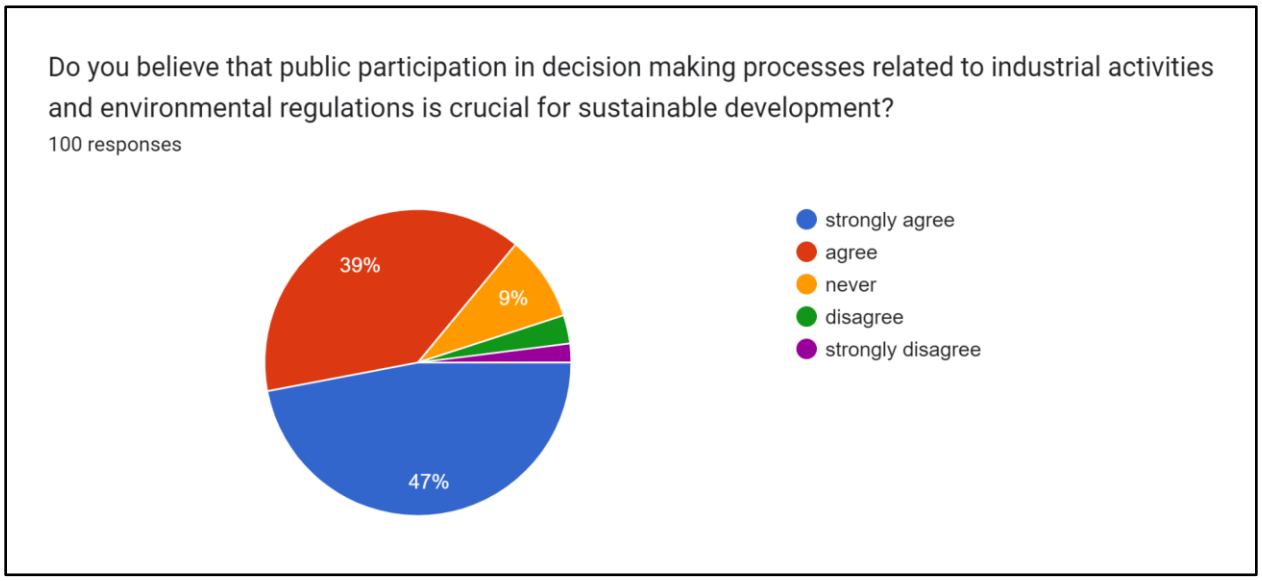
The above figure shows that only 10% of people who answered said they were involved in community learning programs about protecting the environment and the effects of industry. People in this town don't seem to be very involved in projects that aim to make people more aware of environmental problems and how they affect public health. For a community to be able to fight for environmental protection and healthy growth, more people should be encouraged to take part in these kinds of programs.

Figure 4.31 Rating of respondents about the transparency of information provided by local authorities regarding the environmental impact of industrial activities in their area



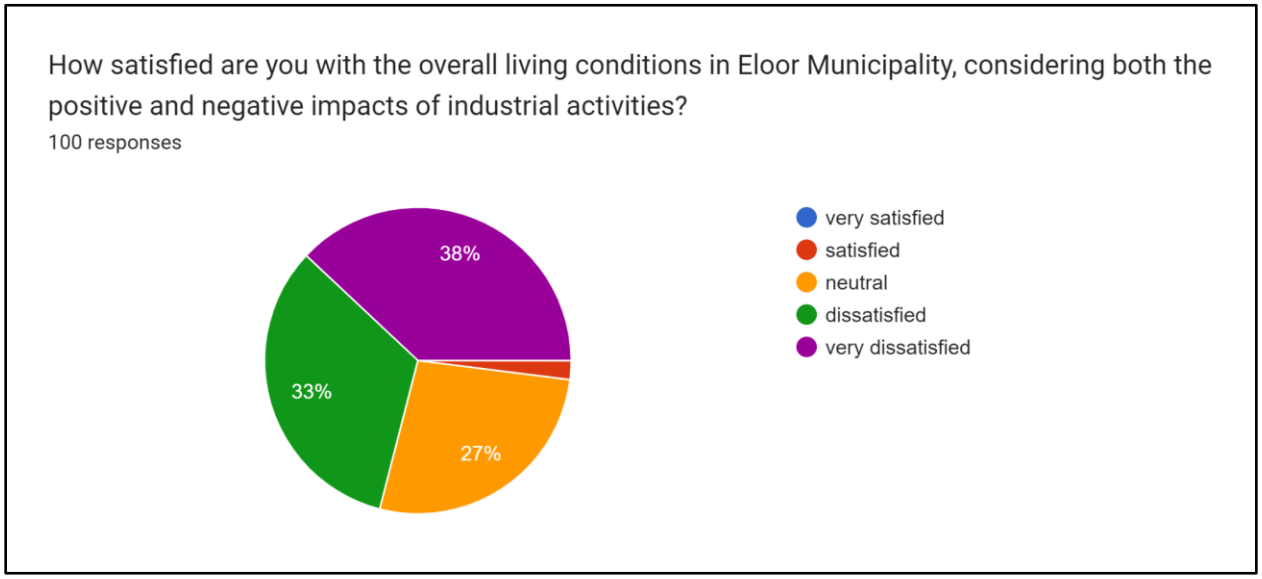
By analyzing the figure local governments' environmental impact information is in doubt, according to the data. 93% of respondents found the data confounding or not clear. Local governments must be transparent about the environmental impacts of economic operations.

Figure 4.32 Respondents who believe that public participation in decision making process related to industrial activities and environmental regulations is crucial for sustainable development



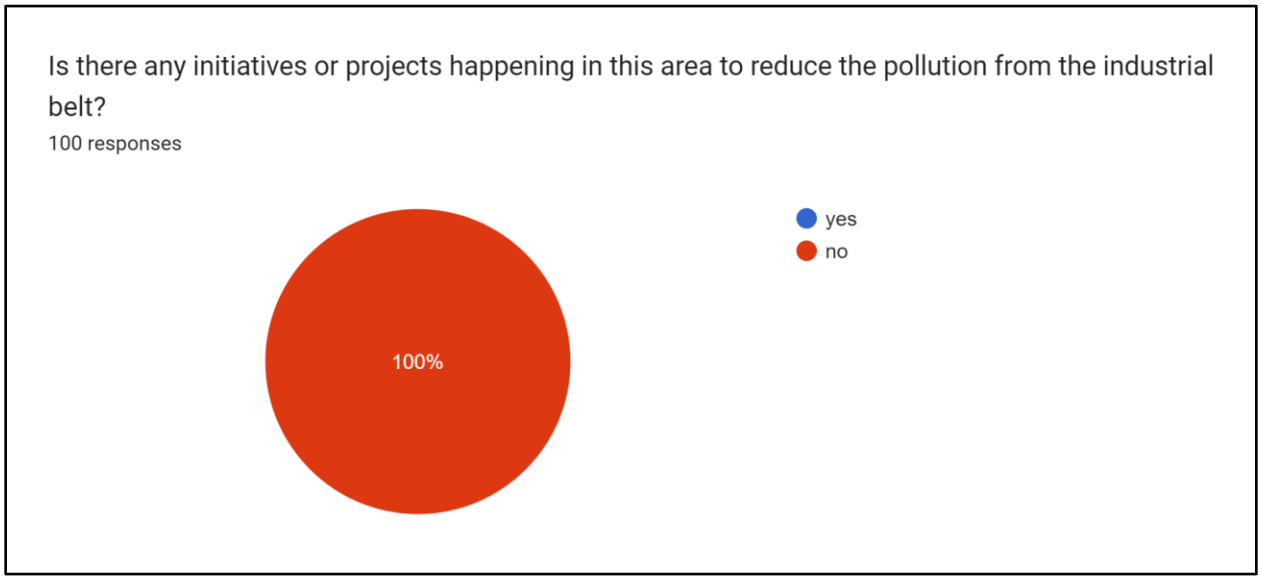
The results from the above figure show that a lot of people (86%) think it is important for healthy growth for the public to have a say in decisions about business activities and environmental rules. This shows how important people think it is for communities to have a say in creating policies and programs that protect the environment and improve people's lives.

Figure 4.33 Rating of the respondents about the satisfaction of overall living conditions in their area considering both the positive and negative impacts of industrial activities



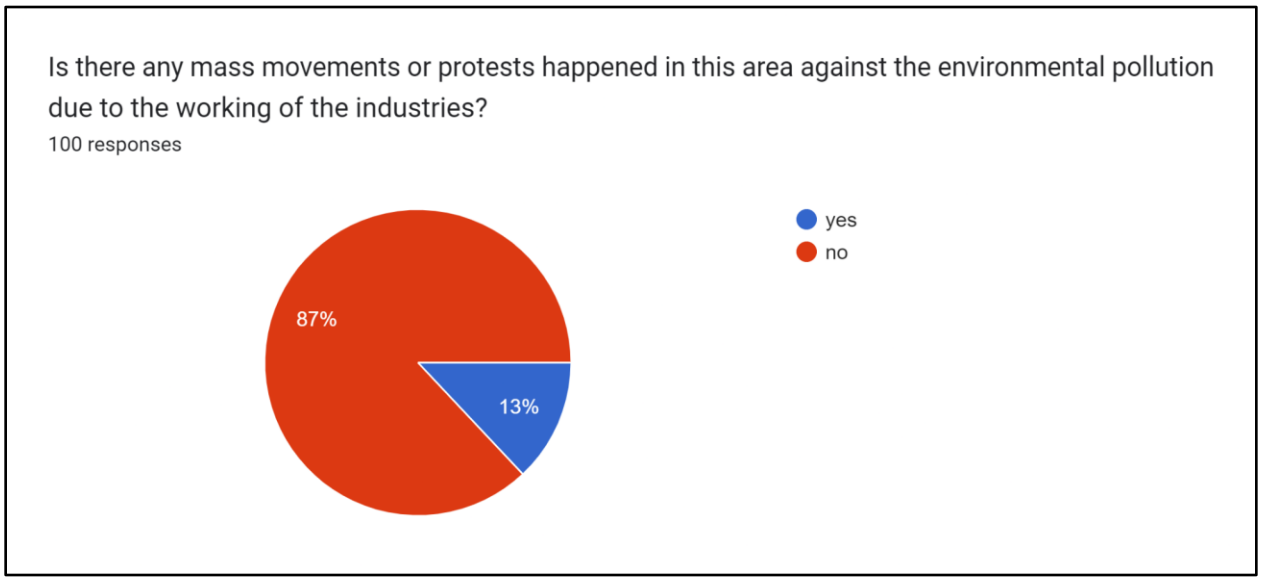
From the above figure, it is identified that 71% of respondents were unhappy with Eloor Municipality's living circumstances. Industrial operations' pros and cons for the neighbourhood may explain this. The high dissatisfaction rate highlights the need for resident-focused initiatives.

Figure 4.34 Respondents who observed any initiatives or projects happened in their area to reduce the pollution from the industrial belt



By analyzing the above figure, the majority of respondents (71%) are unhappy with their living circumstances in Eloor Municipality. This is likely due to industrial negative consequences. There are no industrial belt pollution reduction programs, according to 100% of respondents. It seems that the area's environmental issues are being ignored.

Figure 4.35 Respondents who observed mass movements or protests happened in their area against the environmental pollution due to the working of the industries



The result from the above figure also shows that 13% of those who answered say that there are currently significant campaigns or protests going on to stop pollution from factories. On the other hand, 87% of those who answered say that there aren't any such programs, which shows that there isn't much community action or organized work to stop industry pollution in the area.

4.3 Summary

The analysis part looks at all the survey answers in detail and sheds light on how economic operations in Edayar, Ernakulam affect people and the environment. Through data analysis, it shows how people feel, what they've experienced, and what worries them about pollution, health effects, and government involvement. This gives policymakers and interventionists useful information for making decisions.

Chapter 5: Findings and Conclusion

5.1 Findings

The results of the survey give different important information about how companies in Edayar, Ernakulam, affect people and the environment, which is in line with the study's goals. The main goal of the survey was to find the socio-economic background of the people living in the area. It was clear from the answers that most of the people who did that were from middle-class families and worked in the private sector.

The study additionally looked into what health issues the locals were having because of the industrial units. These numbers showed that being around industrial pollution makes a lot of people sick in other ways, too, like skin conditions, breathing problems, and other health problems. A lot of health problems happen to people who live near industrial zones. This shows how important it is to act right away and keep an eye on things.

The third question of the survey asked people what they thought about how the factories affected the environment. Most of the people who answered said that water and air pollution were a problem in their area. This shows that actions in business are hurting the environment a great deal. People are also afraid about the long-term health of water sources, as shown by the poll (Salehi, 2022). A lot of the people who answered expressed worry about how the businesses would affect the water sources in the area.

People in Edayar, Ernakulam have been impacted by economic growth, damage to the environment, and poor public health in several complex ways. It's clear that pollution is a big issue, and people who live near factories are worried about their health. Going forward, politicians and other important people need to pay attention to what locals say and move quickly to lessen the damage that businesses cause to the area (Malin *et al.* 2022). Certain things that could be done for this are – tightening the rules about the environment, buying tools that manage waste, and taking more initiative for more awareness and public participation in the decision-making process. By Following business practices that are good for the environment will make a huge difference and help the economy grow. To do this, we might need to encourage people to make things in better ways, like promoting alternative energy sources, investing in green infrastructure, etc.… In my opinion, more technology should be used to lessen environmental degradation.

5.2 Overall conclusion

The study gave an excellent overview of how the people who live in Edayar, Ernakulam are impacted by the economy as a whole. The fact that pollution is often tied to health problems in the area which shows how badly we need to take focused action to reduce the harmful effects of industrial pollution on public health. People who responded also said that environment was getting worse. This finding shows how important it is to have effective regulations and policies in the particular are to stop water and air pollution, which is essential for giving people a healthy life. Not only that, but the results also show how important it is for communities to be active and for everyone to be able to help with environmental government. The reality that people want to have a bigger say in choices shows how important it is to have open policies, include everyone, and put the health of the community first. Long-lasting solutions can be found to the difficult problems that industrial growth brings up by getting politicians, business partners, and the local community to talk to each other and work together. Going forward, everyone needs to work together to make big plans that protect the health of people and the earth while simultaneously expanding the economy. To do this, require a well-thought-out plan that takes into account what everybody wants and needs. Businesses, policymakers, and people in the community can all work together to make Edayar's future more stable and fairer, where companies can run with no putting people's health and safety or the environment at risk.

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Appendix

Questionnaire

1. Name of the respondent
2. Age of the respondent
   a) 15 – 25
   b) 26- 35
   c) 36- 45
   d) 45- 55
   e) Above 56
3. Education of the respondent
   a) Below SSLC
   b) SSLC
   c) SSC/HSC
   d) Graduate
   e) Postgraduate
   f) Professional (MBBS, BTech, LLB, MBA)
   g) Technical (diploma, ITI)
   h) Other
4. Occupation of the respondent
   a) Self employed
   b) Government service
   c) Private service
   d) Homemaker
   e) Unemployed
   f) Other
5. Marital status
   a) Single
   b) Married
   c) Divorced/ separated
   d) Other
6. Family type
   a) Joint
   b) Nuclear
   c) Others
7. Annual income
   a) Less than 50,000
   b) 50,000 – 1,00,000
   c) 1,00,000 – 2,00,000
   d) 2,00,000 – 3,00,000
   e) More than 3,00,000
8. What type of industries are operating in this area?

   _____
9. What type of pollutions can see in this area (air pollution, water pollution)?

_____

10. Have you ever noticed any discolouration or unusual taste in your tap water?
    a) Yes
    b) No

    if yes do you think it is because of the pollution from the industrial belt nearby? _____

11 Do you ever feel any unpleasant odour in your tap water?
    a) Always
    b) Often
    c) Sometimes
    d) Rarely
    e) Never
12 Have you been any reports of waterborne illnesses or contamination in your community?
    a) Always
    b) Often
    c) Sometimes
    d) Rarely
    e) Never
13 Have there been any reports of fish kills or the decline of aquatic life in the water bodies nearby?
    a) Yes
    b) No

    If yes do you think it is because of the water pollution from the industries? _____
14 Did you ever observe a decrease in the availability of clean and safe water for domestic use?
    a) Yes
    b) No

    If yes what is your alternative for getting clean and safe water for domestic use_____
15 Do you believe that the industrial activities are significantly impacting the long-term sustainability of water resources in your area?
    a) Always
    b) Often
    c) Sometimes
    d) Rarely
    e) Never
16 Are there visible signs of air pollution (increased levels of smog, haze, or particulate matter)?
    a) Yes
    b) No

If yes please specify_____

17 Did you experience any un pleasant or un usual odours in the air?
   a) Always
   b) Often
   c) Sometimes
   d) Rarely
   e) Never
18 Do you believe that industrial activities are impacting the overall well-being and quality of life in the village?
   a) Always
   b) Often
   c) Sometimes
   d) Rarely
   e) Never

19 Have you encountered any issues with waste disposal (illegal dumping or improper sewage treatment) in your neighbourhood?
   a) Always
   b) Often
   c) Sometimes
   d) Rarely
   e) Never
20 Do you think that improper waste management from industries has severe impact on the environment in the area?
   a) Yes
   b) No

If yes specify_____
21 Did you notice any health issues due to the pollution from the industries?
   a) Yes
   b) No

If yes what are the health issues in particular____
22 Are there any health surveys conducted here to investigate the health impacts of the nearby factories?
   a) Always
   b) Often

c) Sometimes
d) Rarely
e) Never

23 Is there any noticeable change in the frequency or severity of health issues after the establishment of industry?
a) Yes
b) No

24 Have you or anyone in your family experienced any health issues that you believe may be related to the nearby industrial activities?
a) Yes
b) No

If yes please explain _____

25 Do you observe any health issues for the new born children in this area due to the pollution from the industries?
a) Yes
b) No

If yes specify_____

26 Do you think the pollution from the nearby industries is the reason for any of the chronic diseases seen in this area?
a) Yes
b) No

If yes please specify_____

27 Do you think that local authorities are effectively addressing environmental concerns related to air and water pollution in your area?
a) Always
b) Often
c) Sometimes
d) Rarely
e) Never

28 Did the local authorities make any efforts to monitor or mitigate potential health hazards?
a) Always
b) Often
c) Sometimes
d) Rarely
e) Never

29 Have you noticed any government-led initiatives or programs aimed at mitigating the environmental impacts of the industrial activities in your community?

a) Yes
b) No

If yes what are the initiatives taken by the government_____

30 Have you observed any enforcement actions or penalties imposed by the government on industries for violating environmental regulations?
a) Always
b) Often
c) Sometimes
d) Rarely
e) Never

31 In your opinion, does the current level of interference and regulations by government is adequate to safeguard the health of the community?
a) Yes
b) No

If no do you have any suggestions? _____

32 How aware are you of the environmental regulations and standards set by the government for industries activities in your area?
a) Very aware
b) Somewhat aware
c) Neutral
d) Not very aware
e) Not aware at all

33 Have you or anyone you know ever participated in community awareness programs or initiatives related to environmental protection and industrial impact in your area?
a) Yes
b) No

If yes what was the program you participated? _____

34 Are there any specific areas or aspects related to the environmental impact of industrial activities that you feel need more attention from the authorities? Please specify

_____
____

35 How would you rate the transparency of information provided by local authorities regarding the environmental impact of industrial activities in your area?
a) Very transparent
b) Somewhat transparent
c) Neutral
d) Not very transparent
e) Not transparent at all

36 Do you believe that public participation in decision making processes related to industrial activities and environmental regulations is crucial for sustainable development?
a) Strongly agree
b) Agree
c) Never
d) Disagree
e) Strongly disagree

37 In your opinion, what role can community members play in addressing the environmental challenges caused by industrial activities in your area?

_____

38 How satisfied are you with the overall living conditions in your area, considering both the positive and negative impacts of industrial activities?

a) Very satisfied
b) Satisfied
c) Neutral
d) Dissatisfied
e) Very dissatisfied

39 Is there any initiatives or projects happening in this area to reduce the pollution from the industrial belt?

a) Yes
b) No

40 Is there any mass movements or protests happened in this area against the environmental pollution due to the working of the industries?

a) Yes
b) No

If yes please explain the reason and outcome of the protest_____

41 Are there any additional comments or concerns you would like to express regarding the socio – economic, health or environmental aspects of living in your area?

_____