Heat, Rain, and Uncertainty: Climate Change and Informal Workers in Bengaluru

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Contents

Executive Summary

This report examines how climate change is shaping the livelihoods, working conditions, and living environments of informal workers in Bengaluru, Karnataka. Informal workers constitute a critical segment of the city's economy, sustaining sectors such as construction, street vending, sanitation, and waste management. Yet, despite their central role in enabling urban functioning, they remain structurally marginalised, characterised by insecure employment, low and irregular incomes, precarious housing, and limited access to social protection. The findings of this study demonstrate that climate change does not operate as an isolated environmental stressor but rather intensifies these pre-existing vulnerabilities, producing layered and cumulative risks across multiple dimensions of everyday life.

Study Context

Bengaluru represents a rapidly expanding urban landscape shaped by economic growth, migration, and infrastructural transformation. While urbanisation has generated employment opportunities, it has also produced deep inequalities in access to housing, services, and secure livelihoods. A large proportion of the workforce remains engaged in informal employment, characterised by the absence of formal contracts, labour protections, and social security benefits.

At the same time, the city is increasingly experiencing the impacts of climate change. Rising temperatures, erratic rainfall patterns, water scarcity, and urban flooding are becoming more frequent. These changes are closely linked to patterns of unplanned urbanisation, including the loss of green cover, encroachment on water bodies, and inadequate drainage infrastructure. Informal workers are particularly vulnerable to these changes due to their occupational exposure and the conditions in which they live.

Study Design and Methodology

The study adopts a mixed-methods approach to capture both measurable patterns and lived experiences of climate vulnerability. Primary data was collected through structured surveys conducted with 158 informal workers across selected settlements in Bengaluru. These included areas such as JP Nagar, Jayanagar, KR Market, Vajarahalli, and Kalasipallya .

The survey collected data on household characteristics, employment patterns, housing conditions, access to services, and experiences related to extreme weather events. In addition, focus group discussions were conducted with workers engaged in different occupations to understand their perceptions of climate change and coping strategies. Secondary data from policy documents and climate assessments was used to contextualise the findings.

This integrated approach allows the study to move beyond aggregate indicators and capture the everyday realities through which climate change is experienced.

Socio-economic Conditions of Informal Workers

The findings highlight the structural vulnerabilities that shape the lives of informal workers in Bengaluru. A large proportion of respondents belong to historically marginalised communities, including Scheduled Castes and Scheduled Tribes, indicating the intersection of caste and economic disadvantage. Livelihoods are dominated by informal occupations such as street vending, construction work, and daily wage labour, which are characterised by irregular incomes and lack of job security.

Housing conditions further reflect this precarity. A majority of respondents live in rented or semi-permanent housing, with only a small proportion residing in permanent structures. Many settlements lack adequate infrastructure, including reliable water supply, sanitation facilities, and drainage systems. Access to electricity is relatively widespread, but this does not necessarily translate into improved living conditions due to issues of reliability and quality.

Water access remains a critical concern. Most households depend on shared sources such as community taps, leading to uncertainty and time burdens. Women bear the primary responsibility for water collection, often waking early and spending several hours each day securing water, managing household tasks, and preparing for work. This highlights the gendered dimensions of urban vulnerability.

Access to social protection is limited and fragmented. While some households benefit from food security through the Public Distribution System, coverage of health insurance, pensions, and labour welfare schemes is extremely low. Nearly one-third of respondents are not enrolled in any welfare scheme, indicating significant gaps in institutional support.

Financial insecurity is widespread. Most households fall within low-income brackets, and a large proportion report significant levels of debt. Borrowing is often used to meet basic consumption needs and healthcare expenses, reflecting the absence of savings and formal financial protection mechanisms.

Community Perceptions of Climate Change

Informal workers demonstrate a strong and nuanced understanding of climate change, grounded in their everyday experiences. Rather than relying on scientific terminology, respondents interpret climate change through observable changes in weather patterns and their impacts on work and daily life.

The most commonly reported changes include rising temperatures, longer summer seasons, and increasing frequency of extremely hot days. Workers describe heat as becoming more intense and prolonged, making it difficult to sustain physical labour. Irregular rainfall is another key perception, characterised by delayed monsoons, uneven distribution of rainfall, and sudden heavy downpours.

Importantly, respondents interpret these changes as increasing unpredictability rather than simply more extreme events. Seasons are perceived as less reliable, making it difficult to plan work and manage risks. This experiential understanding aligns with scientific evidence on increasing climate variability but is expressed through the lens of livelihood disruption and daily hardship.

Impacts on Livelihoods and Well-being

The impacts of these changes are evident across multiple dimensions of livelihoods and living conditions. Extreme weather events lead to significant loss of working days, often amounting to several months of income loss each year. Even when work continues, productivity is reduced under conditions of extreme heat. Health risks are also pronounced, with increased incidence of heat-related illnesses, respiratory conditions, and infections linked to environmental exposure and poor living conditions. Limited access to healthcare and reliance on out-of-pocket expenditure further compound these risks. Housing conditions are similarly affected, with climate-related events causing damage to structures that many households are unable to repair fully due to financial constraints. At the same time, rising expenditures on food, healthcare, and livelihood inputs place additional strain on already limited resources.

These pressures are closely linked to patterns of indebtedness. Households frequently rely on borrowing to cope with climate-related disruptions, often from informal sources that impose high interest rates. This creates a cycle in which climate shocks translate into long-term financial stress. Changes in consumption patterns further illustrate the fragility of household economies, as some households reduce food intake or adjust expenditure priorities in response to income instability. Even when consumption levels are maintained, they are often sustained through borrowing or by sacrificing other essential needs, indicating underlying economic strain.

In response to these challenges, informal workers adopt a range of coping strategies. These include adjusting working hours to avoid extreme heat, diversifying or shifting livelihoods, relying on social networks, and reducing consumption. While these strategies demonstrate resilience, they are largely short-term and constrained by limited resources. Borrowing emerges as a dominant coping mechanism, but it often deepens long-term vulnerability. The absence of institutional support is particularly striking, as very few respondents report receiving compensation or relief in response to climate-related disruptions. As a result, coping remains largely individualised and informal, highlighting gaps in policy and governance.

Policy Implications

The findings of the study underscore the need for integrated policy responses that address both environmental risks and socio-economic inequalities. Existing policy frameworks at the national and state levels provide a foundation for intervention, but their reach and

effectiveness remain limited for informal workers. Strengthening housing and infrastructure, enhancing livelihood security, expanding access to healthcare and social protection, and improving governance systems are critical priorities. However, these interventions must be grounded in the lived realities of informal workers and designed to address the structural conditions that produce vulnerability.

Conclusion

Overall, the study demonstrates that climate change in Bengaluru is experienced as a cumulative and deeply embedded process that intensifies existing inequalities. Informal workers are not only more exposed to climate risks but also have fewer resources to cope with their impacts. Addressing these challenges requires a shift towards a climate justice approach that integrates social protection, urban planning, and climate adaptation. By recognising and incorporating the experiences of informal workers, policy frameworks can move towards more inclusive and equitable pathways of urban resilience.

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Chapter 1: Context

1.1 Urban Development, Inequality, and Precarity

Urbanisation has become one of the most significant socio-economic transformations of the twenty-first century, reshaping patterns of settlement, production, and livelihoods across the globe. According to the United Nations, more than half of the world's population currently resides in urban areas, and this proportion is projected to increase substantially in the coming decades (UNDESA, 2023). Much of this growth is concentrated in countries of the Global South, where cities are expanding rapidly in response to industrialisation, economic restructuring, and migration. While urbanisation has generated opportunities for employment and economic mobility, it has also intensified inequalities and produced new forms of socio-economic precarity.

Urban economies are characterised by a dual structure in which formal and informal sectors coexist. The informal economy, which includes activities such as street vending, construction labour, domestic work, waste picking, and small-scale services, constitutes a dominant share of employment in many developing countries. In India, nearly 90 percent of the workforce is engaged in informal employment (International Labour Organization [ILO], 2019). These workers play a vital role in sustaining urban systems by providing essential goods and services, often at low cost. However, their contributions are not matched by adequate recognition or protection within policy and planning frameworks.

Informal employment is typically characterised by irregular wages, absence of formal contracts, lack of job security, and limited access to social protection. Workers often depend on daily earnings, making them highly vulnerable to fluctuations in demand and external shocks. This economic insecurity is closely linked to broader patterns of urban inequality. The benefits of urban growth are unevenly distributed, with wealth and resources concentrated among higher-income groups, while low-income populations experience persistent deprivation.

Housing is a key dimension of this inequality. Rapid urban expansion has outpaced the provision of affordable housing, leading to the proliferation of informal settlements. UN-Habitat (2020) estimates that over one billion people globally live in slums or informal settlements, often characterised by overcrowding, insecure tenure, and inadequate access to basic services such as water, sanitation, and electricity. These settlements frequently emerge in marginal or hazard-prone areas where land is available but environmental risks are high.

The spatial distribution of urban poverty reflects the structural inequalities embedded in urban development processes. Low-income households are often pushed to the peripheries or to environmentally vulnerable locations such as floodplains, riverbanks, or areas near waste disposal sites. These patterns are not accidental but are shaped by planning systems that

prioritise formal development while excluding informal populations (Davis, 2006; Roy, 2005).

Working conditions within the informal economy further reinforce precarity. Many informal workers perform physically demanding labour in outdoor or hazardous environments without adequate safety measures. Construction workers, sanitation workers, and waste pickers are exposed to risks such as extreme weather, pollution, and occupational hazards. These risks are compounded by limited access to healthcare and social security systems.

Social hierarchies such as caste, gender, and migration status further shape the experiences of informal workers. Women are disproportionately represented in low-paid and insecure occupations and often bear the additional burden of unpaid care work (Chen et al., 2005). Migrant workers frequently face barriers related to documentation, housing, and access to public services. These intersecting inequalities create a layered structure of vulnerability that defines the everyday realities of the urban poor.

Thus, urbanisation, while generating economic growth, has simultaneously produced conditions of exclusion and precarity for a large segment of the urban population. Understanding these structural inequalities is essential for analysing how environmental challenges such as climate change intersect with urban poverty.

1.2 Uneven Impact: Urbanisation and Climate Change

Cities are central to the global climate crisis, both as major contributors to greenhouse gas emissions and as sites of increasing climate vulnerability. Urban areas account for a significant share of global energy consumption and carbon emissions due to their concentration of infrastructure, industry, and transportation systems (IPCC, 2022). At the same time, the processes of urbanisation themselves alter natural ecosystems, making cities more susceptible to climate-related risks.

The transformation of land for urban development involves the replacement of natural vegetation, wetlands, and permeable surfaces with built infrastructure. This has several ecological consequences. One of the most significant is the urban heat island effect, whereby cities experience higher temperatures than surrounding rural areas due to heat absorption and retention by concrete and asphalt surfaces (Oke, 1982). This effect intensifies the impact of heatwaves, making them more severe in urban environments.

Urbanisation also disrupts natural hydrological systems. The conversion of land reduces groundwater recharge and increases surface runoff, leading to higher risks of flooding during periods of intense rainfall. Encroachment on water bodies and inadequate drainage infrastructure further exacerbate these risks. As a result, many cities experience a paradoxical combination of water scarcity and flooding, often within the same year.

Climate change amplifies these challenges by increasing the frequency and intensity of extreme weather events. Scientific evidence indicates that rising global temperatures are contributing to more frequent heatwaves, erratic rainfall patterns, and extreme precipitation events (IPCC, 2022). These changes place additional stress on urban infrastructure systems and public health.

However, the impacts of climate change are not experienced uniformly across urban populations. The urban poor and informal workers face disproportionately higher levels of exposure and vulnerability due to their socio-economic conditions. This uneven distribution of risk is shaped by several interrelated factors.

First, the location of informal settlements often exposes residents to environmental hazards. These settlements are frequently situated in low-lying or flood-prone areas, on marginal lands, or near environmentally degraded zones. Housing structures in such areas are typically constructed with temporary materials, offering limited protection against extreme weather events.

Second, the nature of informal employment increases exposure to climate risks. Many informal workers are engaged in outdoor occupations that require prolonged exposure to environmental conditions. Heat stress, for example, can significantly reduce labour productivity and increase the risk of illness. The ILO (2019) estimates that heat stress could lead to substantial losses in working hours globally, particularly in regions such as South Asia.

Third, limited access to resources constrains the ability of the urban poor to cope with climate shocks. Low-income households often lack savings, insurance, and access to formal support systems. As a result, climate-related disruptions—such as loss of income, damage to housing, or health emergencies—can have long-lasting impacts on household well-being.

These dynamics highlight the concept of "urban climate vulnerability," which emphasises the interaction between environmental risks and socio-economic inequalities (Satterthwaite et al., 2007). Addressing climate change in urban contexts therefore requires not only environmental interventions but also policies that address underlying structural inequalities.

1.3 Climate Justice and the Need to Protect Informal Workers

The unequal distribution of climate impacts has led to the emergence of climate justice as a critical framework for understanding and addressing the climate crisis. Climate justice emphasises that climate change is not only an environmental issue but also a social and political one, shaped by historical inequalities and power relations (Schlosberg, 2007).

At its core, climate justice highlights the disparity between those who contribute to climate change and those who bear its consequences. Marginalised populations, including the urban

poor and informal workers, typically have low carbon footprints yet face the greatest exposure to climate risks. This imbalance raises fundamental questions of equity, responsibility, and rights.

In urban contexts, climate justice draws attention to the vulnerabilities of informal workers whose livelihoods are closely tied to environmental conditions. Changes in temperature, rainfall, and air quality can directly affect their ability to work and earn income. For instance, heatwaves can reduce working hours and productivity, while floods can disrupt transportation and market access.

Climate justice also emphasises the importance of recognising and addressing differential adaptive capacity. Informal workers often lack access to resources, infrastructure, and institutional support that could help them cope with climate risks. This limited capacity makes them more vulnerable to both immediate and long-term impacts of climate change.

Another key dimension of climate justice is participation. Vulnerable communities are often excluded from decision-making processes related to climate policy and urban planning. Their knowledge, experiences, and priorities are rarely incorporated into policy frameworks, resulting in interventions that may not adequately address their needs (Bulkeley et al., 2014).

A climate justice approach therefore calls for inclusive and equitable policy responses. This includes extending social protection systems, improving access to basic services, and ensuring safe working conditions for informal workers. It also involves investing in climate-resilient infrastructure, such as improved housing, drainage systems, and urban green spaces, which can reduce exposure to environmental hazards.

Importantly, climate justice shifts the focus from viewing vulnerability as an individual condition to understanding it as a product of structural inequalities. It recognises that addressing climate change requires systemic changes that promote social equity and inclusion alongside environmental sustainability.

1.4 Vulnerability of Informal Workers in Bengaluru, Karnataka

Bengaluru, the capital of Karnataka, represents a rapidly transforming urban landscape where economic growth, demographic expansion, and environmental stress intersect. Over the past two decades, the city has experienced significant growth driven by the expansion of the information technology sector, real estate development, and service industries. This growth has attracted large numbers of migrant workers, many of whom are absorbed into informal employment.

Despite its reputation as a modern and economically dynamic city, Bengaluru faces significant environmental challenges that are increasingly linked to climate change. Rising temperatures, erratic rainfall patterns, urban flooding, and water scarcity have emerged as key

concerns. These challenges are closely tied to patterns of unplanned urban expansion and ecological degradation.

One of the most notable environmental changes in Bengaluru is the loss of green cover and water bodies. The city's network of lakes, which historically played a crucial role in water management, has been significantly reduced due to encroachment and pollution (Karnataka State Action Plan on Climate Change [KSAPCC], 2014). This has weakened the city's natural capacity to manage rainfall, leading to frequent flooding in low-lying areas.

At the same time, Bengaluru faces growing water stress. Rapid urbanisation has increased demand for water, while groundwater resources are being depleted due to over-extraction. Climate variability further exacerbates this problem by making rainfall patterns more unpredictable. As a result, many parts of the city experience water shortages, particularly during dry periods.

Rising temperatures and the urban heat island effect have also become increasingly evident. The expansion of built-up areas and reduction of vegetation have contributed to higher surface temperatures, affecting both environmental conditions and public health. Informal workers engaged in outdoor occupations are particularly vulnerable to heat stress, which can lead to reduced productivity and increased health risks.

The impacts of these environmental changes are not evenly distributed. Informal workers in Bengaluru face heightened vulnerability due to their living and working conditions. Many reside in informal settlements that lack adequate infrastructure, including reliable water supply, sanitation, and drainage systems. These settlements are often located in areas prone to flooding or environmental degradation, increasing exposure to climate risks.

Livelihood insecurity further compounds vulnerability. Informal workers depend on daily wages from occupations such as construction, street vending, domestic work, and waste collection. These livelihoods are highly sensitive to environmental conditions. Extreme weather events can disrupt work opportunities, leading to income loss and financial instability.

Health risks are another critical dimension of vulnerability. Exposure to heat, pollution, and unsanitary conditions increases the likelihood of illness among informal workers. Limited access to healthcare services and low levels of insurance coverage further exacerbate these risks.

Gender and migration also shape vulnerability in important ways. Women often bear the burden of managing household responsibilities in addition to income-generating work, and climate-related challenges such as water scarcity increase their workload. Migrant workers, on the other hand, face barriers related to documentation and access to welfare schemes, limiting their ability to access institutional support.

Overall, the vulnerability of informal workers in Bengaluru reflects the intersection of environmental change and socio-economic inequality. The city's climate challenges are deeply embedded within its patterns of urban development, making it essential to adopt integrated approaches that address both environmental and social dimensions of vulnerability.

1.5 Community Knowledge and the Lived Experience of Climate Change

While climate change has been extensively studied at global and national levels, there remains a significant gap in understanding how it is experienced at the level of everyday life, particularly among vulnerable urban populations. Informal workers represent one of the most affected yet least documented groups in climate research.

Existing studies often rely on macro-level indicators and technical assessments, which may overlook the lived realities of communities facing climate risks. Informal workers, however, experience climate change directly through its impacts on their livelihoods, health, and living conditions. Their daily interactions with the environment provide valuable insights into localised patterns of climate variability.

Understanding community perceptions of climate change is important for several reasons. First, it helps identify how individuals interpret environmental changes and the factors they consider important. Second, it provides insights into the coping strategies adopted by households in response to climate-related disruptions. Third, it highlights gaps between policy frameworks and ground realities.

Informal workers often develop adaptive strategies such as adjusting work schedules, diversifying income sources, or relying on social networks during periods of crisis. While these strategies provide short-term resilience, they are often insufficient to address long-term vulnerabilities. Without adequate institutional support, households remain exposed to recurring climate shocks.

In the context of Bengaluru, where rapid urbanisation and environmental change are occurring simultaneously, understanding these lived experiences becomes particularly important. The city's informal workforce plays a critical role in sustaining its economy, yet their perspectives are rarely incorporated into climate planning processes.

This study is therefore motivated by the need to document and analyse how informal workers understand, experience, and respond to climate change. By foregrounding their voices and lived realities, the research aims to contribute to a more inclusive and grounded understanding of urban climate vulnerability. Such an approach aligns with the principles of climate justice and can inform policy interventions that are both equitable and effective.

Chapter 2: Study Design and Methodology

Understanding the impacts of climate change on informal workers requires a research approach that captures both measurable patterns and lived experiences. Informal workers operate in complex socio-economic and environmental conditions where livelihood security, housing, health, and urban infrastructure intersect with climatic variability. Traditional quantitative indicators alone are often insufficient to fully capture these multidimensional vulnerabilities. For this reason, the present study adopts a mixed-methods research framework that combines quantitative surveys with qualitative engagement with workers and communities.

2.1 Scope of Study

The present study examines how climate change and extreme weather events are affecting the livelihoods, working conditions, and living environments of informal workers in Bengaluru, Karnataka. The research is situated within a climate justice framework, recognising that climate change disproportionately affects socially and economically marginalised populations. Informal workers, who constitute a significant segment of the urban workforce, face heightened vulnerability due to insecure employment, limited access to social protection, and precarious housing and living conditions.

Bengaluru, one of India's fastest-growing metropolitan cities, has undergone rapid urban expansion over the past two decades. The growth of sectors such as information technology, construction, transport, and urban services has generated diverse employment opportunities, attracting migrant workers from across Karnataka and other states. However, a large proportion of this workforce is employed in informal occupations characterised by irregular wages, absence of formal contracts, and limited labour protections. Informal workers engaged in construction, sanitation, waste management, domestic work, street vending, and daily wage labour play a critical role in sustaining the functioning of the city.

Despite their contributions, these workers often experience precarious living and working conditions. Many reside in informal settlements, slums, or temporary housing located in environmentally vulnerable areas with inadequate access to basic services such as water, sanitation, drainage, and secure housing. Their occupations frequently involve physically demanding labour performed in outdoor or hazardous environments, exposing them directly to climate-related risks such as extreme heat, intense rainfall, flooding, and air pollution.

Climate variability in Bengaluru has intensified these risks in recent years. Rising temperatures, erratic rainfall patterns, and increasing instances of urban flooding have significant implications for workers whose livelihoods depend on stable environmental conditions. The urban heat island effect has led to higher temperatures within the city,

increasing the risk of heat stress among outdoor workers. At the same time, heavy rainfall events have resulted in frequent waterlogging and flooding, disrupting transportation systems, damaging housing in informal settlements, and reducing work opportunities for daily wage labourers.

Bengaluru also faces growing water stress due to declining groundwater levels, uneven distribution of water supply, and increasing demand from a rapidly expanding population. Informal settlements are particularly affected by these challenges, as residents often depend on tanker water or shared sources that are unreliable and costly. Such conditions further increase the vulnerability of informal worker households.

Within this context, the scope of the present research is to document and analyse how climate change is affecting the everyday lives and livelihoods of informal workers in Bengaluru. The study focuses on workers engaged in sectors such as construction, sanitation, waste collection, street vending, and other forms of daily wage labour, as these occupations involve high levels of exposure to environmental conditions.

The research is conducted across selected informal settlements and worker clusters in the areas of JP Nagar, Jayanagar, KR Market, Vajarahalli, Eliyashnagar, and Kalasipallya among other areas where informal workers live and work. By focusing on these communities, the study seeks to capture the intersection of climate risks with socio-economic marginalisation.

The study aims not only to document the impacts of climate variability but also to understand how informal workers perceive environmental change and respond to its effects. Through this approach, the research seeks to generate insights that can inform more inclusive and equitable climate adaptation policies, particularly in rapidly urbanising cities where informal labour plays a central role in sustaining urban economies.

2.2 Objectives of the Study

- To study the forms of vulnerabilities and disruptions faced by marginalised urban communities, including impacts on housing, employment, access to basic services, and livelihood stability in the context of climate change.
- To document how these communities experience and perceive climate change in their everyday lives, including its impacts on livelihoods, income security, health, and consumption patterns across different climatic regions.
- To generate policy insights that foreground the lived experiences and knowledge of marginalised urban populations, contributing to more inclusive and justice-oriented climate adaptation strategies in urban governance.

2.3 Research Methodology

The study adopts a mixed-methods research design that integrates quantitative and qualitative approaches to examine the impacts of climate change on informal workers. This methodological approach allows the research to capture both statistical patterns and detailed narratives about how climate variability affects livelihoods and daily life.

Quantitative data provides measurable indicators related to household demographics, employment patterns, housing conditions, and climate-related impacts. Qualitative data, on the other hand, provides deeper insights into the experiences, perceptions, and coping strategies of workers. Combining these two forms of data allows for a more comprehensive understanding of climate vulnerability.

The research design involved the collection of primary data through structured surveys and focus group discussions conducted with informal workers across selected settlements in Bengaluru. Secondary data from policy documents, climate assessments, and academic literature was also reviewed to contextualise the findings within broader climate and urban development debates.

A total of 158 informal workers were surveyed as part of the quantitative component of the research. The survey captured information on employment patterns, housing conditions, access to basic services, health impacts, and experiences related to extreme weather events. The respondents were selected from various informal settlements in Bengaluru where large numbers of informal workers reside.

In addition to the survey, the study conducted ten focus group discussions with informal workers representing different occupations, including construction workers, sanitation workers, and daily wage labourers. These discussions provided an opportunity for participants to share their experiences of climate change, discuss the challenges they face in their work environments, and identify the strategies they use to cope with environmental disruptions.

The combination of surveys and group discussions enabled the research to capture both individual experiences and collective perspectives on climate impacts. While survey data helped identify patterns across the sample population, qualitative discussions revealed the social and economic contexts in which these impacts occur.

Data analysis involved the use of descriptive statistical techniques for quantitative data and thematic analysis for qualitative data. Survey responses were analysed using frequencies and percentages to identify patterns related to housing conditions, occupational characteristics, and climate-related disruptions. Qualitative narratives from focus group discussions were analysed to identify recurring themes related to vulnerability, livelihood impacts, and coping strategies.

Ethical considerations were an important component of the research design. All participants were informed about the purpose of the study and their rights as respondents. Participation in the survey and group discussions was voluntary, and respondents were assured that their identities would remain confidential. Data collected during the research was used solely for academic and policy analysis purposes.

2.4 Data Collection Tools

To capture the diverse dimensions of climate vulnerability among informal workers, the study employed multiple data collection tools. These tools were designed to gather both quantitative and qualitative information on the experiences, perceptions, and coping mechanisms of workers.

Structured Survey

The primary quantitative tool used in the study was a structured questionnaire administered to 158 informal workers across informal settlements in Bengaluru. The survey collected detailed information on household characteristics, employment patterns, income levels, housing conditions, and access to basic services such as water, sanitation, and electricity.

The questionnaire also included questions related to climate-related experiences, including exposure to extreme heat, heavy rainfall, water scarcity, and environmental disruptions affecting livelihoods. The survey was conducted through face-to-face interviews to ensure clarity of questions and accuracy of responses. This approach also enabled researchers to engage with respondents who may have limited literacy or familiarity with formal survey formats.

The structured format of the questionnaire ensured consistency across interviews, allowing the research team to collect comparable data from different settlements and occupational groups. The survey provided a quantitative overview of the socio-economic conditions of informal workers and the extent to which climate change affects their livelihoods.

Focus Group Discussions

Focus group discussions formed the primary qualitative component of the study. Ten focus group discussions were conducted with informal workers residing in the selected settlements. Each group consisted of participants engaged in different occupations such as construction labour, sanitation work, waste picking, and daily wage labour.

The discussions were facilitated by trained researchers using semi-structured discussion guides. These guides included open-ended questions designed to encourage participants to share their experiences of climate change and discuss how environmental changes affect their work and daily lives.

Focus group discussions allowed participants to collectively reflect on issues such as changing weather patterns, disruptions to livelihoods, health risks, and challenges related to housing and infrastructure. The group setting encouraged participants to build upon each other's responses, generating richer insights into community experiences and shared concerns.

Key Informant Interactions

In addition to surveys and group discussions, the study also involved informal interactions with community leaders and representatives of worker groups within the selected settlements. These interactions helped provide contextual information about the socio-economic conditions of the communities and the institutional environment in which informal workers operate.

Key informants provided insights into local labour dynamics, migration patterns, housing conditions, and the availability of government welfare schemes. Their perspectives helped contextualise the experiences of workers within broader urban governance structures.

Secondary Data Review

The research also incorporated secondary data sources to complement the primary data collected during the field study. These sources included government policy documents, climate action plans, labour statistics, and academic studies related to urban vulnerability and climate change.

Secondary data helped situate the findings of the study within broader debates on climate adaptation, urban development, and labour rights. Reviewing policy frameworks also enabled the research to identify gaps between policy commitments and the lived experiences of informal workers.

Together, these data collection tools provided a comprehensive understanding of how climate change affects informal workers in Bengaluru. By combining quantitative indicators with qualitative narratives, the study captures both the measurable impacts of climate variability and the lived realities of workers navigating environmental and economic uncertainty.

Chapter 3: Data Analysis

3.1. Respondent Profile

Understanding the socio-economic profile of respondents is essential for analysing how climate change affects informal workers. Informal workers often experience multiple layers of vulnerability related to employment insecurity, housing conditions, limited access to public services, and financial instability. These conditions shape their capacity to cope with environmental shocks and climate variability.

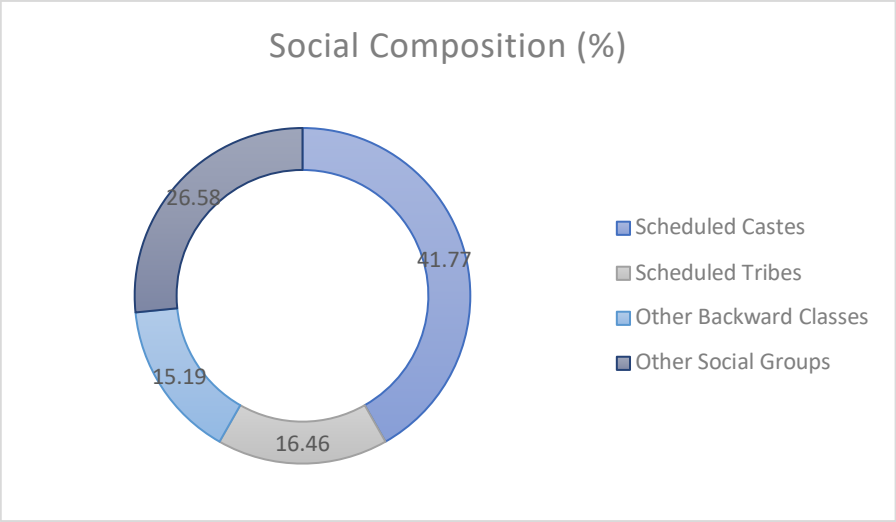
The present study surveyed 158 informal workers residing Bengaluru, focusing primarily on workers engaged in construction labour, sanitation work, waste collection, and other forms of daily wage employment. The respondent profile highlights key socio-economic characteristics of the surveyed households, including social background, livelihood patterns, access to housing and services, and financial conditions. These factors provide an important context for understanding how climate change interacts with existing urban inequalities to influence the vulnerability of informal workers.

Social and Livelihood Composition

The respondent profile shows a relatively balanced gender distribution, with 55% male, 44% female, and a small representation of transgender individuals. The age distribution suggests that the respondent group is predominantly composed of working age individuals with three-fifth of respondents falling within the 30–50 years age group and another one-fifth respondents being less than 30 years old.

The social composition of respondents reflects the intersection of caste and economic vulnerability. A substantial proportion belong to historically marginalised communities, with Scheduled Castes (43%) forming the largest group, followed by Scheduled Tribes (16.46%) and Other Backward Classes (15%). In religious identity, the majority of respondents identify as Hindu (78%), followed by Christian (17%) and Muslim (5%). This reflects the diversity of Bengaluru's informal workforce, while also pointing to the layered nature of socio-economic marginalisation.

These figures highlight the continued concentration of socially marginalised communities within informal occupations. Limited access to education, land, and formal employment opportunities has historically pushed these groups into precarious labour markets. As a result, they are disproportionately represented in low-paid and physically demanding jobs such as construction labour, sanitation services, and waste picking. The social composition of respondents therefore reflects the intersection between caste-based inequality and labour market segmentation within urban economies.



Livelihood patterns among the surveyed households are dominated by casual work and self employment. The largest occupational group comprises street vendors (37%), followed by construction workers (31%). A further 29% are engaged in other forms of informal work, including cleaning, choultry services, and miscellaneous labour. A small proportion is involved in domestic work and home-based activities.

These livelihood patterns reveal the precarious nature of employment within the informal economy. Most respondents depend on occupations that offer little job security, irregular wages, and limited access to labour protections. Employment is often seasonal and highly sensitive to economic fluctuations and environmental conditions. For instance, street vending and construction activities may slow down during extreme heat or heavy rainfall, leading to temporary job or income losses for daily wage workers.

Migration status is another significant marker of the respondent group. While 55% of respondents are non-migrants, a substantial 44% have migrated to Bengaluru, with a small proportion commuting daily from nearby areas.

Among migrants, the primary reasons for relocation include lack of employment opportunities, search for better-paid work, and failure or unprofitability in agriculture. These findings highlight the role of rural economic distress and limited livelihood opportunities in driving migration to urban centres.

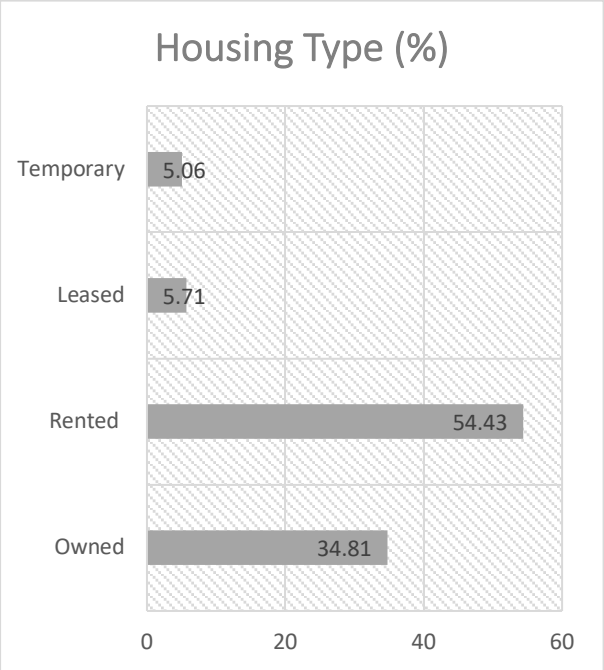
Overall, the social and livelihood composition of respondents reflects the structural inequalities embedded within urban labour markets. Informal and migrant workers not only face economic insecurity but also experience social marginalisation that shapes their access to opportunities, resources, and public services.

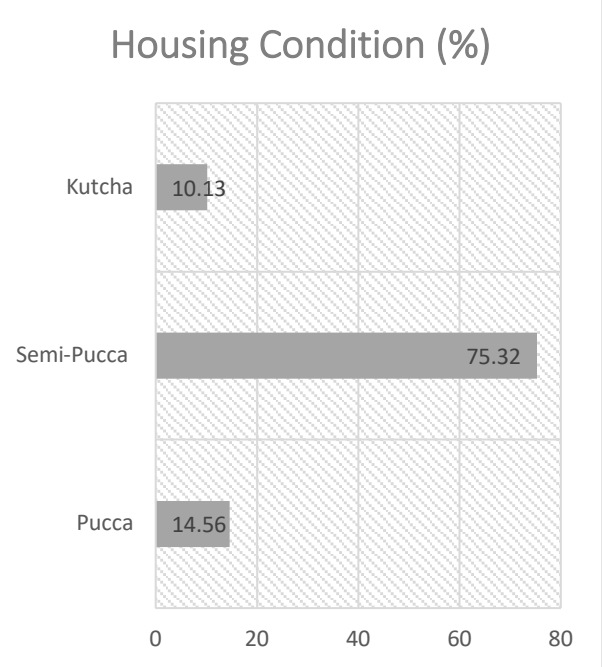
Conditions of Housing, Water, and Sanitation Facilities

Housing conditions play a critical role in shaping the vulnerability of informal workers to environmental risks and climate-related hazards. The study categorises housing arrangements among respondents into four main types: permanent housing, rented accommodation, leased housing, and temporary shelters.

The findings reveal that a majority of respondents (54%) live in rented accommodation, while 34% own their homes indicating that a majority of households lack secure housing tenure. Smaller proportions reside in leased or temporary housing arrangements.

In terms of housing quality, the majority of respondents (75%) live in semi-permanent (semi-pucca) structures, while 10% reside in kutcha housing constructed with temporary materials. Only 15% live in permanent (pucca) houses. These findings indicate that a large proportion of informal worker households live in housing that offers limited protection against environmental hazards such as heavy rainfall, flooding, and extreme heat.





Although access to electricity is relatively high, with 93.04% of households reporting electricity connections, this does not necessarily translate into improved living conditions. Many respondents reported irregular supply or shared connections, particularly in densely populated settlements.

Access to water and sanitation services remains uneven. The majority of households (70%) depend on community taps for water, while a smaller proportion has access to private water connections. This reliance on shared water sources often leads to uncertainty in supply and increased time spent collecting water. Women in particular bear the primary responsibility for water collection, often spending several hours each day securing water for household use. In

many areas, women reported waking up as early as 4:30 a.m. daily to collect water, access sanitation facilities, and prepare meals—often resulting in workdays extending up to 17 hours.

Sanitation facilities are available to many households, but their quality and accessibility vary. Only few households (24%) have access to private toilets, others depend on shared or public facilities, which are often poorly maintained. Inadequate drainage systems in many settlements contribute to waterlogging during heavy rainfall, increasing exposure to health risks.

Cooking fuel usage is predominantly LPG (94%), suggesting some level of access to clean energy, though affordability and consistency of supply may remain concerns.

These housing arrangements highlight the precarious living conditions faced by many informal workers. Informal settlements frequently lack planned infrastructure, reliable drainage systems, and durable housing structures. As a result, residents are particularly vulnerable to flooding, waterlogging, and extreme heat. Poor ventilation and densely built neighbourhoods further intensify the effects of heatwaves, especially during summer months.

These findings demonstrate that access to basic urban services remains uneven among informal worker communities. Inadequate housing, limited sanitation infrastructure, and unreliable water supply increase the vulnerability of these households to environmental hazards and public health risks.

Access to Social Security and Welfare Measures

Access to social security and welfare measures is a critical determinant of the resilience of informal worker households, particularly in the face of economic instability and climate-related disruptions. However, the findings from the Bengaluru survey reveal that access to such measures remains uneven, fragmented, and insufficient, leaving a significant proportion of workers without meaningful institutional support . The data indicates that nearly one-third of respondents (31%) are not enrolled in any welfare scheme at all, pointing to a substantial level of exclusion within a population that is already economically vulnerable. Even among those who are covered, access is typically limited to one or two schemes, rather than reflecting a comprehensive safety net that addresses multiple dimensions of vulnerability.

The most prominent form of social protection available to informal workers is the Public Distribution System (PDS), with 62% of respondents reporting access. This suggests that food security schemes form the primary, and in many cases the only, interface between informal worker households and the state. The importance of PDS in this context cannot be overstated, as it provides a crucial buffer against food insecurity in households characterised by low and irregular incomes. However, the dominance of a single scheme also highlights the narrow scope of social protection available. While food subsidies address immediate consumption needs, they do little to mitigate other forms of risk, such as health emergencies, income loss, or old-age insecurity.

In contrast to the relatively wider reach of food security programs, access to other forms of welfare remains extremely limited. Health insurance coverage, for instance, is almost negligible, with only 2.5% of respondents reporting any form of enrolment. This lack of financial protection against health risks is particularly concerning given the occupational profile of informal workers, many of whom are exposed to hazardous working conditions, extreme weather, and environmental pollution. In the absence of insurance, healthcare expenses are typically met through out-of-pocket payments, which often result in debt or deferred treatment. This reinforces a cycle in which health shocks translate directly into financial distress.

Similarly, access to pension schemes is limited, with only 8.2% of respondents reporting registration under old-age pensions and an even smaller proportion accessing widow pensions. These figures suggest that social security mechanisms designed to support vulnerable groups over the life cycle are not effectively reaching large sections of the population. For workers who spend their entire lives in informal employment without retirement benefits, this lack of support has serious implications for long-term security and well-being.

The near absence of labour-linked welfare and employment schemes further underscores the structural gaps in social protection. Labour welfare schemes, which are specifically designed for workers in sectors such as construction, show extremely low levels of coverage, with only 3.1% of respondents reporting access, while one-third of respondents working in this sector. This suggests that barriers such as lack of registration, complex documentation requirements, and low awareness continue to prevent workers from accessing benefits to which they may be entitled. This reflects a broader policy gap in addressing livelihood insecurity in urban areas, where informal workers face frequent disruptions in employment but lack access to institutional mechanisms that could provide income support during periods of distress.

Access to schemes related to education, nutrition, and gender support is similarly limited. Very few respondents reported benefiting from educational assistance programs or child welfare schemes, and participation in initiatives targeted at women or other vulnerable groups remains negligible. These gaps are particularly significant because such programs play an important role in addressing intergenerational disadvantage and improving long-term outcomes for households. Their limited reach suggests that social protection systems are not adequately addressing the broader developmental needs of informal worker families.

Although a small proportion of respondents reported access to state-specific schemes, such as those targeted at particular social groups or occupations, these remain marginal in terms of overall coverage. The fragmented nature of scheme access indicates that while multiple programs may exist on paper, their implementation does not translate into widespread or effective coverage. Instead, access appears to depend on a combination of awareness, eligibility, and administrative feasibility, leading to uneven outcomes across households.

The patterns observed point to several underlying structural barriers. Documentation requirements and proof of residence often exclude migrant workers, who constitute a significant share of the informal workforce. Lack of awareness about available schemes

further limits enrolment, while bureaucratic processes and administrative hurdles discourage participation. At the same time, the informal nature of employment means that many workers are not registered within official systems, preventing them from accessing labour-linked benefits. These factors collectively contribute to a situation in which social protection remains inaccessible to those who need it most.

The implications of these gaps are particularly significant in the context of climate change. Informal workers are highly exposed to climate-related risks such as heat stress, flooding, and income disruption due to extreme weather events. In the absence of robust social security systems, households are forced to rely on informal coping mechanisms, including borrowing, reducing consumption, or withdrawing children from education. Such strategies may provide short-term relief but often exacerbate long-term vulnerability. The lack of health insurance increases exposure to climate-related health risks, while the absence of employment support mechanisms amplifies the impact of lost working days. Similarly, limited access to pensions and welfare schemes reduces the ability of households to cope with shocks over time.

Overall, these shortcomings not only reflect broader structural inequalities within urban systems but also contribute directly to the vulnerability of informal worker households. Strengthening access to comprehensive and inclusive social protection will therefore be essential for improving resilience and ensuring that urban development pathways are both equitable and climate-responsive.

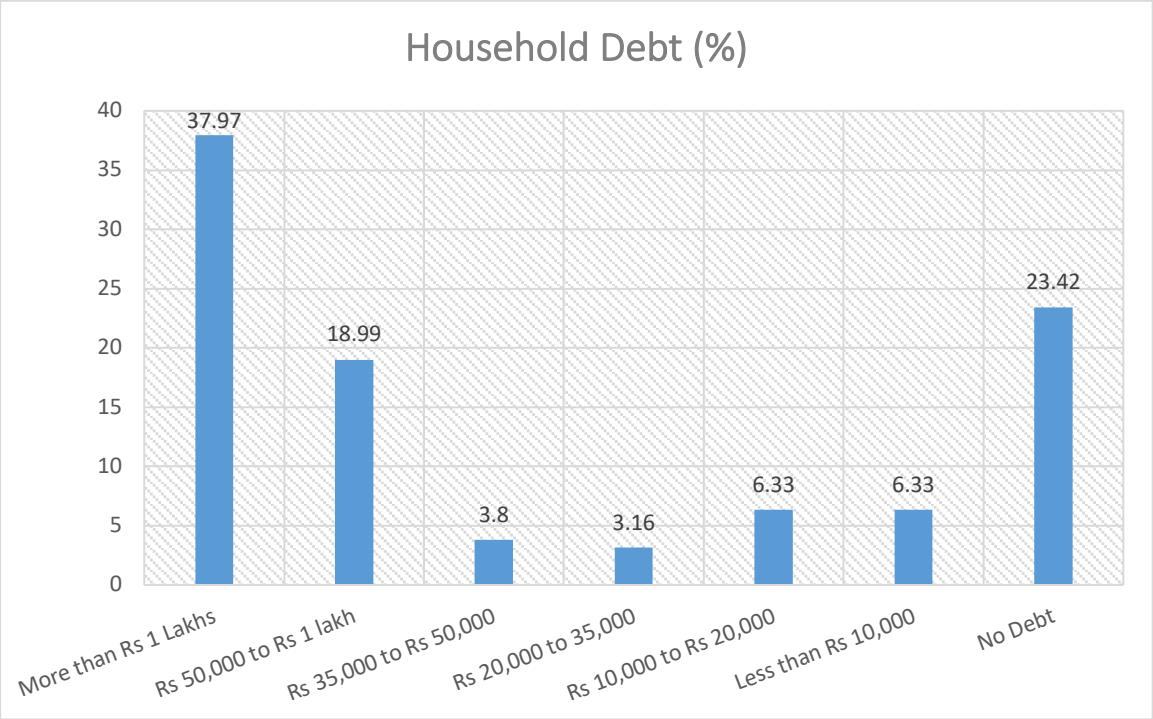
Income and Debt Profile

The income and financial profile of respondents highlights the precarious economic conditions faced by informal workers in Bengaluru. Most households rely on daily wage labour or irregular employment in sectors such as construction, street vending, choultry, and other informal services. These forms of employment are characterised by unstable incomes and limited financial security, leaving workers highly vulnerable to economic shocks and climate-related disruptions.

Income distribution data highlights the precarious economic conditions faced by these informal workers. A majority of households fall within lower income brackets, with 57% earning between ₹10,001 and ₹25,000 per month, and 16% earning below ₹10,000. Only a small proportion of respondents earn above ₹25,000, indicating widespread income insecurity. These low levels of income severely constrain the ability of households to invest in housing improvements, healthcare, education, or savings. Consequently, many families remain trapped in cycles of poverty and financial instability.

The analysis of household debt among informal workers in Bengaluru reveals that indebtedness is both widespread and structurally embedded within their economic lives, functioning less as an occasional coping mechanism and more as a routine strategy for survival. The data indicates that a significant proportion of respondents carry substantial debt burdens, with 38% reporting outstanding debt above ₹1 lakh, and an additional 19% owing between ₹50,000 and ₹1 lakh. This distribution points to a pattern where debt is not only

prevalent but often sizeable relative to household income, which for the majority lies between ₹10,000 and ₹25,000 per month.



The incidence of such high levels of debt must be understood in the context of irregular and insufficient earnings. Informal workers typically rely on daily wage labour or unstable income streams, making it difficult to accumulate savings or absorb unexpected expenses. As a result, households frequently resort to borrowing not only for emergencies but also for routine consumption needs. This is reflected in the primary reasons for debt, where consumption-related expenditure emerges as the most common factor (39%), closely followed by healthcare expenses (37%). The prominence of consumption-related borrowing indicates that incomes are often inadequate to meet basic household needs, forcing families into cycles of borrowing for day-to-day survival.

Healthcare-related debt represents another major dimension of vulnerability. In the absence of widespread health insurance coverage, medical expenses are largely financed through borrowing. This not only places an immediate financial burden on households but can also lead to long-term indebtedness, particularly in cases of serious illness or chronic conditions, reinforcing the link between lack of social protection and indebtedness.

In addition to consumption and healthcare, 25% of respondents reported borrowing for livelihood-related investments, such as purchasing tools, setting up small businesses, or sustaining existing economic activities. While such borrowing can potentially enhance income-generating capacity, it also reflects the absence of accessible and affordable institutional credit for informal workers. Without formal financial support, households often

rely on high-cost borrowing to finance economic activities, which can further entrench financial precarity.

The sources of debt further highlight the precarious financial ecosystem within which informal workers operate. A large proportion of respondents rely on non-banking financial institutions (45%), which often provide easier access to credit but at higher interest rates compared to formal banks. Traditional moneylenders are another major source (34%), reflecting continued dependence on informal credit markets. These sources are typically characterised by flexible lending but also by exploitative terms, including high interest rates and short repayment periods.

Self-help groups (SHGs) also play a significant role, with 27% of respondents accessing credit through these networks and borrowing from friends, relatives, or neighbours (13%) represents another important coping mechanism. In contrast, access to formal banking institutions remains relatively low, with only 20% of respondents reporting bank-based borrowing. As a result, households are often locked into cycles of informal borrowing, which can exacerbate financial vulnerability over time.

The interplay between high debt levels, informal sources of credit, and consumption-driven borrowing reveals a pattern of chronic indebtedness rather than episodic borrowing. Debt is not merely a response to isolated shocks but is embedded in the everyday economic practices of informal worker households. This has important implications for their ability to cope with additional stresses, including those arising from climate change. Environmental disruptions such as extreme heat, flooding, or loss of working days can reduce income while simultaneously increasing expenditure, forcing households to take on additional debt or deepen existing liabilities.

Overall, the findings suggest that debt among informal workers in Bengaluru is both widespread and structurally determined, arising from a combination of low incomes, inadequate social protection, and limited access to affordable financial services. Addressing this issue requires not only expanding access to formal credit but also strengthening social security systems, particularly in areas such as healthcare and income support, to reduce the need for distress borrowing.

3.2. Perceptions on Weather Patterns Changes

Understanding how communities perceive environmental change is an important component of climate research, particularly when examining the impacts of climate variability on vulnerable populations. Informal workers often spend long hours outdoors and rely directly on environmental conditions for their livelihoods. As a result, they develop a strong awareness of weather patterns and seasonal changes through their daily experiences.

The survey conducted among informal workers in Bengaluru revealed that respondents perceive significant changes in local weather conditions over recent years. These perceptions are shaped by direct exposure to extreme heat, irregular rainfall, flooding, and other environmental disturbances that affect both living conditions and livelihood opportunities.

The findings suggest that climate variability is not an abstract concept for these communities; rather, it is experienced through tangible disruptions in everyday life.

Incidence of Extreme Weather Events

Informal workers in Bengaluru understand and interpret climate change primarily through their repeated encounters with extreme weather events that directly affect their livelihoods, health, and living conditions. Rather than conceptualising climate change in scientific or abstract terms, respondents associate it with a noticeable increase in the frequency, intensity, and overlap of everyday climatic disruptions—particularly heatwaves and irregular rainfall. A large majority report experiencing irregular rainfall (72.78%) and heatwaves (72.15%) over the past three years, with nearly half indicating that these events occur together. This overlap is critical in shaping perceptions, as it reflects how climate change is experienced not as isolated incidents but as compounding and mutually reinforcing stressors.

For many respondents, especially those engaged in outdoor and labour-intensive occupations such as construction work, street vending, and waste collection, heatwaves are perceived as one of the most immediate and tangible indicators of climate change. Workers describe extreme heat in terms of physical discomfort, exhaustion, and reduced ability to work for long hours. The increase in heat is not only seen as a seasonal phenomenon but as something that has intensified over time, with hotter days becoming more frequent and prolonged. This has led to a perception that the working environment itself has become more hostile, directly linking climate change to declining productivity and income.

Irregular rainfall is similarly interpreted through its disruptive effects on daily routines and economic activities. Respondents associate climate change with unpredictability in rainfall—unexpected showers, delayed monsoons, or uneven distribution of rain across the season. This unpredictability creates significant uncertainty for informal workers whose livelihoods depend on stable environmental conditions. For instance, construction work is often halted during rainfall, while street vendors face reduced customer footfall. Sudden rainfall events can also damage goods, disrupt transport, and increase the cost of daily operations. In this way, irregular rainfall is not just a climatic change but a source of economic instability.

Although less frequently reported, events such as flooding and storm surges are also recognised as manifestations of climate change, particularly among respondents living in vulnerable or low-lying areas. While only 5.70% reported experiencing such events, their impacts are often severe, including waterlogging, damage to housing structures, and temporary displacement. However, the relatively lower reporting of these events suggests that respondents perceive climate change more through frequent, moderate disruptions rather than rare catastrophic events. This distinction is important, as it highlights that the everyday experience of climate change is shaped by cumulative, recurring stresses rather than singular disasters.

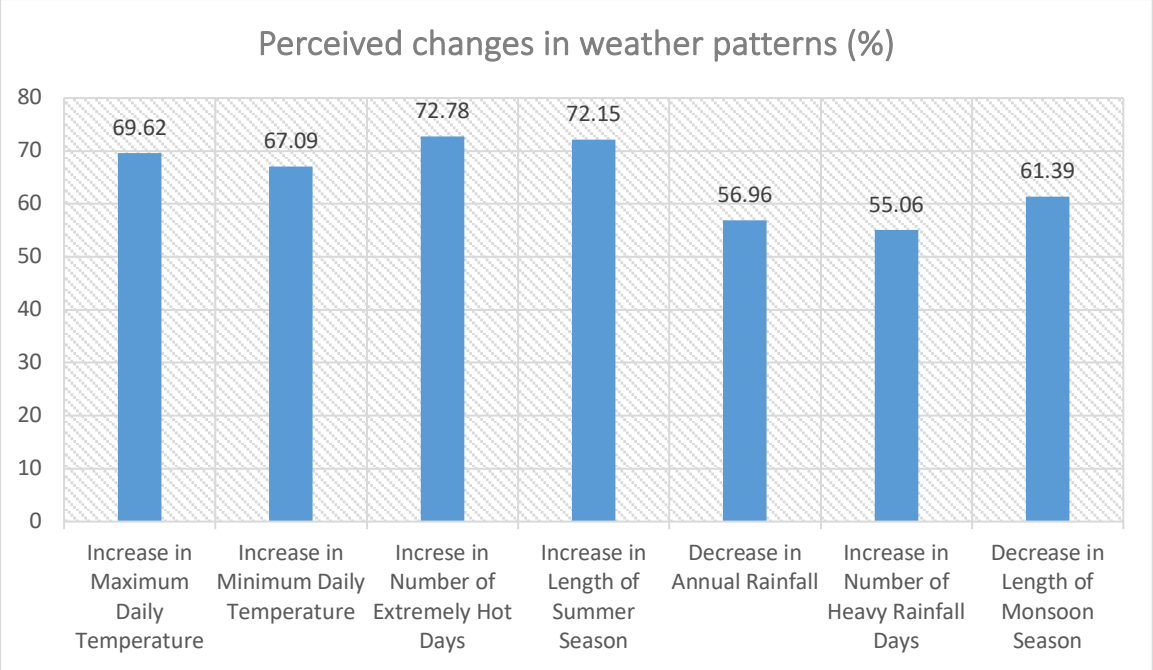
The near-universal exposure to at least one type of extreme weather event further reinforces the perception that climate change is an ongoing and pervasive phenomenon. Only a small

fraction of respondents reported no such experiences, indicating that extreme weather has become embedded in the routine realities of urban life. This normalisation of disruption plays a key role in shaping how climate change is understood—not as an occasional anomaly, but as a persistent condition that affects work, income, and well-being.

The impacts of these events extend beyond immediate disruptions to include longer-term economic and material consequences. Respondents reported damage to their housing, particularly roofs and walls, reflecting the vulnerability of semi-permanent and informal housing structures to rainfall and storms. More significantly, respondents reported substantial numbers of days without income due to extreme weather. These prolonged interruptions reinforce the association between climate change and livelihood insecurity, as workers are forced to cope with repeated income shocks. Thus, for informal climate change, in this context, is defined by the intensification of everyday risks that directly affect survival and stability.

Changes in Seasonal Patterns

In addition to specific extreme events, informal workers strongly associate climate change with broader and long-term shifts in weather patterns, particularly rising temperatures, changing seasonal cycles, and increasing unpredictability. These perceptions are shaped by cumulative observations over time, reflecting how workers make sense of gradual environmental changes through everyday experience.



A dominant theme in respondents' perceptions is the steady increase in temperature. A significant majority report that both maximum (69%) and minimum temperatures (67%) have

increased, indicating a widespread perception of overall warming. This is further reinforced by the belief that the number of extremely hot days has increased (73%) and that the summer season has become longer (72%). For informal workers, these changes are not abstract trends but lived realities that shape daily routines. Extended summers mean longer periods of exposure to heat, reduced working hours, and increased health risks such as dehydration and fatigue.

Workers often interpret these changes as a fundamental shift in the nature of seasons themselves. Summer is no longer seen as a fixed period but as an expanding phase that encroaches on other seasons. This blurring of seasonal boundaries contributes to a broader perception that the climate has become unstable and unpredictable. The experience of prolonged heat also affects household conditions, particularly in densely populated settlements with limited ventilation, further reinforcing the perception that climate change is making everyday life more difficult.

Rainfall patterns are another key component of how respondents understand climate change. A majority perceive a decline in annual rainfall (57%), along with an increase in heavy rainfall days (55%) and a shortening of the monsoon season (62%). This captures a seemingly contradictory but analytically significant perception among informal workers—that rainfall is both declining overall and becoming more intense in shorter bursts. However, this combination reflects not inconsistency in responses, but rather a nuanced experiential understanding of changing rainfall regimes under climate variability.

At one level, the perception of a decline in annual rainfall indicates that respondents associate climate change with increasing water scarcity and longer dry periods. This aligns with everyday experiences of delayed monsoons, reduced frequency of rain over the season, and prolonged intervals without precipitation. At the same time, the reported increase in heavy rainfall days suggests that when rainfall does occur, it is perceived as more intense and concentrated. This reflects a shift from steady, moderate rainfall to episodic and high-intensity precipitation events. Such rainfall is often disruptive rather than beneficial—it can lead to waterlogging, flooding of streets and settlements, damage to goods and housing, and immediate work stoppages. For informal workers, this kind of rainfall does not compensate for overall scarcity; instead, it introduces additional risks and instability.

The perception of a shortening monsoon season further reinforces this pattern. Respondents appear to be observing that the duration of the rainy season has decreased, even as rainfall within that shorter window has become more erratic and intense. This compression of rainfall into shorter timeframes is critical, as it reduces the predictability and spread of rainfall across weeks or months. A shorter monsoon limits the number of working days that are climatically "normal," while increasing the likelihood of abrupt disruptions.

This concept of "irregular rainfall" emerges as a central way in which workers interpret these changes. Rather than focusing on total rainfall amounts, respondents emphasise the timing, distribution, and predictability of rainfall. Delayed monsoons, sudden downpours, and uneven rainfall across days or weeks are seen as key indicators of climate change. This

unpredictability disrupts not only work schedules but also broader patterns of urban life, including transport, market activity, and access to services.

Perceptions of winter changes are more varied, with some respondents reporting increases in cold days and others noting decreases. However, this variation itself contributes to a shared understanding that weather patterns are no longer consistent. The lack of clear and predictable seasonal patterns reinforces the perception that climate change is characterised by instability rather than uniform change.

Another important dimension of these perceptions is the relative stability in reported flooding patterns, with a majority indicating no significant change in the number of flood days. However, a notable minority reports increases, suggesting that flooding remains a localised but important concern. This variation highlights how perceptions of climate change are shaped by local environmental conditions, with some risks being more visible or relevant in specific areas.

Overall, informal workers interpret changes in weather patterns as a shift towards greater variability, unpredictability, and intensity. Climate change is understood as a process that disrupts the regularity of seasons, making it more difficult to anticipate and adapt to environmental conditions. These perceptions are closely tied to lived experiences of work and survival, as unpredictable weather directly affects income, health, and daily routines.

Importantly, this experiential understanding of climate change reflects a form of grounded knowledge that captures dimensions often overlooked in formal climate data—particularly the lived consequences of variability and uncertainty. For informal workers, climate change is not just about rising temperatures or changing rainfall averages, but about the erosion of predictability that once allowed them to plan their work and manage risks.

3.3. Impact of Changing Weather Patterns on Livelihood and Living Conditions

The survey findings indicate that respondents perceive changing weather patterns as having a significant influence on both their livelihoods and their everyday living conditions. Informal workers in Bengaluru are particularly sensitive to climatic variations because most of their occupations involve outdoor labour and depend heavily on environmental conditions. As a result, respondents often interpret climate change not only through extreme weather events but through the ways these events disrupt their ability to work, earn income, and maintain stable household conditions.

Participants in the study frequently described climate variability as something that directly shapes their daily routines. Heatwaves, unpredictable rainfall, and dust storms were commonly cited as conditions that make it difficult to continue work for long hours. These disruptions affect employment opportunities, household finances, and consumption practices, creating multiple layers of vulnerability for already marginalised communities.

Changes in Livelihood Patterns

Informal workers in Bengaluru overwhelmingly perceive changes in weather patterns as directly undermining the stability, predictability, and sustainability of their livelihoods. These impacts are not limited to occasional disruptions but are experienced as a continuous erosion of income security, driven by both extreme weather events and gradual climatic shifts such as rising temperatures and erratic rainfall.

A central way in which respondents associate climate change with livelihood impacts is through the reduction of income and working days. The data shows that around 80% of workers associate losing more than a month of work annually, due to climate related disruptions. This scale of disruption is substantial, effectively translating into long periods of lost income each year. In addition, many respondents report days with reduced earnings, indicating that even when work is available, productivity and income are often compromised due to adverse weather conditions. For many respondents, the loss of labour hours is one of the most visible and immediate consequences of changing weather patterns. It reduces their ability to earn daily income and creates uncertainty about their capacity to meet household expenses.

Heatwaves and prolonged summer seasons are particularly disruptive. Workers report that extreme heat makes it physically impossible to sustain long hours of labour, especially in sectors such as construction, street vending, and waste work. This leads to shorter working hours, increased rest periods, and in some cases complete withdrawal from work during peak heat periods. Similarly, irregular rainfall disrupts work unpredictably, halting activities such as construction and reducing customer footfall for vendors. Respondents also pointed out that employers sometimes suspend construction activities during periods of extreme rainfall, leaving workers without employment for several days or weeks. Since informal workers typically do not have employment contracts or paid leave, these interruptions translate directly into lost wages. These disruptions are not only immediate but cumulative, creating long-term income instability.

The data also reflects structural shifts in livelihood patterns. A significant proportion of respondents report that certain occupations have reduced or become less viable over time, particularly street vending (32%) and construction work (28%). These sectors are highly climate-sensitive, and increasing variability reduces their reliability as income sources. In response, some households have attempted to diversify or shift livelihoods, with increases reported in domestic and home-based work. However, these shifts often represent coping strategies rather than upward mobility, as workers remain confined within the informal economy.

There is also evidence of increased mobility as an adaptive response, with some households reporting migration or commuting to nearby areas for work. This suggests that climate-induced livelihood stress is not only altering occupational choices but also spatial patterns of work. However, such adaptations often involve additional costs, risks, and uncertainties, further complicating livelihood strategies.

Overall, respondents perceive climate change as creating a condition of persistent livelihood precarity, where income is no longer stable or predictable. The combined effects of lost workdays, reduced productivity, and shifting occupations reinforce a sense that traditional livelihood patterns are becoming increasingly untenable under changing climatic conditions.

Impacts on Health and Wellbeing

Changes in weather patterns are also strongly associated with declining occupational safety and health, which in turn affects both well-being and economic productivity. A significant proportion of respondents (37%) report experiencing illness related to extreme weather events, indicating that health impacts are widespread and closely linked to environmental conditions.

The rise in temperatures and the increase in extremely hot days are perceived as major contributors to physical stress and health risks. Construction workers and street vendors in particular reported that working under direct sunlight for extended periods becomes increasingly difficult during peak summer months. Some workers noted that they feel physically drained by midday and are forced to rest for longer periods before resuming work. Workers report symptoms such as fatigue, dehydration, dizziness, and in some cases heat stroke. These conditions not only reduce immediate work capacity but can also lead to longer-term health complications. The extension of summer further exacerbates these risks by increasing the duration of exposure.

Irregular rainfall and changing humidity levels contribute to a different set of health challenges. Respondents report illnesses such as frequent fever, respiratory problems, persistent cough, and skin and eye infections. These conditions are often linked to poor living and working environments, including exposure to polluted water, damp conditions, and inadequate sanitation. The coexistence of heat and humidity further intensifies discomfort and health risks.

Heavy rainfall and waterlogging were identified as another major health concern. Respondents reported that during periods of heavy rainfall, poor drainage infrastructure in informal settlements leads to stagnant water in residential areas and workplaces. These conditions increase the risk of waterborne diseases and infections.

An additional health-related impact emerging from the data is the burden of water collection, which respondents associate with changing climatic conditions such as rising temperatures and irregular rainfall. Water collection is predominantly undertaken by women (79%), highlighting its gendered nature. Respondents report increased effort due to factors like summer heat, unreliable water supply, and crowding at sources. These responses suggest that even where time burdens remain constant, the conditions of access have worsened, with higher temperatures and inconsistent availability making water collection more physically demanding and stressful. Respondents link this to increased fatigue, heat exposure, and reduced time for rest or work, indicating that climate change is intensifying everyday labour

in subtle ways. Thus, water collection is perceived not only as a routine task but as an emerging site of climate-related health vulnerability, particularly for women.

Respondents also emphasised the cumulative nature of these health challenges. Many workers explained that the combination of physically demanding labour, extreme weather conditions, and limited access to healthcare gradually weakens their ability to work over time. Illness often results in missed workdays, compounding the effects of climate-related work disruptions. For daily wage workers, declining health can directly affect livelihood opportunities, creating a cycle in which poor health reduces income while reduced income limits access to medical treatment. In many cases, multiple family members may be affected, amplifying the overall impact on household income.

Access to healthcare remains limited, and many respondents report not receiving adequate treatment. Even when care is sought, it often involves out-of-pocket expenditure, which can be substantial relative to household income. The data shows that some households incur significant medical expenses, adding to financial stress. Hospitalisation, though less common, represents an extreme form of vulnerability, combining health shocks with economic strain.

Thus, respondents perceive climate change as directly affecting their physical capacity to work, creating a feedback loop where declining health reduces earning potential, which in turn limits the ability to seek adequate treatment. This linkage between environmental conditions, health, and income highlights the multidimensional nature of vulnerability among informal workers.

Impact on Housing, Assets and Debt

Respondents clearly link climate change to a growing sense of insecurity in their housing and material conditions, interpreting extreme weather events as direct threats to the safety and stability of their homes. Around 14% of respondents report damage to their houses, most commonly to roofs and walls, which they associate with excessive and irregular rainfall. For many, such damage is not seen as an isolated incident but as evidence that changing weather conditions are making their already fragile dwellings more vulnerable over time.

Even when the extent of damage appears limited, respondents perceive its implications as severe. Minor damage is understood to weaken the structure of the house, increase exposure to future weather events, and create unsafe living conditions. This reflects an awareness that climate change amplifies existing vulnerabilities—particularly for those living in informal or semi-permanent housing. The inability to fully repair such damage, which respondents link to financial constraints and repeated exposure to climate-related risks further deepens this perception. In this sense, climate change is seen as creating a condition of permanent partial recovery, where households are unable to restore stability before the next disruption occurs.

Respondents also connect climate impacts to the loss or deterioration of household and livelihood assets, including items such as appliances, tools and unsold goods. While such losses may not always be widespread, they are perceived as significant because they affect daily functioning, require additional expenditure to replace and thereby lead to loss of income

generating capabilities. These experiences reinforce the understanding that climate change affects both income and also the material basis of everyday life.

Debt emerges as a central way in which respondents cope with these impacts, and they explicitly associate borrowing with climate-related shocks. About 22% report incurring debt due to extreme weather events, often to cover repair costs, healthcare expenses, or compensate for lost income. Respondents perceive this borrowing not as a choice but as a necessity, driven by the absence of savings and immediate financial needs. At the same time, they recognise that reliance on informal or semi-formal sources—such as moneylenders, non-banking institutions, and self-help groups—places them under additional financial pressure due to high interest rates and strict repayment conditions.

A key aspect shaping these perceptions is the near absence of institutional support. Almost no respondents report receiving compensation for damages, and the majority report not receiving any form of relief following extreme weather events. This lack of support leads respondents to view climate change as a self-managed crisis, where they must rely on their own limited resources or take on debt to recover.

Overall, respondents interpret climate change as contributing to a cycle of material damage, incomplete recovery, and increasing indebtedness, where each event weakens their financial position further. Housing vulnerability, asset loss, and debt are not seen as separate issues but as interconnected outcomes of changing weather patterns, reinforcing long-term insecurity.

Changes in Consumption Patterns

Respondents also associate climate change with pressures on household consumption, particularly in relation to food security and basic needs. While a majority report maintaining their consumption levels, respondents explicitly perceive an increase in household expenses as a direct and unavoidable consequence of climate-related vulnerabilities, linking rising costs to both the immediate and cascading effects of changing weather patterns. The data shows that households report a wide range of additional annual expenditures due to extreme weather events, which are not viewed as isolated or one-time costs, but as recurring financial pressures that accompany frequent climate disruptions.

A key way respondents interpret this rise in expenditure is through the multiplicity of costs triggered by a single climatic event. Increased spending is most commonly reported on food (92%), livelihood inputs (65%), and healthcare (59%), indicating that climate change simultaneously affects basic consumption, income generation, and well-being. Respondents associate higher food expenditure with both rising prices and the need to compensate for irregular income, while increased spending on livelihood inputs reflects the additional costs required to sustain or restart work after disruptions.

Healthcare emerges as another major driver of increased expenditure, closely linked to the earlier findings on climate-related illness. Respondents connect rising medical costs to greater exposure to heat, pollution, and unsanitary conditions following rainfall events. These health-related expenses are often unplanned and urgent, further straining already limited financial

resources. The data also shows that a significant number of respondents incur out-of-pocket expenses for treatment, sometimes amounting to tens of thousands of rupees, reinforcing the perception that climate change increases financial risk through health shocks.

Transport costs (31%) also increase as respondents adjust to disrupted mobility patterns caused by extreme weather, such as waterlogging or excessive heat, which make commuting more difficult and expensive.

These changes are closely tied to how respondents experience income instability. Loss of workdays, reduced earnings, and increased expenditures—especially on health and housing repairs—force households to adjust their spending. Respondents describe reducing food intake, skipping meals, or lowering the quality of food consumed as immediate responses to financial stress. In this way, climate change is understood as directly affecting the most basic aspect of daily life—food consumption—through its impact on income and expenditure.

At the same time, many respondents emphasise that they try to maintain food consumption even under difficult conditions. This often involves prioritising food over other expenses, borrowing money, or cutting back on non-food needs such as education, healthcare, or housing improvements. As a result, stable consumption levels do not necessarily indicate resilience; rather, respondents recognise that they are often maintaining consumption at the cost of increasing financial strain. This highlights an important perception that the visible stability of consumption can conceal deeper economic stress and indebtedness.

Overall, respondents interpret climate change as indirectly but powerfully shaping consumption patterns by destabilising income and increasing expenditure pressures. The need to constantly adjust consumption—whether by reducing intake or reallocating resources—reinforces a broader perception of economic fragility, where households are forced into difficult trade-offs to cope with ongoing environmental change.

Chapter 4: Discussions

The analysis presented in the previous chapter demonstrates that informal workers in Bengaluru face multiple, interconnected risks arising from changing weather patterns. These risks are shaped not only by climatic variability but also by structural inequalities related to employment insecurity, inadequate housing, limited access to services, and weak social protection systems.

Existing research highlights that climate change acts as a "risk multiplier," intensifying pre-existing socio-economic vulnerabilities (IPCC, 2022). Informal workers represent one of the most exposed groups within urban economies because their livelihoods depend heavily on outdoor labour and because they often reside in environmentally fragile settlements. The findings of this study reinforce these observations and show how climate variability interacts with urban poverty to produce new forms of livelihood insecurity.

The following sections discuss three key dimensions emerging from the analysis: the relationship between climate change and increased vulnerability among informal workers, community perceptions of climate change, and the coping mechanisms adopted by households facing environmental disruptions.

4.1. Climate Change and Increased Vulnerability of Informal Workers

The socio-economic profile of respondents reveals multiple, intersecting forms of precarity. Low and irregular incomes, high levels of indebtedness, insecure housing, and limited access to social protection create a fragile baseline condition. When climate-related disruptions—such as extreme heat and irregular rainfall—interact with these conditions, they amplify vulnerability rather than simply adding to it. For instance, the data shows that a large proportion of workers lose significant working days annually due to extreme weather, directly affecting income. This is consistent with findings by the International Labour Organization (2019), which highlights how heat stress reduces labour productivity, particularly in outdoor occupations common in the informal sector.

Housing conditions further compound vulnerability. With the majority of respondents residing in semi-permanent or kutcha structures, even moderate climatic events can result in damage, displacement, or unsafe living conditions. As Davis (2006) and Roy (2005) argue, the spatial marginalisation of the urban poor into environmentally vulnerable areas is a structural outcome of urban development processes. In Bengaluru, this is reflected in settlements with inadequate drainage, exposure to waterlogging, and limited protection from heat.

The financial dimension of vulnerability is particularly striking. The data indicates widespread indebtedness, with a significant proportion of households carrying large debt

burdens relative to their income. Climate-related disruptions further deepen this condition by simultaneously reducing income and increasing expenditure, particularly on healthcare, food, and livelihood inputs. This dual pressure creates what can be described as a "climate-induced poverty trap," where households are unable to recover fully from shocks before encountering new ones.

The absence of comprehensive social protection exacerbates these vulnerabilities. While access to the Public Distribution System provides some level of food security, other forms of support—such as health insurance, labour welfare, and income protection—remain largely inaccessible. This reflects broader findings in urban policy literature, which highlight the inadequacy of existing welfare systems in addressing the needs of informal workers (Chen et al., 2005). Without institutional support, households rely on informal coping mechanisms such as borrowing, which further entrenches financial insecurity.

Overall, the findings reinforce the concept of compound vulnerability, where climate change interacts with structural inequalities to produce layered and mutually reinforcing risks. Informal workers in Bengaluru are not only more exposed to climate hazards but also less equipped to cope with their impacts, making them disproportionately vulnerable within the urban system.

4.2. Community Perception of Climate Change

The study highlights that informal workers possess a rich, experiential understanding of climate change, grounded in their daily interactions with the environment. Unlike scientific or policy-driven definitions, respondents interpret climate change through observable changes in weather patterns and their direct consequences on livelihoods and living conditions.

A dominant perception among respondents is the increase in temperature and the extension of summer seasons. This aligns with scientific evidence on urban heat island effects and rising temperatures in rapidly urbanising cities (Oke, 1982; IPCC, 2022). However, what distinguishes community perceptions is the way these changes are framed—not in terms of temperature averages, but in terms of workability, physical strain, and livelihood disruption. For informal workers, climate change is understood through the question of whether it is possible to work under current conditions.

Similarly, perceptions of rainfall reflect a nuanced understanding of climate variability. Respondents simultaneously report a decline in total rainfall and an increase in heavy rainfall events, along with a shortening of the monsoon season. While this may appear contradictory, it corresponds closely with scientific observations of increasing rainfall variability and intensity under climate change. The concept of "irregular rainfall" used by respondents captures this complexity, emphasising unpredictability rather than averages.

Importantly, respondents tend to perceive climate change through frequent, moderate disruptions rather than rare catastrophic events. Heatwaves and irregular rainfall are seen as

more significant than floods or storms, even though the latter may have more dramatic impacts. This reflects the cumulative nature of climate vulnerability, where repeated small disruptions can have profound long-term effects on livelihoods and well-being.

The findings also highlight that climate change is understood as a progressive deterioration of environmental stability. Respondents frequently describe changes in terms of unpredictability—seasons no longer follow expected patterns, and weather conditions are harder to anticipate. This erosion of predictability has significant implications, as it undermines the ability of workers to plan their activities and manage risks.

These perceptions align with emerging literature on "lived experiences of climate change," which emphasises the importance of local knowledge in understanding environmental change (Bulkeley et al., 2014). Informal workers' interpretations provide valuable insights into how climate variability is experienced on the ground, particularly in urban contexts where formal data may not capture micro-level variations.

At the same time, the findings reveal a gap between community perceptions and policy frameworks. While respondents clearly recognise and articulate changes in weather patterns, their understanding is not necessarily linked to formal climate discourse or adaptation strategies. This highlights the need to bridge the gap between scientific knowledge and experiential knowledge, ensuring that policy interventions are grounded in the lived realities of affected communities.

4.3. Coping with Climate Change

The findings indicate that informal workers adopt a range of coping strategies in response to climate-related disruptions. However, these strategies are largely short-term, reactive, and constrained by limited resources, reflecting what the literature describes as "autonomous adaptation" (IPCC, 2022).

One of the primary coping mechanisms is the adjustment of work patterns. Workers report altering their working hours to avoid peak heat, taking longer rest periods, or temporarily withdrawing from work during extreme conditions. While these strategies help reduce immediate health risks, they also result in reduced income, highlighting a trade-off between safety and livelihood.

Another key strategy is livelihood diversification and mobility. Some respondents report shifting occupations or seeking work in different locations to cope with reduced opportunities in climate-sensitive sectors. However, these shifts are often within the informal economy and do not necessarily lead to improved income or stability. Instead, they reflect constrained choices within a limited set of options.

Financial coping strategies are particularly prominent. Households rely heavily on borrowing to manage climate-related expenses, including healthcare costs, housing repairs, and consumption needs. This reliance on debt, often from informal sources, indicates that coping

mechanisms are frequently debt-driven and unsustainable, reinforcing long-term vulnerability.

Adjustments in consumption patterns also form an important coping response. Some households report reducing food intake or altering consumption habits during periods of financial stress. Others prioritise essential expenditures such as food while cutting back on education, healthcare, or housing improvements. These strategies highlight the difficult trade-offs that households must make in order to cope with limited resources.

Social networks play a supportive role in some cases, with households borrowing from friends or relatives or relying on community-based support systems. However, these networks are often themselves vulnerable, limiting their capacity to provide sustained assistance.

A critical finding is the near absence of institutional coping mechanisms. Very few respondents report receiving compensation, relief, or support from government programs in response to climate-related disruptions. This suggests that coping is largely individualised and informal, rather than supported by structured policy interventions.

The literature on climate adaptation emphasises the distinction between coping and adaptive capacity. While coping strategies help households manage immediate shocks, they do not necessarily enhance long-term resilience (Adger, 2006). In the case of informal workers in Bengaluru, the predominance of short-term coping mechanisms indicates a low level of adaptive capacity, driven by structural constraints such as poverty, lack of social protection, and limited access to resources.

Overall, the findings suggest that informal workers are actively responding to climate change, but within a context of severe constraints. Their strategies reflect resilience at the micro level, but also highlight the limits of individual adaptation in the absence of supportive institutional frameworks. Strengthening adaptive capacity will therefore require systemic interventions that address both environmental risks and underlying socio-economic inequalities.

Chapter 5: Policy Recommendations

The findings of the study demonstrate that climate change acts as a multiplier of existing vulnerabilities among informal workers in Bengaluru, affecting livelihoods, health, housing, and financial stability. These impacts are deeply intertwined with structural gaps in urban planning, social protection, and service delivery. Addressing these challenges requires an integrated policy approach that combines climate adaptation with social equity, in line with the principles of climate justice.

Policy responses must therefore address both environmental risks and socio-economic inequalities. Strengthening climate resilience among informal workers requires improvements in housing, infrastructure, social protection, livelihoods, healthcare access, and inclusive governance systems.

5.1 Housing and Infrastructure

Improving housing quality and urban infrastructure is essential for reducing climate vulnerability among informal worker households.

Housing

• Expand climate-resilient housing for informal workers under the Pradhan Mantri Awas Yojana (PMAY-Urban) by prioritising low-income informal worker households living in temporary settlements.

• Promote heat-resilient building designs in affordable housing schemes, including reflective roofing, improved insulation, ventilation, and shaded community spaces to reduce heat stress in densely populated settlements.

• Regularise and upgrade informal settlements through in-situ slum redevelopment programs under PMAY and the Karnataka Slum Development Board initiatives, ensuring secure tenure and improved basic services.

• Promote retrofitting of semi-pucca and kutcha housing using support from state housing programs and urban poverty alleviation schemes

Water Supply and Sanitation

• Strengthen piped water supply systems in informal settlements through the Jal Jeevan Mission and state water supply programs.

• Improve community water infrastructure, including storage tanks and local distribution networks, to reduce the time spent collecting water.

• Upgrade sanitation facilities by ensuring adequate water supply for toilets and regular maintenance of community sanitation infrastructure.

• Promote decentralised wastewater management systems in informal settlements to reduce environmental contamination and improve hygiene conditions.

Urban Infrastructure and Climate Resilience

• Strengthen drainage infrastructure in informal settlements to prevent waterlogging during heavy rainfall through municipal infrastructure programs and Smart City initiatives.

• Develop climate-resilient urban infrastructure under programs such as the Atal Mission for Rejuvenation and Urban Transformation (AMRUT), prioritising drainage, stormwater systems, and flood management.

• Increase urban green cover through city-level greening initiatives, including roadside tree plantations, community parks, and urban forests to mitigate the urban heat island effect.

• Create shaded public spaces and cooling centres in areas with high concentrations of outdoor workers as part of city Heat Action Plans.

Nature-based and climate-sensitive planning

• Restore lakes, wetlands, and stormwater systems under Karnataka State Action Plan on Climate Change and Bengaluru lake rejuvenation programs

• Increase urban green cover under state urban forestry and BBMP greening initiatives

• Implement rainwater harvesting and groundwater recharge systems in line with Karnataka groundwater regulations

5.2 Livelihood and Finances

Strengthening livelihood security and financial resilience is essential for reducing the economic impacts of climate variability on informal workers.

Employment and Livelihood Support

• Strengthen livelihood programs under the National Livelihood Mission to support skill development and alternative income opportunities for informal workers.

• Promote climate-resilient livelihood training, including skills in urban services, repair work, green jobs, and small-scale entrepreneurship through the Karnataka Skill Development Corporation (KSDC)

• Introduce urban wage employment programs during periods of climate disruption to provide temporary income support for informal workers.

• Provide wage compensation during extreme weather disruptions through state disaster relief funds.

Occupational Safety and Labour Protection

• Integrate informal workers into city Heat Action Plans by introducing workplace guidelines for heat stress management.

• Mandate shaded rest areas, drinking water, and protective equipment at construction sites and other outdoor workplaces.

• Develop shaded vending zones and climate-safe workspaces through local urban livelihood programs and street vendor policies

• Strengthen labour welfare boards, particularly the Building and Other Construction Workers Welfare Board, to ensure access to welfare benefits for construction labourers.

• Conduct awareness campaigns on occupational safety during extreme weather events, including heatwaves and dust storms.

Reducing debt vulnerability

• Expand access to low-interest credit through financial inclusion initiatives such as the Pradhan Mantri Mudra Yojana and microfinance programs.

• Promote savings and credit cooperatives or self-help groups among informal workers to reduce dependence on high-interest moneylenders.

• Introduce climate risk insurance schemes for informal worker households to protect against loss of income and housing damage.

• Simplify documentation requirements for accessing welfare schemes, particularly for migrant workers who lack formal identification or residence proof.

5.3 Social Protection and Healthcare

Improving access to social protection measures and healthcare is essential for strengthening long-term resilience among informal worker households.

Expanding social protection coverage

• Strenghthen access to food security through the Public Distribution System while ensuring portability for migrant workers under *One Nation One Ration Card*

• Expand coverage of public health insurance programs such as Ayushman Bharat – Pradhan Mantri Jan Arogya Yojana for all informal worker households.

• Promote inclusion of informal workers in low-cost insurance schemes such as Pradhan Mantri Suraksha Bima Yojana

• Expand community nutrition programs for children and pregnant women through Integrated Child Development Services (ICDS) and Poshan Abhiyan.

• Improve inclusion in pension schemes (old-age, widow, disability) through Karnataka social welfare programs

• Promote community kitchens and food assistance programs during extreme climate events to address temporary food insecurity.

Improving Healthcare Services

• Strengthen urban primary healthcare services in informal settlements by improving access to community health centres and mobile clinics.

• Organise periodic health camps for informal workers, focusing on heat stress management, waterborne diseases, and occupational injuries.

• Provide free or subsidised essential medicines through public health programs, particularly during periods of climate-related disruption.

5.4 Governance

Strengthening governance systems is essential for ensuring that climate adaptation policies effectively address the needs of informal workers.

Participatory Climate Governance

• Include informal worker representatives in urban climate planning processes, particularly in the preparation of city climate action plans.

• Strengthen collaboration between municipal governments and community organisations working with informal workers.

• Promote community-based climate adaptation initiatives, enabling local participation in environmental management.

Institutional Coordination

• Improve coordination between departments responsible for housing, labour, health, and urban development to address climate vulnerability in an integrated manner.

• Establish dedicated climate resilience units within municipal bodies to implement local adaptation strategies.

• Integrate informal worker concerns into state-level climate policies, including the Karnataka State Action Plan on Climate Change.

Data and Monitoring

• Develop city-level monitoring systems for climate impacts on informal workers, including periodic surveys and labour data collection.

• Encourage partnerships between research institutions, civil society organisations, and government agencies to generate evidence-based policy solutions.

• Use community-level data to identify high-risk settlements and prioritise climate adaptation investments.

The policy actions outlined above highlight the importance of integrating climate adaptation with social protection, labour rights, and inclusive urban development. Informal workers are essential to the functioning of urban economies but remain among the most vulnerable to climate-related risks.

Addressing these challenges requires coordinated interventions that improve housing conditions, strengthen livelihood security, expand access to healthcare and education, and ensure that informal workers are included in climate governance processes. By aligning climate adaptation strategies with existing national and state schemes, policymakers can develop more effective and inclusive responses to climate change.

References

International Labour Organization (ILO). (2019). *Working on a warmer planet: The impact of heat stress on labour productivity*.

IPCC. (2022). *Sixth Assessment Report*.

Karnataka State Action Plan on Climate Change (KSAPCC). (2014). Government of Karnataka.

UNDESA. (2023). *World Urbanization Prospects*.

UN-Habitat. (2020). *World Cities Report*.