



**PRIMARY SURVEY  
REPORT**

**LOCAL ACTION FOR CLIMATE  
CHANGE IN HADAPSAR-MUNDHWA  
WARD**

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**BATCH OF 2022 – 2025**

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## 1. Introduction:

This comprehensive primary research report examines 'Local Action for Climate Change in Pune City,' focusing on the Hadapsar ward. It analyses the current climate profile and vulnerabilities within the Hadapsar-Mundhwa ward and proposes mitigation, adaptation, and strategies to address climate change impacts in Pune City. Initially, a detailed primary survey was conducted among approximately 159 households in the ward. Subsequently, an Expert Interview was conducted with Anuja Bali, a renowned SDG & Climate Action Consultant and Ex-Maharashtra President of the WICCI Water Resource Council, to gain a thorough understanding of climate change perceptions in the city, its impact on residents, and those involved in managing its effects. Convenience sampling was employed as the method during the report's development. The report's conceptualization was based on data analysis, data visualization and hypothesis testing. Various relevant graphs depicting socioeconomic status, ward demographics, and mission-focused analyses were made to illustrate relationships among variables. The study used several software tools, including Knime, Python, R programming, and Stata. Additionally, three hypothesis tests employing the chi-square method were conducted to ascertain the statistical significance of variables.

Hadapsar stands out due to its emphasis on sustainability, with many modern buildings incorporating features such as rainwater harvesting storage and solar panels for electricity generation. Notably, townships like Amanora Park have prioritized eco-friendliness. Garbage disposal and sewage treatment facilities are well-maintained across localities in the ward. Data analysis revealed that young adults aged 21-30 exhibit the highest level of concern about climate change, with a correlation

existing between family income and awareness of climate change.

The dataset highlights the significant impact of climate change on daily life, particularly regarding extreme heat and declining air quality.

Gaining insight into the knowledge and engagement of climate experts in Pune is critical to identifying the obstacles and potential for progress in addressing environmental issues. While policies and regulations serve as crucial guides for the city's response to climate challenges, their successful execution remains a significant challenge. In Pune, frameworks such as the 2016 Solid Waste Management (SWM) regulations and the Extended Producer Responsibility (EPR) regulation offer promising strategies for sustainable waste management. Nonetheless, the slow implementation of EPR and issues like unlawful dumping indicate a disconnect between policy goals and tangible results.

The data obtained from various missions, such as the National Solar Mission and the National Mission for Sustainable Agriculture, has revealed significant discrepancies between the level of awareness and implementation of sustainable practices in different parts of the country. This highlights the need for targeted education and outreach efforts to bridge the gap and promote sustainable practices more effectively. Furthermore, the study also revealed income disparities, which impact the preferences for organic produce and the adoption of sustainable agricultural methods. Which requires paying immediate attention to the socioeconomic barriers to sustainability and ensuring that everyone has equal access to the resources and knowledge needed to adopt sustainable practices. Given that Pune is a densely populated city with rapidly developing residential and commercial areas such as Hadapsar, Viman Nagar, PCMC etc it is crucial that the urban planning of the city prioritizes energy efficiency, sustainable land use practices, and green

infrastructure. This will not only help mitigate the adverse environmental impacts of urbanization but also promote a healthy and sustainable lifestyle for the residents of the city.

## **2. Objectives of the Study:**

- 1.To outline the climate profile of the city.
- 2.To study the stakeholders' (citizens and government officials) awareness level of climate change in Pune city.
- 3.To assess local action for climate change inwards of Pune City and suggest suitable action plans and strategies.

## **3. Research Questions:**

- 1.What is the current climate profile and vulnerabilities present in the Hadapsar-Mundhwa ward?
- 2.What is the level of awareness amongst citizens and government officials regarding local Action for climate change?
- 3.What can be the mitigation, adaptation & strategies to overcome the impacts of climate change in Pune City?

## **4. Research Methodology:**

### *4.1 Sample Selection:*

The population for this study is the ward Hadapsar - Mundhwa of Pune city. First, a primary survey has been conducted on the households of the ward. Second, an expert who is well versed with the climate landscape of Pune was invited for an interview. The method used was convenience sampling. It is a nonprobability sampling method where units are selected for inclusion in the sample because they are the easiest for the researcher to access.

### *4.2 Conceptualization:*

The preceding conceptualization of plan is based on data analysis through data visualization tools and Hypothesis testing. The study has included various relevant graphs to depict the relationship among different variables. These graphs represent socio economic status, demographics of the ward and focus on mission wise analysis. Software like Knime, Python, R programming and Stata were used for the same.

The study includes a set of three hypothesis testing using the chi-square method, to determine the significance of variables with each other statistically. After determining the table for observed frequency from Stata and expected frequency from MS Excel, critical value was calculated to test their significance. The significance is calculated at the level of 95%.

## **5. Overview of the ward:**

Hadapsar, located in the eastern part of Pune, is a rapidly developing residential and commercial area. During the team's visit to the ward as part of the primary data collection efforts for the local action on climate change report, quite a few observations were made for the ward, like firstly that a lot of modern and recently constructed buildings are designed to be sustainable like most buildings in the ward had inbuilt Rainwater harvesting storage and solar panels attached for electricity generation. Hadapsar also has a few townships, like for example The Amanora Park town which has made sure that they are an Ecofriendly Township i.e. apart from providing residential and commercial space they provide space for urban Agriculture growing plants on balconies, Vertical farming etc.

All the localities in the ward have a proper Garbage Disposal i.e. Garbage chutes provided at each residential sector for dry and wet waste collection and

a Sewage Treatment Plant. One problem that we observed was that even though the buildings had installed rainwater harvesting plants they were not being utilized. Since Hadapsar is densely populated and has a lot of tech parks, shiny corporate office buildings, and exclusive gated residential complexes it's important that the urban planning of the ward is such that it is energy-efficient, promotes sustainable land use practices and enhances green infrastructure.

## 6. Data Analysis:

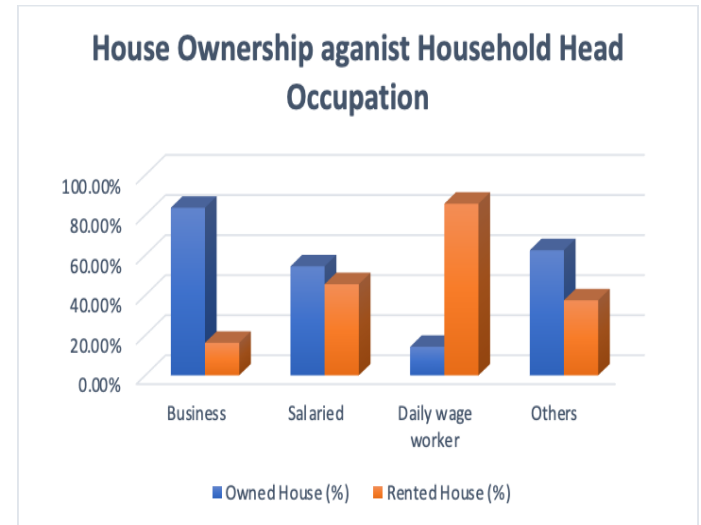
### *Socio-Economic Demographic:*

Age (n years)	Female (n=84)	Male (n=74)	Others (n=1)	Total (n=159)
25 and less	4.76	6.76	0	5.66
26-35	39.29	33.78	0	36.48
36-50	50.00	47.30	100	49.06
>50	5.95	12.16	0	8.81
Total	100.00	100.00	100.00	100.00

Table 1: Depicts the Socio-Economic Demographic

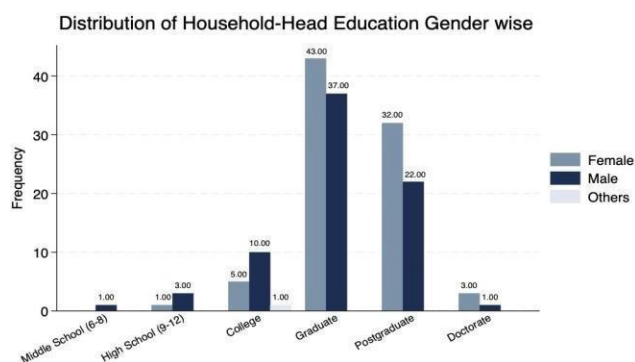
In the comprehensive study conducted in the Hadapsar-Mundhwa ward the demographic analysis revealed crucial insights into the socio-economic composition of the surveyed population. Among the 159 participants, the majority were male (n=74, 46.54%) compared to females (n=84, 52.83%), with a

minimal representation from individuals identifying as "Others" (n=1, 0.63%). The age distribution further delineated the socio-economic landscape, with participants predominantly falling within the 36-50 age bracket (n=78, 49.06%), followed by those aged 26-35 (n=58, 36.48%). Interestingly, while the older age groups (>50 years) exhibited lower participation rates, they still accounted for a notable segment of the surveyed population, indicating a diverse age demographic.



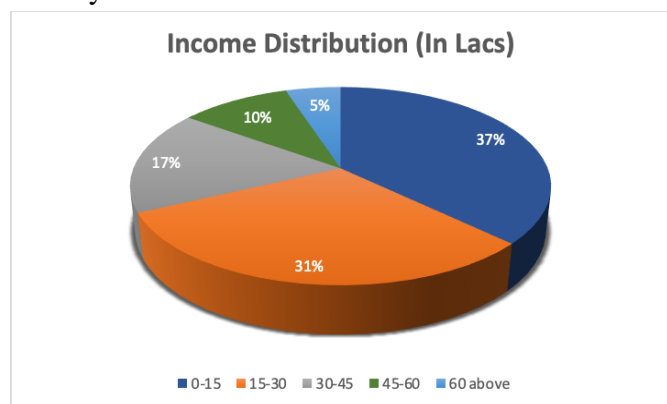
Graph 1: Homeownership by Household Head Occupation

Upon examining the housing tenure across different occupational categories, distinct socio-economic patterns emerged. Business owners displayed the highest rate of homeownership, with 83.72% owning their homes, while a smaller proportion rented (16.28%). Similarly, salaried individuals demonstrated a relatively balanced homeownership rate (54.45%) but also had a significant percentage renting (45.55%). In contrast, daily wage workers exhibited a stark contrast, with only 14.28% owning their homes and the majority renting (85.72%). Interestingly, individuals categorized as "Others" displayed a higher rate of homeownership (62.50%) compared to daily wage workers, suggesting potential variations within occupational categories.



Graph 2: Distribution of Household-Head Education Gender wise

Across all education levels, male household heads outnumber their female counterparts, with notable figures such as 37 males and 43 females at the graduate level. However, a positive trend emerges at higher education tiers, where more female heads are represented, particularly evident in postgraduate and graduate levels. The majority of surveyed heads have education beyond high school, with graduate education being the most prevalent, emphasizing the city's investment in higher education. Additionally, a small fraction of household heads categorized as "others" are observed throughout various educational tiers, underlining the demographic diversity within the city's households.



Graph 3: Distribution of Income among Respondents.

Approximately 38% of respondents fall within the income bracket of 0-15, indicating a significant presence of individuals with lower incomes. Around 31% of respondents belong to the income bracket of

15-30, suggesting a substantial portion of the population earning moderate incomes. The income bracket of 30-45 represents about 17% of respondents, indicating a smaller but notable presence of individuals with higher incomes. The brackets of 45-60 and 60 above constitute approximately 11% and 5% of the surveyed population, respectively, representing minority groups with relatively higher incomes.

	Mean	Standard Deviation
Years in Pune	20.5	1.21
Household size	3.81	0.10
Number of Rooms	2.65	0.068

Table 2: Depicts the respondents' Years in Pune, Household size, and Number of Rooms.

The average duration of residency of the respondents was approximately 20.5 years, and the relatively low standard deviation of 1.21 years around the mean suggests that the residency durations are clustered closely around the average. Each household had on an average approximately 4 members in their family with on an average 2.65 rooms in each household.

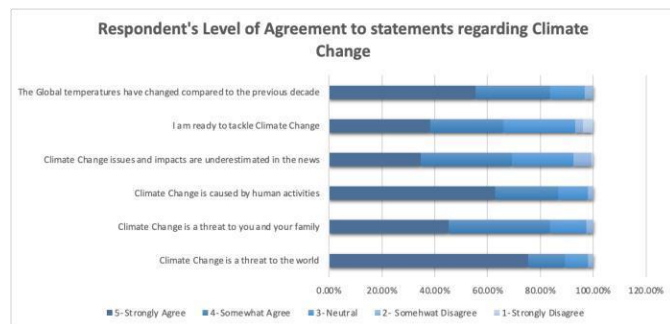
#### Strategic household awareness :

S.N.	Age Group	Extremely Concerned	Very Concerned	Moderately Concerned	Slightly Concerned	Not at all Concerned	Weighted Means	Rank
1	Young (21-30)	75	44	6	4	0	4.3	I
2	Middle Age (31-45)	190	144	54	10	1	4.07	III
3	Old (Above 45)	65	44	15	4	0	4.26	II

Table 3: Household Awareness Levels Across Various Age Groups.

Young adults aged 21-30 exhibit the highest level of concern, with a significant majority expressing

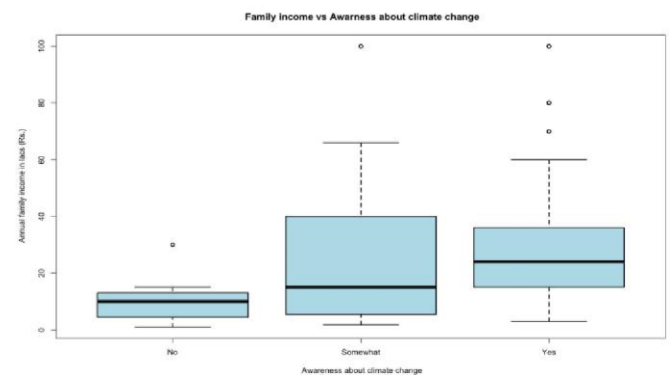
either extreme or very high levels of worry, reflected in their weighted mean score of 4.3. Conversely, middle-aged individuals aged 31-45 also demonstrate considerable concern, albeit slightly lower than their younger counterparts, with a weighted mean score of 4.071, indicating a moderate level of concern. Interestingly, older individuals above 45 display a lower level of concern compared to younger age groups, although their weighted mean score of 4.267 still positions them ahead of the middle-aged cohort. This suggests a nuanced perspective, where younger generations tend to express higher levels of alarm about climate change, but a notable portion of older individuals also share significant concerns.



Graph 4: Depicts the Respondents' level of agreement with statements regarding climate change.

The data depicts a prevalent acknowledgment of climate change as a global concern, with a substantial majority (75.47%) strongly concurring. However, when assessing personal implications, respondents' perspectives diverge, with a lesser proportion (45.28%) perceiving it as a threat to themselves and their families. Noteworthy is the consensus regarding the anthropogenic contribution to climate change, with 62.90% attributing it to human activities. Furthermore, a significant contingent (34.60%) believes that climate change's severity is underrepresented in mainstream media coverage. Encouragingly, a substantial segment (38.36%) expresses a readiness to engage in efforts

to combat climate change. There is also a recognition (55.35%) of the observed alterations in global temperatures compared to the previous decade.



Graph 5: Family Income vs Awareness about Climate Change

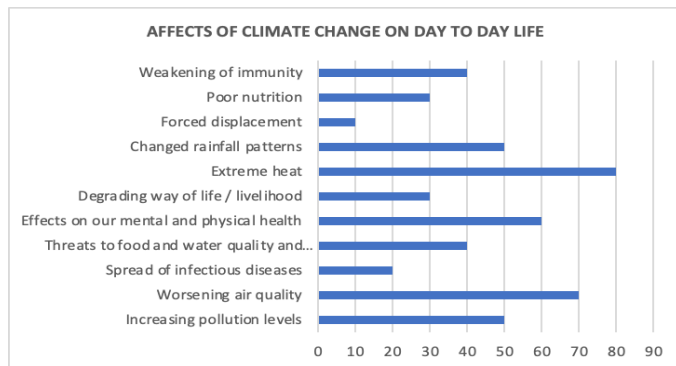
The plot shows the relationship between family income and awareness about climate change. People who are aware about climate change have median family income around 30 lac RS., and for people who are not aware their median family income is much lower around 10 lac Rs.

(n=159)	Poverty	Global Warming	OverPopulation	Violence	Infectious Diseases	Economic Crisis	Lack of Infrastructure
Strongly Agree	18.24	41.50	22.01	5.03	5.03	14.46	5.03
4- Somewhat Agree	8.80	36.48	25.79	6.30	8.80	15.72	9.43
3- Neutral	37.74	15.73	31.45	18.24	22.01	26.42	23.27
2- Somewhat Disagree	28.92	5.66	16.35	30.81	25.16	22.65	28.93
1- Strongly Disagree	6.3	0.63	4.40	39.62	39	20.75	33.34
TOTAL	100	100	100	100	100	100	100

Table 4: Respondents' Agreement on Different Issues of the Ward

The highest percentage of respondents who strongly agree or somewhat agree are concerned about global warming (78%), followed by poverty (56%) and overpopulation (51%), fewer respondents express strong agreement or agreement regarding other challenges such as lack of infrastructure (38%), economic crisis (38%), and infectious diseases (37%) suggesting that while certain challenges like global warming and poverty are widely

acknowledged, perceptions vary concerning other issues, indicating a diverse range of concerns within the surveyed community.



Graph 6: Effects of Climate Change on Day-to-Day Activities

The dataset clearly reveals the significant influence of climate change on day-to-day life, with particular emphasis on two major factors: extreme heat and worsening air quality. Among respondents, a substantial portion—80 individuals—highlighted extreme heat as a prominent concern, while 70 individuals identified worsening air quality as a major issue.

*Null Hypothesis:* There is no significant association between awareness about the term climate change and changes made by the people in their lifestyle with respect to climate change.

*Alternative hypothesis:* There is a significant association between awareness about the term climate change and changes made by the people in their lifestyle with respect to climate change.

How aware are you of the term Climate change?	Are you changing your lifestyle for climate change?			
	No	Somewhat	Yes	Total
No	5	1	1	7
Somewhat	2	6	3	11
Yes	9	36	96	141
Total	16	43	100	159

Table 5: Table of observed frequency for climate awareness and Lifestyle changes.

How aware are you of the term Climate change?	Are you changing your lifestyle for climate change?			
	No	Somewhat	Yes	Total
No	0.704403	1.893081761	4.402516	7
Somewhat	1.106918	2.974842767	6.918239	11
Yes	14.18868	38.13207547	88.67925	141
Total	16	43	100	159

Table 6: Table of expected frequency for climate awareness and Lifestyle changes

Interpretation: Since p value is smaller than 0.05 we accept the null and hence there is no significance between awareness about the term climate change and changes made by the people in their lifestyle with respect to climate change. This suggests that spreading awareness about climate healthy practices would not have a direct impact on the adoption of the same by the households.



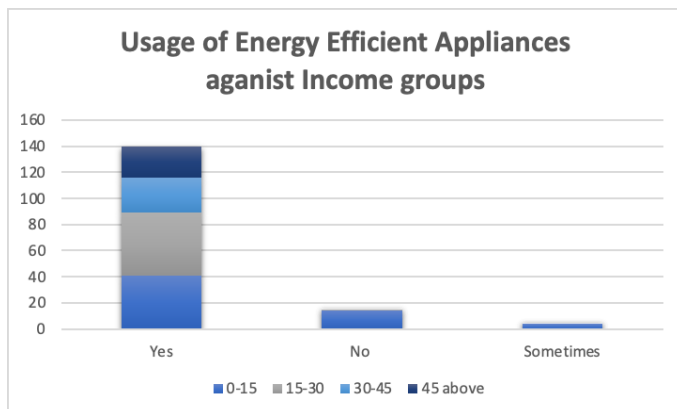
### National Solar Mission:

Are you aware of solar energy?	Do you use any solar electricity-driven items (such as - solar cookers, solar li			Total
	Don't K..	No	Yes	
No	0	3	1	4
Yes	11	95	49	155
Total	11	98	50	159

Table 7: Awareness about solar energy with respect to use of solar driven devices.

The data presented highlights a relationship between awareness of solar energy and the utilization of solar-driven appliances. Among the 155 educated individuals who are aware about solar energy, a striking 95 individuals do not make use of solar appliances. This observation displays a disparity between awareness and implementation, indicating a potential gap in the adoption of sustainable energy solutions.

### National Mission for Enhanced Energy Efficiency:



Graph 7: Usage of Energy-Efficient Appliances Across Income Groups

Across all income brackets, a notable portion of participants reported using energy-efficient appliances, indicating a positive inclination towards adopting ecofriendly technologies. However, disparities emerge when examining

usage trends among different income groups. Lower income brackets, encompassing individuals earning between 0-15 and 15-30, exhibit higher rates of energy-efficient appliance usage compared to their higher-income counterparts. Conversely, respondents in the 30-45 and 45 above income brackets display lower utilization rates, suggesting potential barriers to adoption within wealthier households.

*Null Hypothesis:* There is no significant association between annual family income of households and the reduction in the energy consumption in response to global climate change.

*Alternative hypothesis:* There is a significant association between annual family income of households and the reduction in the energy consumption in response to global climate change.

ANNUAL INCOME(in rs lakhs)	Have you reduced your energy consumption in response to global climate change?			
	No	Somewhat	Yes	Total
0-20	21	20	39	80
20-40	4	15	30	49
40-60	0	5	17	22
60-80	0	0	5	5
80-100	0	0	3	3
Total	25	40	94	159

Table 8: Observed frequency of annual income with respect to reduced energy consumption.

ANNUAL INCOME(in rs lakhs)	Have you reduced your energy consumption in response to global climate change?			
	No	Somewhat	Yes	Total
0-20	12.57862	20.12579	47.2956	80
20-40	7.704403	12.32704	28.96855	49
40-60	3.459119	5.534591	13.00629	22
60-80	0.786164	1.257862	2.955975	5
80-100	0.471698	0.754717	1.773585	3
Total	25	40	94	159

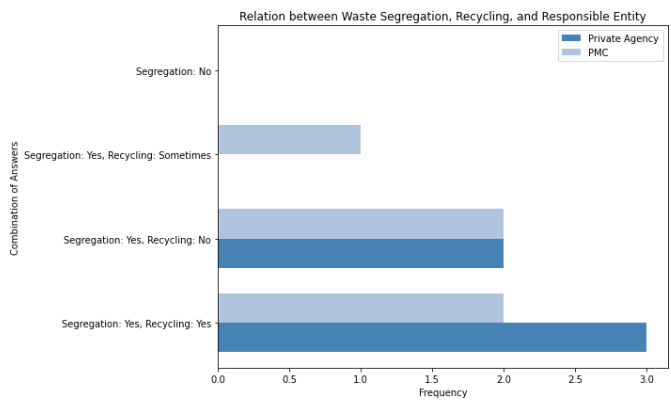
Table 9: Expected frequency of annual income with respect to reduced energy consumption.

CHI SQUARE: 0.011281647

Interpretation: Since p value is less than 0.05 we accept the null and hence there is a significance between income and the reduction in the energy consumption in response to global climate change. This suggests that reduction in electricity consumption is not just a subject of Income and the upper classes of society are also trying to utilize less resources.

**National Mission for Sustainable Ecosystem and Sustainable Habitat:**

The data outline survey results pertaining to waste segregation, recycling, and the roles of various entities involved, such as private agencies and the Pune Municipal Corporation (PMC). It examines the frequency of waste collection and segregation, as well as the involvement of waste pickers in these processes. The data indicates significant involvement of waste pickers, contracted either by private agencies or directly by the PMC, in waste collection and segregation. While most instances indicate regular waste collection and segregation, some show a lack of recycling despite segregation efforts.

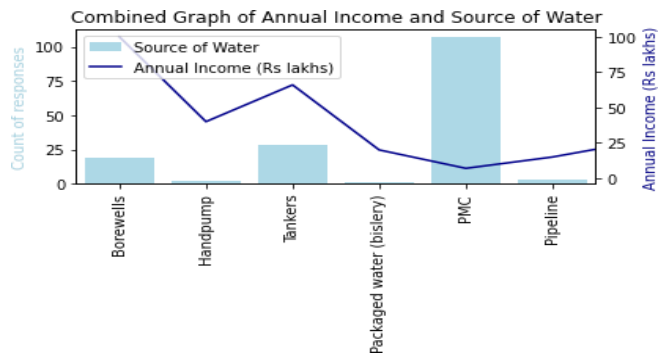


Graph 8: Relations between waste segregation, recycling, and responsible Entities

It illustrates waste pickers' involvement in both dry and wet waste segregation, albeit with varying

consistency. In analysis, the data focuses on the role of waste pickers in waste management and stresses the fact for more consistent recycling practices, particularly when segregation is established. Discrepancies in waste pickers' involvement and inconsistent recycling efforts post-segregation emphasize potential areas for improvement in waste management strategies. Policymakers and waste management authorities can utilize this data to evaluate and refine waste management approaches, aiming to bolster efficiency and sustainability across the board.

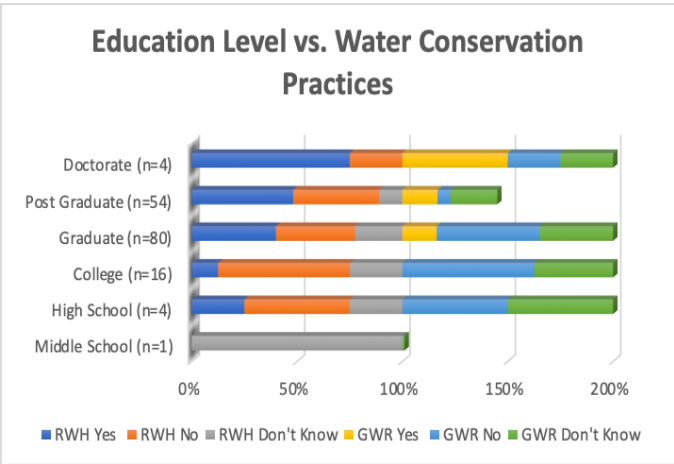
**National Water Mission:**



Graph 9: Depicts the Combined Graph of Annual Income and Source of Water

The combined graph features two axes, with the xaxis denoting annual family income and the y-axis representing water sources: handpumps, tankers, PMC (public municipal corporation), borewells, packaged water (Bisleri), and pipelines. Each data point on the graph corresponds to the intersection of annual income and the respective water source for each household. Analysis of the graph reveals income-dependent variations in water source preferences. Lower-income households, earning around 15 Rs lakhs annually, predominantly rely on handpumps, tankers, and borewells, whereas higherincome households favor municipal corporation supplies, pipelines, and packaged water. This correlation highlights disparities in water access linked to income

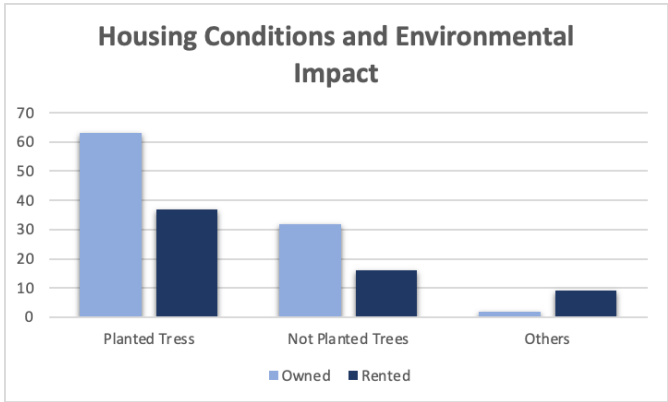
levels, underscoring the need for targeted policies to ensure equitable water access across socio-economic strata. The graph serves as a valuable tool for informing interventions aimed at addressing such disparities and promoting sustainable water provision for all households.



Graph 10: Education Level vs. Water Conservation

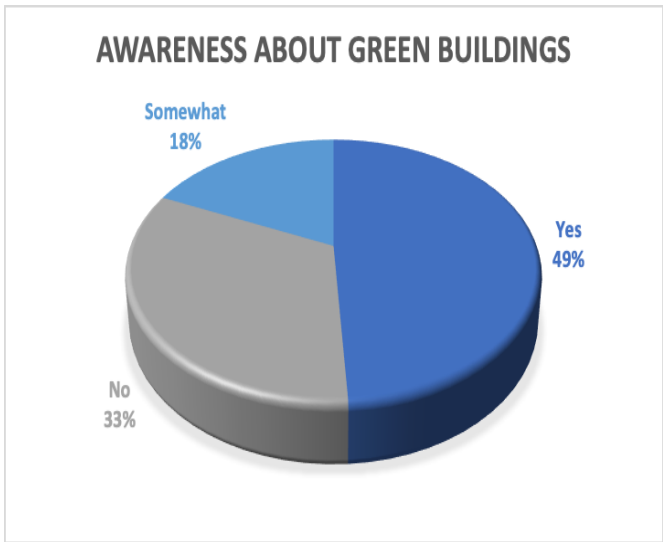
Individuals with higher education levels exhibit greater awareness and propensity towards adopting these water conservation methods. Graduates and postgraduates show the highest inclination towards Rainwater Harvesting, with adoption rates of 40% and 48.14% respectively, while those with a doctorate exhibit the highest adoption rate of 75%. Conversely, respondents with lower education levels, such as middle school and high school, display lower awareness and adoption rates. Interestingly, a considerable portion of respondents across all education levels indicated uncertainty (Don't Know) regarding Rainwater Harvesting and Groundwater Recharge Practices, suggesting a potential gap in awareness and education on these sustainable practices.

### National Mission for a Green India:



Graph 11: Housing Conditions and Environmental Impact

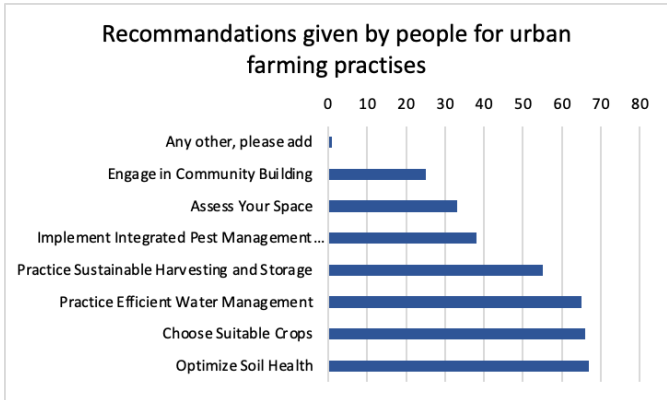
Examining the statistics related to tree plantation, it is discernible that homeowners exhibit a slightly higher propensity for tree planting activities compared to renters. Specifically, 64.95% of homeowners acknowledged participating in tree plantation endeavours, whereas 59.68% of renters reported similar involvement. While the disparity between the two groups is not stark, it does imply a marginally greater inclination towards environmental stewardship among homeowners.



Graph 12: Respondents' Level of Awareness about Green Buildings

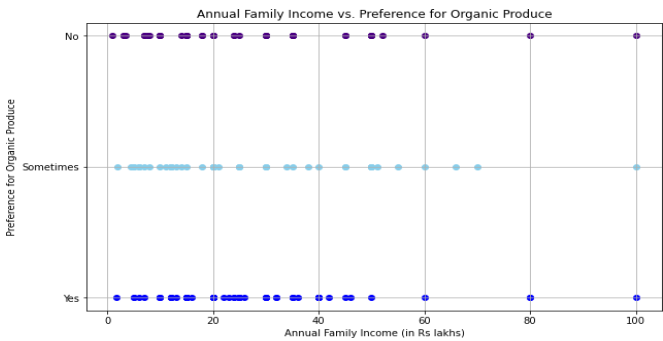
Nearly half of the surveyed population (49%) exhibits a clear understanding of green building concepts. This signifies a positive indication of receptiveness towards sustainable construction practices, aligning with the objectives of the National Mission for Green India to promote environmentally friendly infrastructure development. However, the presence of a sizable segment (33%) lacking awareness underscores the imperative for enhanced education and outreach efforts to ensure broader engagement and compliance with green building standards.

**National Mission for Sustainable Agriculture:**



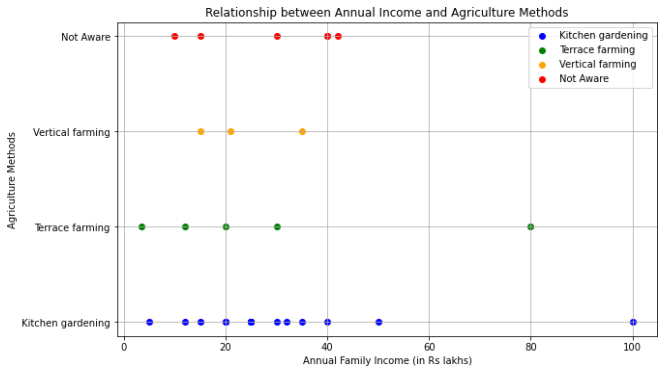
Graph 13: Recommendations given by people for urban farming practises

The graph illustrates the recommendations provided by respondents regarding urban farming practices. It is evident that the majority of participants favoured optimizing soil health, selecting suitable crops, and practicing efficient water management. These findings underscore the significance of prioritizing soil quality, crop selection, and water conservation in urban farming initiatives.



Graph 14: Annual Family Income vs Preference for Organic Produce

Initial analysis reveals a discernible correlation between annual family income and organic produce preference. Higher income brackets exhibit a stronger inclination towards organic items, as evidenced by a prevalence of "Yes" responses. Conversely, lower income segments display a higher occurrence of "No" or "Sometimes" responses, indicating a less definitive preference. This implies that income influences the willingness to pay a premium for organic products.



Graph 15: Relationship Between Annual Income and Agriculture Methods

Findings outline the distribution of agriculture methods across income brackets. Kitchen gardening emerges as a prevalent choice across all income levels, followed by consistent utilization of terrace farming, particularly among lower to mid-income brackets. Conversely, vertical farming appears more favoured in higher income brackets, with fewer lower income participants adopting this method.

Significantly, a proportion of respondents are unaware or receive no specific recommendations regarding certain agricultural methods.

*Null Hypothesis:* There is no significant association between frequency of buying organic products and checking for the logo/tag of organic products.  
*Alternative hypothesis:* There is a significant association between frequency of buying organic products and checking for the logo/tag of organic products.

How often do you buy organic products?	Do you see the organic produce logo/tag before purchasing them?			
	No	Sometimes	Yes	Total
Never	13	7	2	22
Sometimes	21	28	26	75
Often	2	4	41	47
Total	36	39	69	144

Table 10: Observed frequency of relation between frequency to buy organic product and check for logo/tag of the same.

How often do you buy organic products?	Do you see the organic produce logo/tag before purchasing them?			
	No	Sometimes	Yes	Total
Never	5.5	5.958333333	10.54167	22
Sometimes	18.75	20.3125	35.9375	75
Often	11.75	12.72916667	22.52083	47
Total	36	39	69	144

Table 10: Expected frequency of relation between frequency to buy organic product and check for logo/tag of the same.

CHI-SQUARE: 0.00

Interpretation: Since p value is smaller than 0.05 we accept the null and hence there is no significance between frequency of buying organic products and checking for the logo/tag of organic products. This suggests a lack of consumer awareness in the sector of food labelling.

## 7. Discussion and Findings

Understanding the awareness level of experts regarding climate change in Pune city sheds light on the challenges and opportunities in addressing environmental concerns. Policies and regulations play a crucial role in guiding the city's response to climate challenges, but their effective implementation remains a significant hurdle.

In Pune, regulatory frameworks like the Solid Waste Management (SWM) regulations of 2016 and the Extended Producer Responsibility (EPR) regulation theoretically offer solutions for sustainable waste management. However, delays in implementing EPR and issues like illegal dumping reveal gaps between policy intent and practical action.

Similarly, promoting sustainable agriculture in urban environments faces obstacles. While the government encourages urea-based farming, there's a growing realization of the benefits of organic practices, such as use of Nano fertilizers. Yet, challenges such as water scarcity and limited knowledge hinder progress, leading to higher costs for organic produce. To address these issues, it's crucial to bridge regulatory frameworks with on-the-ground implementation. Raising awareness and engaging communities are vital steps for effective climate action. Initiatives like the "Shadu Ganpati" campaign and rooftop solar installations showcase grassroots efforts making a difference. However, scaling up these initiatives requires collaboration between officials and active community involvement. Moreover, tackling gaps in waste management, water conservation, and sustainable agriculture demands collaborative approaches involving multiple stakeholders.

During the investigation of the Hadapsar-Mundhwa ward's households, several significant observations were documented, reflecting both commendable

initiatives and extant challenges in the ward's sustainability endeavours. A substantial number of modern, sustainably designed buildings were noted, featuring rainwater harvesting systems and solar panels, indicative of a commitment to environmental consciousness. Townships like Amanora Park Town had eco-friendly practices by integrating urban agriculture initiatives, such as balcony gardening and vertical farming, into their urban landscape.

Demographic analysis of the surveyed population revealed insights into the socio-economic composition of the community. While the majority of respondents were male, individuals aged 36-50 comprised the largest age group, indicating a diverse age demographic. Housing tenure varied across different occupational categories, with business owners exhibiting the highest rate of homeownership.

Concerns about climate change were prevalent among respondents, particularly among young adults aged 21-30, who expressed the highest level of concern. However, the readiness of people to change their lifestyle choices is not related to awareness about climate change, the study suggests that some factors like income and qualitative aspects like mindset plays a great role in it. People are aware about the critical consequences of climate change but are not taking a step to mitigate the effect of the same. While there was widespread acknowledgment of climate change as a global concern, personal perceptions varied, reflecting the complex interplay of individual beliefs and experiences.

The dataset also highlighted the significance of climate change on day-to-day life, with extreme heat and worsening air quality emerging as major concerns among respondents. However, while challenges exist, there was also a notable readiness among the community to engage in efforts to combat climate change.

Across various missions, such as the National Solar Mission and National Mission for Sustainable Agriculture, the data revealed disparities between awareness and implementation of sustainable practices, underscoring the need for targeted education and outreach efforts. Additionally, income disparities were evident in preferences for organic produce and adoption of sustainable agricultural methods, highlighting the importance of addressing socio-economic barriers to sustainability.

### ***Swot Analysis***

#### ***i Strength:***

In Hadapsar, sustainability has become a foundation of modern architectural design, with a growing number of buildings integrating eco-conscious features such as rainwater harvesting systems and solar panels. Furthermore, developments like Amanora Park exemplify a shift towards ecofriendly living, incorporating innovative practices like urban agriculture and efficient waste management systems. These initiatives not only showcase the community's commitment to environmental responsibility but also set a precedent for sustainable urban development in the region.

#### ***ii Weaknesses:***

The underutilization of rainwater harvesting systems within buildings underscores a potential gap in either awareness or effective implementation strategies. Moreover, The dense population in Hadapsar could strain resources and infrastructure, making it challenging to implement effective climate change measures. Additionally, there is a lack of awareness among residents about the importance of sustainable practices and their role in mitigating climate change.

### iii Opportunities:

There is a chance to improve education and outreach initiatives to increase understanding of the benefits of sustainable practices and encourage community participation. Also almost all the societies have rainwater harvesting systems but there is still an opportunity for inhabitants to utilize the infrastructure.

### iv Threats:

The rapid urbanization and continuous constructions and infrastructure development in the area has posed threat to the green cover and biodiversity of the region. Locals have witnessed a massive deforestation and biodiversity loss but there are no measures to mitigate the negative effects.

## 8. Challenges

### i *National Solar Mission:*

Despite awareness about solar energy, a considerable number of educated individuals in the Hadapsar ward do not utilize solar-driven appliances. This discrepancy indicates barriers to the adoption of sustainable energy solutions, such as affordability, accessibility, and awareness. The lack of targeted interventions and incentives may cause the lack of uptake of solar technologies, particularly among households with the potential to benefit from renewable energy sources. Moreover, the alarming fact that almost all respondents were unaware of available tax incentives or subsidies for solar usage further highlights the problem surrounding this mission.

### ii *National Mission for Enhanced Energy Efficiency:*

Disparities in energy-efficient appliance usage across different income brackets suggest barriers to adoption within wealthier households in the Hadapsar ward. These findings highlight the importance for targeted interventions, including financial incentives, public awareness campaigns, and infrastructure improvements, to promote energy efficiency measures among all income groups.

### iii *National Mission for Sustainable Ecosystem and Habitat:*

All localities in the ward were equipped with proper garbage disposal systems, including garbage chutes for efficient collection of dry and wet waste, along with sewage treatment plants. However, ensuring consistent recycling practices and community participation remained challenging, as indicated by discrepancies in waste pickers' involvement and inconsistent recycling efforts post-segregation.

### iv *National Water Mission:*

Income-dependent variations in water source preferences highlight challenges in ensuring equitable access to clean and reliable water sources across socio-economic strata in the Hadapsar ward. An evident challenge observed during the investigation was the underutilization of rainwater harvesting systems despite their widespread installation. This underscores the importance of not only implementing sustainable infrastructure but also ensuring effective utilization to maximize environmental benefits.

### v *National Mission for Sustainable Agriculture:*

Considering the preference for urban farming approaches, inadequate resources and finance may hinder the effective implementation of sustainable

agricultural activities in the Hadapsar ward. This dilemma highlights the need for more funding and investment in urban agricultural infrastructure and resources. Moreover, given the popularity of kitchen gardening and terrace farming, a large number of respondents at all educational levels are ignorant of or do not get explicit advice for sustainable agricultural approaches. Bridging the awareness and knowledge gap is critical to promoting sustainable agriculture practices and improving community food security.

#### *vi National Mission for Green India:*

While homeowners in the Hadapsar ward exhibit a slightly higher propensity for tree planting activities compared to renters, there are challenges related to land availability, maintenance, and community engagement that may hinder tree plantation initiatives.

### **9. Recommendations:**

To facilitate local action in the ward of Hadapsar-Mundhwa we recommend improvements in these four sectors.

#### *1. Technological shift:*

Adopting the use of energy efficient appliances, rainwater harvesting practices and installation of solar panels being the most feasible technological solutions for local actions. It is also observed that lower income class is reluctant to install solar panels even after providing subsidies, due to their high maintenance cost and comparatively less rewards. Implementation of net metering on solar panels could be immensely helpful in not only encouraging the wider adoption of the same but also in reducing carbon footprints. Data plays a very crucial role in decision making, institutionalization and transparency of the same is mandatory to make data backed positive reforms. Monitoring and evaluation mechanisms should be

implemented to ensure the efficacy of policy measures and changes introduced.

#### *2. Regulatory issues:*

It is also noticed that generally public deliberations and expectations get ignored while implementing new policies and reforms such as, the newly constructed highway in Hadapsar region has caused problems to a lot of locals. Many decisions regarding energy and climate change are out of the view of local administrators and are taken at state or national level. Building a citizens' network and connecting to people at a community or ward level could help a lot in making substantial positive changes. Institutional awareness for the issues as well as decentralization of decision making is necessary to tackle climate change at a local level.

#### *3. Behavioural shift:*

While analysing the data researchers found that there is no relationship between awareness and adoption of sustainable practices. So, climate change awareness campaigns may not prove to be as effective as the severity of the problem. Climate education should be more application based such as participating in plantation drives, mindful usage of resources such as electricity and water and limiting wastage as well as effective management of waste. Promoting budget friendly ways to reduce indoor pollution could prove effective in dealing with a household level mitigation strategy. Developing public transport infrastructure and community initiatives to deal with operational climate problems could help in bringing in the much-needed behavioural shift in citizens.

#### *4. Design Skill:*

Designing sustainable urban infrastructure, such as vertical gardens, green roofs, and rainwater



harvesting systems, addresses both NAPCC's missions and local climate action priorities. Integrating waste management solutions and energy-efficient technologies into urban design fosters environmental sustainability and enhances community well-being. Encouraging insulation of buildings, groundwater recharge practices and mundane innovation in terms of infrastructure is essential for driving progress towards climate resilience, sustainable development, and a more equitable future for all residents.

## **10. Conclusion:**

This report examined the state of sustainability initiatives in the Hadapsar-Mundhwa ward of Pune City, for the report on 'Local Action for Climate Change in Pune City'. The ward has its fair share of both commendable initiatives and challenges in the ward's sustainability endeavours. The report aims to draw attention to the importance of local action in achieving sustainable development and highlights innovative local models that can be adopted in Pune and other Indian cities. The Report does a Demographic analysis of the surveyed population to gain insights into the socio-economic composition of the community, discusses the findings and recommendations from the expert interview and has made extensive data analysis, data visualization and hypothesis testing. It underlines the challenges of climate change in day-to-day life, with extreme heat and worsening air quality emerging as a major concern among respondents. The dataset also reveals

While there was a widespread acknowledgement of climate change as a global concern, personal perceptions varied, reflecting the contrast between individual beliefs and experiences. Pune has experienced rapid population growth in recent years, due in large part to the growth of the software, automobile, and electronics industries. However, this growth has also led to urban sprawl, traffic congestion, and air pollution. To address these issues, sustainable urban planning is necessary across all wards of Pune.

that the readiness of people to change their lifestyle choices is not related to awareness about climate change, the study suggests that some factors like income and qualitative aspects like mindset play a great role in it. People are aware of the critical consequences of climate change but are not taking steps to mitigate the effect of the same.

## 11. References

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Knowledge and perception about climate change and human health: findings from a baseline survey among vulnerable communities in Bangladesh. (2016). *BMC Public Health*.

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## 12. Appendix

### 12.1. Number of Responses per student

- Shreya Jain – 25 responses
- Shubhika Rathi – 27 responses
- Shubhvi Jindal – 25 responses
- Swastika Bafna – 26 responses
- Vanisha Verma – 31 responses
- Yuvika Baid – 25 responses

### 12.2 Expert Questionnaire

Expert Name: Anuja Bali

A renowned SDG & Climate Action Consultant and Ex-Maharashtra President of the WICCI

Consent Form

This survey is conducted as a part of our project on “Local Action for Climate Change in Pune City” and is purely for academic purposes. The study aims to understand the awareness and practices of households related to climate change in the city of Pune. The individual perception of citizens is of immense value for the successful completion of this study. The interviewer would like to interview a member from your household above 21 years of age. The interviewer will ask you a few questions and this will take about 15-20 minutes. Your identity will be kept confidential. You are free not to answer these questions and you may also refuse to answer any or few question from the entire survey. You are free to withdraw at any given point of time. Do I have your permission and consent to proceed with the survey?

- Yes
- No

If 'Yes', please proceed

Objectives of the Study:

1. To outline the profile of climate risks in the city of Pune.
2. To identify the factors responsible for climate change risks, and climate change vulnerability.

3. To outline mitigation & adaptation strategies for Climate Change in Pune City.
4. To study and understand the stakeholders' (citizens and government officials) awareness level of climate change in Pune city.
5. To assess local action for climate change in Pune City and suggest suitable action plans and strategies.
6. To understand the impacts of current measures on different sectors of the population.

## Expert Questionnaire

### Introduction:

1. According to you what contributes the most to local climate change impacts in Pune?
  - Greenhouse gasses (CH<sub>4</sub> + CO<sub>2</sub>)
  - Land use and land cover
  - River pollution
  - Air pollution including vehicular pollution
  - Urban development/construction
  - Burning of Waste
  - Deforestation
  
  - Any other
2. What are, in your opinion, the main challenges and risks that a city like Pune faces in relation to climate change?
3. How do climate change impacts vary across socio-economic groups and geographic locations within Pune?

### Challenges:

4. What are the permissible Air Quality Index (AQI) levels?
5. Is there a mechanism to measure AQI in your ward?
6. What are the mitigation and adaptation challenges?
7. What are the main barriers to climate change action?

### Solutions:

8. How can a city like Pune be more sustainable and climate resilient?
9. What, in your opinion, needs to be done to control the ill effects of climate change?

(suggest appropriate strategies for local action for climate change in Pune).

10. Who in Pune is taking action to address climate change (mitigation or adaptation)?

11. What kinds of action is being undertaken? Please explain them.

12. Which regulations impact our capacity or ability to take climate action and how?

13. What policies and regulations support or hinder the development of sustainable agriculture in urban environment.

**Disclaimer:**

The interviewee is free to ask questions (if any). We at Symbiosis School of Economics (SSE), thank the interviewee for their time and for participating in the survey. If you have suggestions regarding the survey, you may contact Dr. Gargi at [gargi.patil@sse.ac.in](mailto:gargi.patil@sse.ac.in) and Dr. Chandani at [chandani.tiwari@sse.ac.in](mailto:chandani.tiwari@sse.ac.in).

12.2 Pictures of Field survey

Picture 1: Student surveying at Satyam prima Residency.



Picture 2: Student surveying at Jaimala Residency



Picture 3: Student surveying at offices in Hadapsar.





Picture 4: Student surveying at Almond Park



Picture 5: Documenting responses at Amonara Towers



Picture 6: Surveying at Satyam Prima residency



Picture 7: Collecting responses at Magarpatta