

## SWOT ANALYSIS AND URBAN RENEWAL TECHNIQUES FOR BAGHBANPURA, LAHORE

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### Abstract

*The research focuses on the development problems and planning dilemmas that affect Baghbanpura in Lahore which maintains historical importance in Pakistan. The research analyzes the historical changes alongside land use development and infrastructure conditions together with social and economic aspects in the locality. The evaluation focuses on reviewing the transportation framework as well as public facilities while studying the residential quality standard and the environmental aspects which affect the area's livability. The assessment determines how governance operations function and it focuses on recognizing gaps within urban oversight as well as regulations execution and enforcement practices. The research uses a combination of planning standards and present strategic recommendations to revitalize the area sustainably while enhancing service delivery and land management practices. The combined use of local community perspectives together with urban planning principles reveals practical solutions for policymakers and local authorities and urban planners who aim to improve the growth path of Baghbanpura toward an improved resilient urban space.*

### 1. Introduction:

More than 55% of the total populace dwells in metropolitan regions, which is expected to ascend to 60% by 2030 and 66.4% by 2050 (UN-DSA, 2019). The projected metropolitan populace development in the less evolved districts will increment to 2 billion by 2050 with a 90% expansion in Asia and Africa (Satterthwaite et al., 2019). Due to the lack of facilities in rural areas, urbanization is going to increase in these regions but due to temporal spatial interdependence, this will affect the urban sustainability of urban areas. The metropolitan poor is among the world's most denied networks, with low human, normal, social, physical, and monetary resources (Williams et al., 2019; Alcayna Stevens, 2015). Urban settlements that

grew up outside of the official systems of land use, planning, construction, health, and safety are referred to as "informal settlements" and are frequently home to the impoverished. Along with the large populations may someday live in unofficial settlements due to predicted rates of urban population growth in developing and least-developed countries by 2050 (Satterthwaite et al., 2020). Informal settlements frequently lack the resources, assets, and appropriate facilities and means to deal with and recover from disaster impacts because they are mostly situated in environmentally sensitive and marginal locations (Wekesa et al., 2011). Baghbanpura, also known as the Union Council of Shalimar tehsil in Lahore District, Punjab, Pakistan. It used to be the old CBD of Lahore. Baghbanpura's name translates to "Town of Gardeners," as the Arain Mian family held most of the numerous gardens that once surrounded this location. However, as time move on, all of the gardens and agricultural fields were transformed into built infrastructure, leaving just the Shalimar Garden, which is currently listed as a UNESCO World Heritage Site. Some gardens still have the remnants of their Mughal-style gates visible along G.T. Road. These days, Baghbanpura is a part of the contemporary metropolis of Lahore (Wikipedia). Due to haphazard urbanization, it has become one of the informal settlements of Lahore.

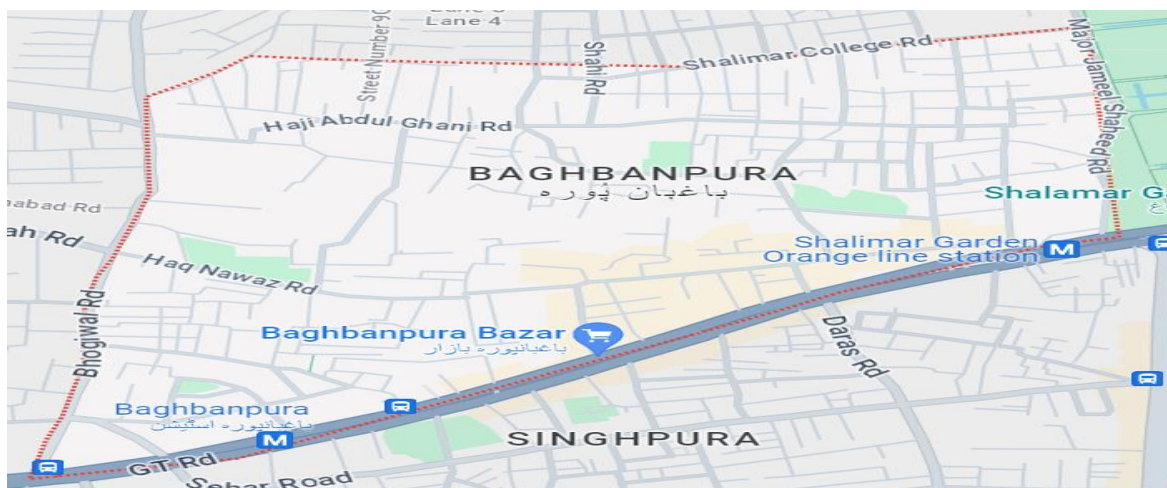


Figure 1 Baghbanpura Map

### 1.1. Objectives:

- To identify the specific issues and challenges of the people residing in the informal settlement of Baghbanpura
- To examine the root causes of the problems identified
- To come up with and present feasible and effective solutions to the problems
- To design a complete urban regeneration plan for Baghbanpura
- To ensure that the suggested urban renewal plan considers the social sustainability of the community
- To create a replicable plan in other such areas of Lahore for development
- To find strengths, weaknesses, opportunities, and threats in the development of the area
- To make recommendations based on the data gathered through surveys, field visits, and analysis.

## 2. Literature Review:

The historical parts of Lahore suffer from out-of-date infrastructure together with population shifts from urban cities and deteriorating conditions of old structures. The research examines governance methods used for Walled City revitalization through World Bank investments and municipal authority donations in specific areas of Lahore. The undertaking was performed across two communities where one community was governed by a nonprofit organization and the other received governance from the local administration. The research examines urban renewal governance through utilization of five governance criteria developed by the United Nations Development Program. This research examines all the conditions beneficial and obstructive to good governance practices in similar projects. The research provides conclusions which recommend strategies to create effective governance systems for historical area urban regenerations in Pakistan. Analysis follows a comparison between the restoration projects Gali Surjan Singh and Koocha Charkh Garan completed by AKCSP (Aga Khan Cultural Support Program) together with Mohammadi Mohalla transformed by the SDWCLP (Sustainable Development of Walled City Lahore Project) as local government programs (Hashmi & Matsuyuki, n.d.).

The urban landscapes of cities throughout the world have suffered significant social along with economic stressors during the past few decades which created uneven distribution of impacts. Poverty-stricken households now exist mainly within lower-income urban residential zones. Different UK government programs have attempted various levels of success in combating the physical social and economic effects of environmental changes through sustainable community-focused regeneration programs. This strategy represents initiatives to establish sustainable urban areas through multiagency public partnerships. Research has thoroughly examined the nature of urban issues and we currently possess important lessons derived from urban regeneration projects spanning from the twentieth to twenty-first centuries. The Castle Fields regeneration initiative's sustainability achievement was evaluated through combined questionnaire and semi-structured interview methods during 2006-2007. Analysis needed the Sustainable Communities Plan as the blueprint that included governance and transportation along with services and housing components (McDonald, Malys, & Malienè, 2009).

The Rimini Canal Port became the subject of study for the FRAMESPORT project because it addresses the rising demand to achieve European decarbonization goals through urban area emission reduction and environmental impact reduction. The European Interreg Italy-Croatia program obtains this initiative to achieve sustainable development targets in Adriatic small port facilities. The first stage of research incorporated historical documentation evaluation with urban regulations examination to identify both strengths and weaknesses along with threats and opportunities for SWOT analysis. Stakeholders participated extensively in the co-design framework that used online surveys for participation. A BOCR model was used to establish the critical issues after data collection operations. The research demonstrates how soft mobility strongly influences projects of urban regeneration by improving cycle/pedestrian paths and establishing new bike/pedestrian trail networks (Corticelli et al., 2022).

The strategic plan known as urban regeneration uses improved infrastructure alongside business support to restore deteriorating urban neighborhoods. Western cities used urban development as their first method to combat poverty during the period that followed World War Two. Urban renewal strategies developed problems during the 1960s because of mounting crime rates and unemployment until the community-based approach became mainstream in the 1970s. At the beginning urban development initiatives kept residents out but during the 1980s and 1990s successful urban regeneration became possible through

resident participation. The successful implementation of urban regeneration requires citizen involvement because this approach helps people address problems while cutting down on social isolation. Jin, Lee, and Kim (2018) advocate this perspective through an integrative implementation which combines community-led initiatives with authoritative direction while promoting team initiatives between planners and policy creators and neighborhood members.

### **3. Methodology:**

#### **3.1. Profile of area:**

Baghbanpura is the informal settlement of Lahore. It has an area of about 183 acres. The population of this area is 1,26,684. The residents are mostly laborers or linked with small businesses (Naoman Aqil, 2016). Another, the close proximity of Baghbanpura to the GT Road, which links Lahore with other regions of the nation, is a notable geographical feature. In addition, it is close to the Lahore Ring Road, an orbital freeway that circles the city and connects to the National Highway (Naoman Aqil, 2016). Due to its connectivity to the main roads of the city, it is the old CBD of the city due to the unplanned growth of this region it has become an informal settlement of the city. Commercialization of this area is also haphazard resulting in traffic congestion along the main road. Orange line route has also increased the value of this area, resulting in attracting more people to this area without the provision of the new infrastructure to deal with the urbanization problems.

#### **3.2. Mapping**

The subsequent step is to digitize the region by Google Earth Pro & GIS (Geographic Information System) so we can be ready to direct a review of the chosen region by utilizing a digitized map.

#### **3.3. Data collection:**

Based on the theoretical framework, a household questionnaire was developed and was administered. The survey questionnaire was organized into three sections. The initial section included general inquiries regarding the household, such as its demographic and socioeconomic characteristics. The last segment focused on the sensitivity and challenges that households faced concerning social, economic, and environmental matters over time. The questions in this section were crafted to assess the hindrances that social, economic, and environmental factors presented to the protective and beneficial roles of household welfare. The third part centered on the various internal and external attributes of the household that assist it in supporting, coping with, and adjusting to the adverse impacts of urbanization in the region. This section asked questions about the household's access to amenities, technology, and infrastructure, as well as the external support it received from the government, civil society, and neighbors. On the other hand, the internal characteristics section is concerned. The inside qualities zeroed in on the data about the navigation capacity and vocation choices of the family to change by the changes. (See Appendix II)

#### **3.4. Sample size:**

After the questionnaire development, our following stage was to settle the sample size for information assortment which was a difficult errand, since we had no clue about the careful populace of the Baghbanpura region. The entire review depends on the outcome of the information gathered by this example size and on the off chance that the example size isn't precise, the outcomes may not communicate the genuine state of occupants.

Due to the non-accessibility of the populace of the region for inspecting, we utilized an expected populace. Shalimar is one of the oldest neighborhoods in Lahore, located along the historic Grand Trunk Road. In Shalimar there total 18 union councils with 2,280,308 population. If we take average then population of one union council will be 126684. So, the



population of Bagbanpura is 1,26,684. Cochran (1997) shaped a recipe for working out example size for the obscure populace which is:

$$n_0 = \frac{z^2 pq}{e^2}$$

In this formula, z represents the crucial value of the configuration level sought, n<sub>0</sub> indicates the sample size, and e signifies the desired level of perception  $q = 1 - p$ , which estimates the proportion of the characteristic found within the population (Sarmah and Hazarika, 2012).

The sample size of Lahore with a 5 % margin of error is approx. 384. But we had a specific area. According to the conditions, the sample was taken 245. After preliminary preparations, a field survey was conducted. Land use, building height and building condition were considered. Every student conducted at least 8 questionnaires.

#### 4. Analysis:

Based on the survey and the responses of the inhabitants of people of this area we did a SWOT analysis and get a Swot matrix of the area to cope up the problems of this settlement.

##### 4.1. Analysis of Data:

The information gathered was examined using the Statistical Package for Social Sciences (SPSS) software. Descriptive statistics were utilized to present quantitative data regarding the characteristics of the respondents.

The reliability of the data was assessed using Cronbach's Alpha.

##### 4.2. Maps

Observing the Land use, building height, and building conditions in the study area maps are prepared by using the tools i.e: Google earth pro, GIS and AutoCAD.

###### 4.2.1. Land use Map

The predominant use of this case study area is residential while the commercial and mix used land are mostly located on main roads. Mostly the industrial land use is along G.T. road. The industrial impact results in the climate change of the area and have increase the temperature of the area which have make it vulnerable for the residential use which is principal in this case study area. The green spaces provided are unable to cope up the requirements of the area as shown in maps.

###### 4.2.2. Building Height Map

In the residential part of this area, we observed dominantly two story and multi-story buildings and all the buildings was encroaching the streets from top which hinders the sunlight and air.

###### 4.2.3. Building Condition Map

Map showing building conditions represents that the building condition of study area is significantly normal but some buildings are in deteriorated condition, so in the next coming years due to the impact of climate these buildings are at high risk of deterioration.

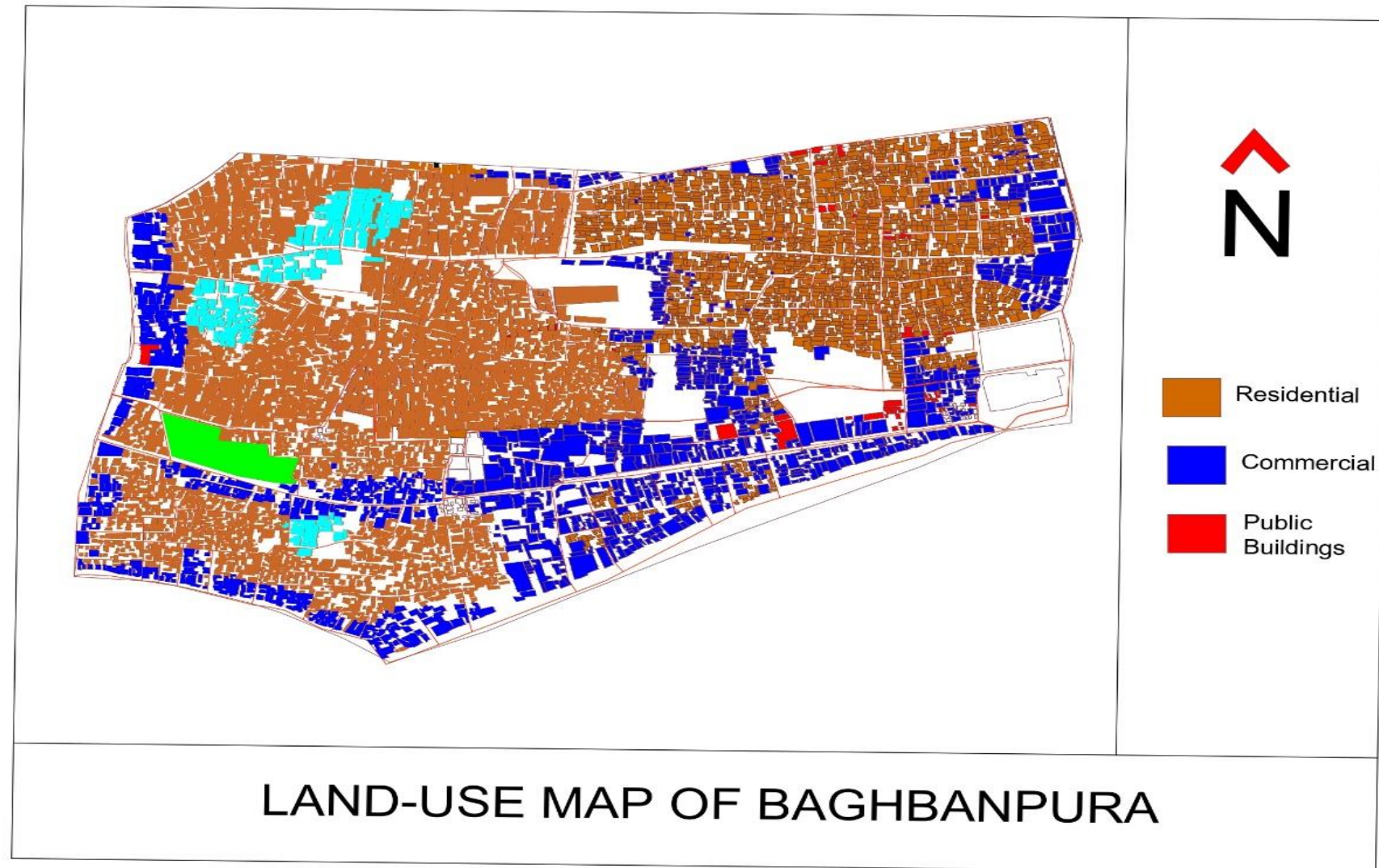


Figure 2 Land use map

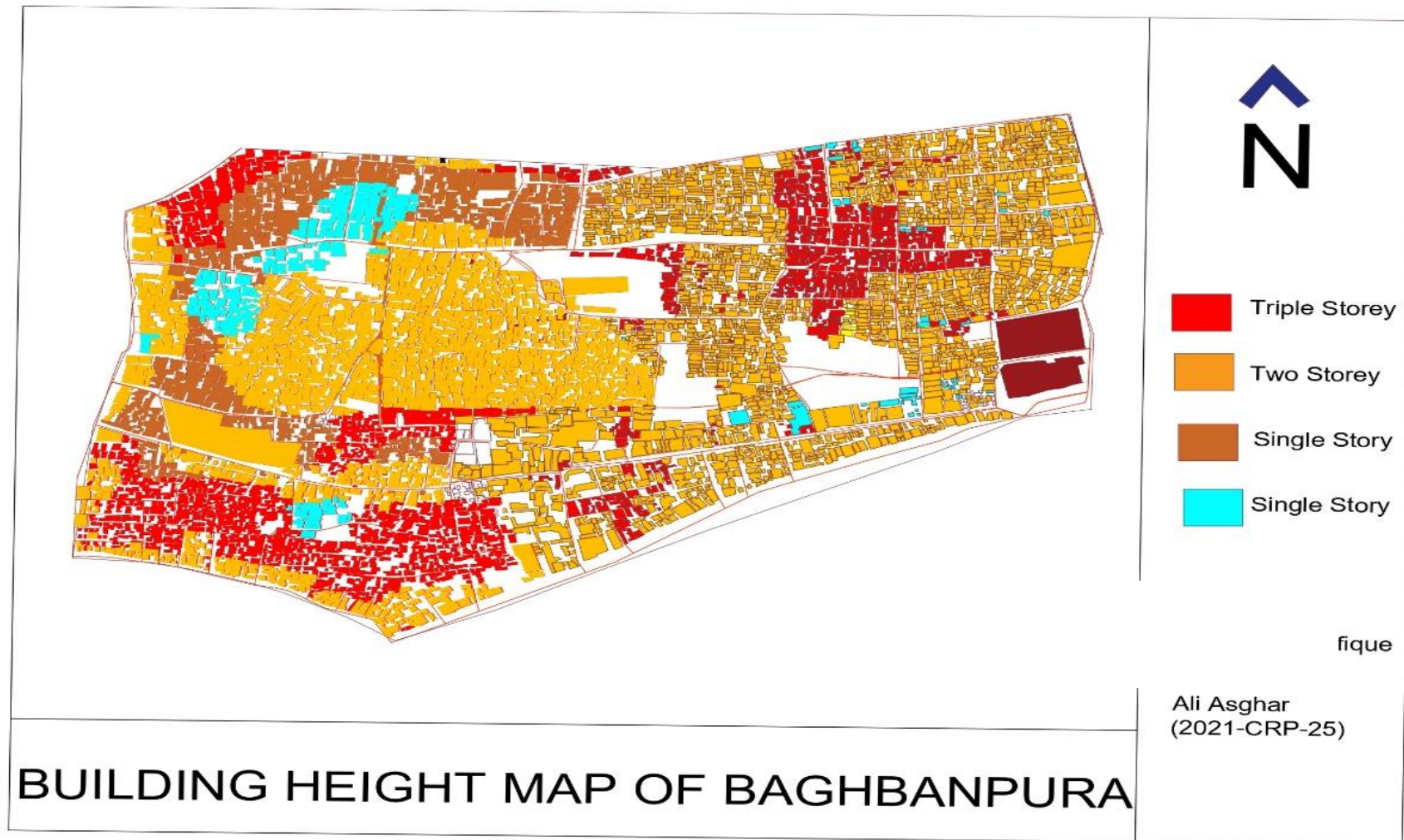
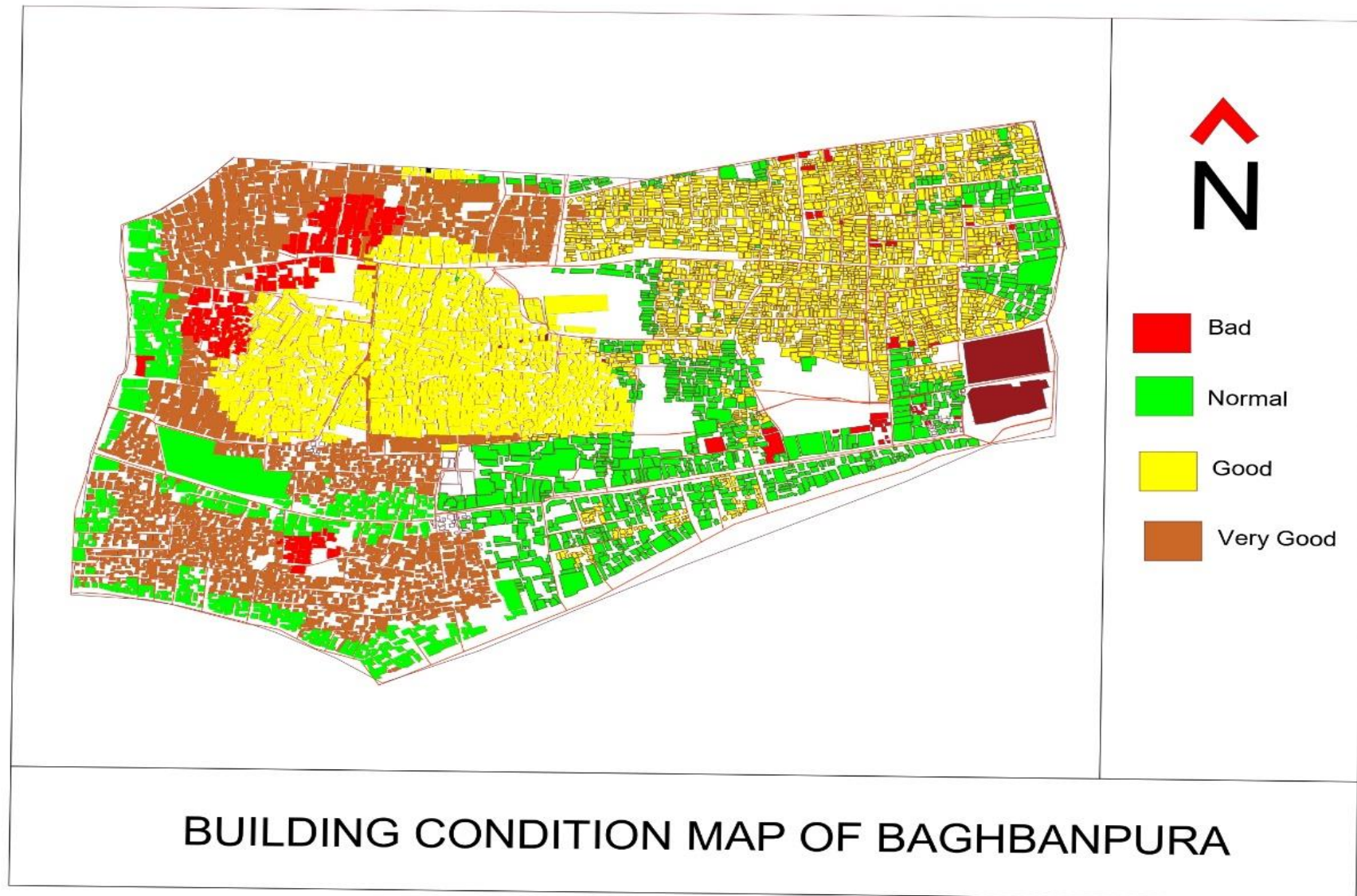


Figure 3 Height map of Buildings





*Figure 4 Building condition map*



### 4.3. Data presentation:

#### 4.3.1. Household Characteristics

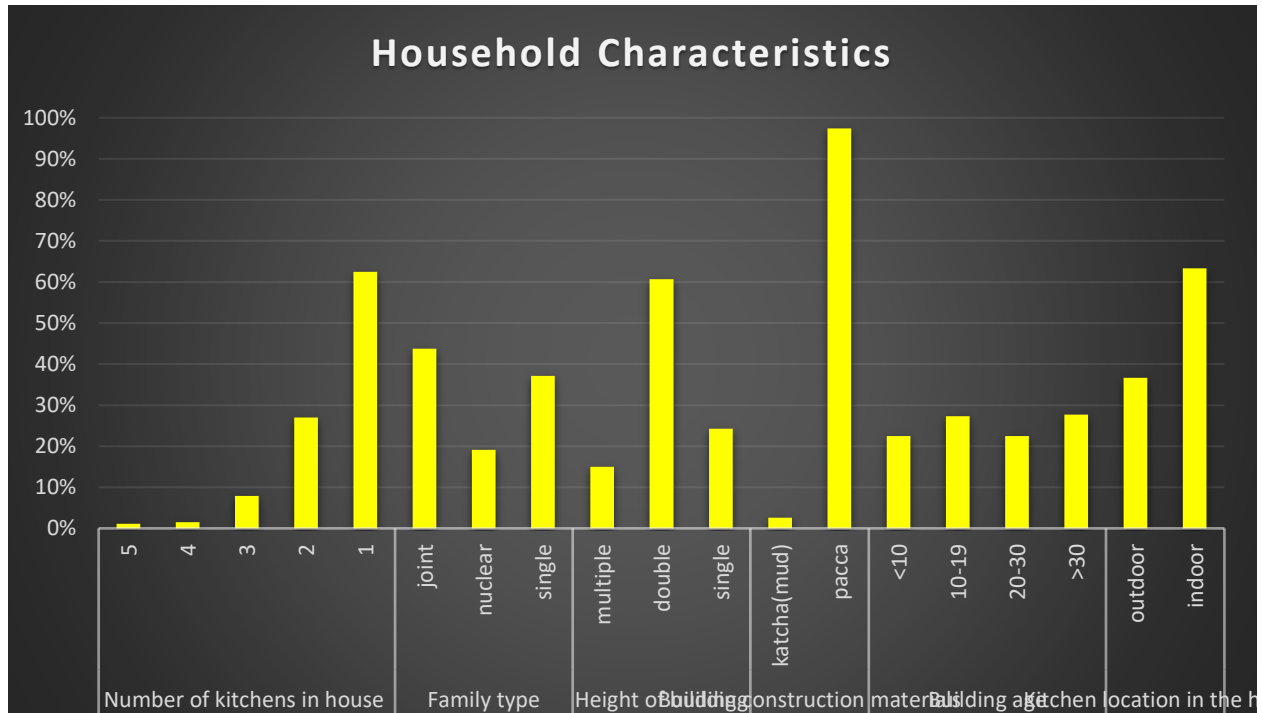


Figure 5 Household characteristic

- The most of respondents (60%) having one kitchen indicate a common housing characteristic in the community.
- The high percentage of joint families (43%) suggests a strong social support system within the community.
- Single-story buildings indicate older or smaller housing units, potentially facing space constraints. The majority of double-story buildings accommodates more residents within a limited footprint, which can be relevant in a densely populated city like Lahore.
- The fact that 27% of respondents have houses more than 30 years old indicates the presence of older housing stock. Meanwhile 22% of respondents with buildings less than 10 years old may indicate recent construction trends, which might involve more advanced materials and design considerations.

#### 4.3.2. Socioeconomic factor

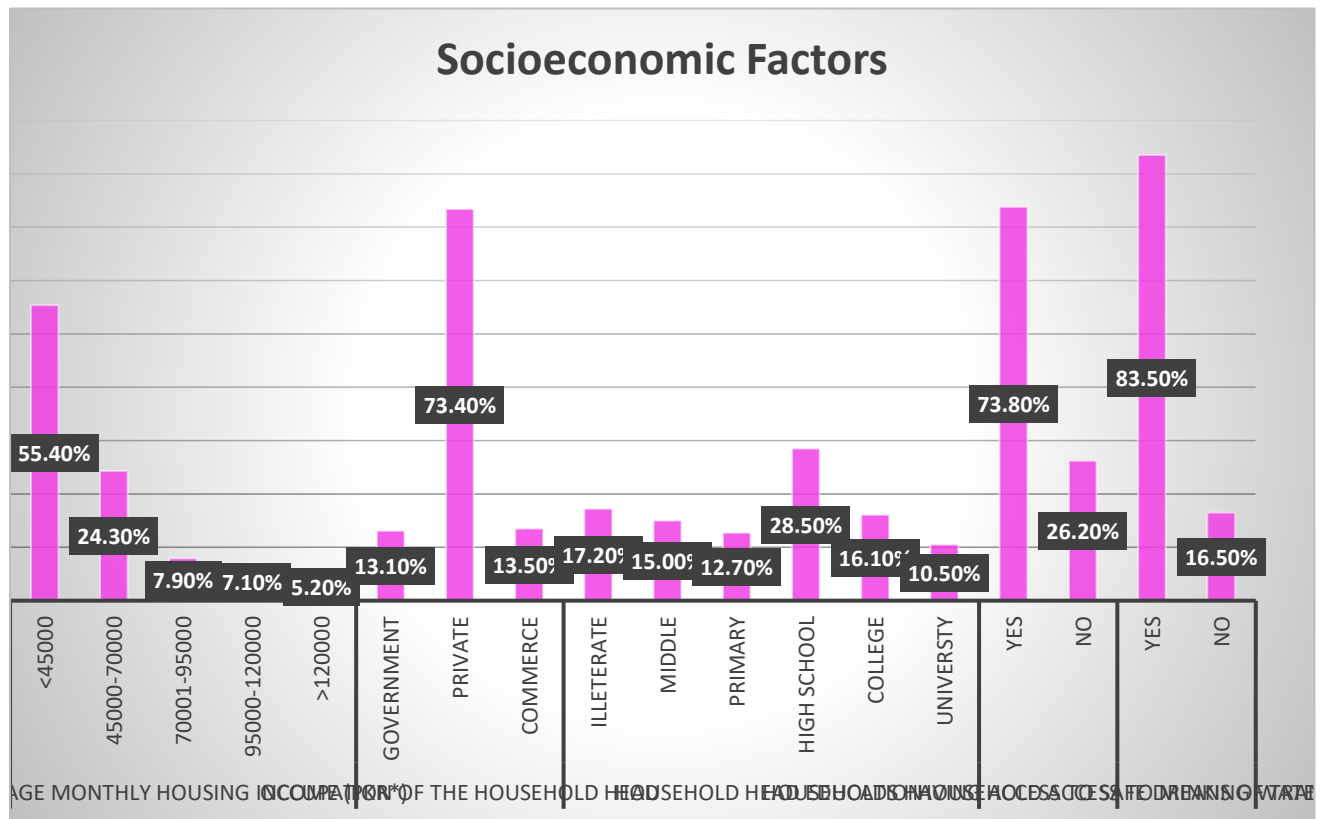


Figure 6 Socioeconomic factor

- The majority of respondents (55%) having a monthly income below 45 thousand, reflects a significant portion of low-income households.
- The fact that 73% of respondents have access to safe drinking water is a positive sign. However, the 26% without access to safe drinking water represents a significant minority facing a critical challenge, as clean water is fundamental for health and well-being.

#### 4.4. Reliability Analysis

##### 4.4.1. Reliability Analysis

Reliability Statistics	
Cronbach's Alpha	N of Items
.755	48

- If Cronbach's Alpha value is 0.7 and above, the result is reliable.
- In this case Cronbach's Alpha value is .755 for 48 questions which is greater than 0.70 so our result is reliable for 48 questions out of 50 questions.
- For 50 questions Cronbach's Alpha value was 0.323 because the question about how long the respondents have been living here was creating reliability issues due to open

ended question and different responses from each individual. So we removed it and the the the realibility value became 0.696 for 49 questions.

- For more better results we removed question about number of family members in house as there were different response due to mixture of single and joint family responses so after removing it the realiability value reached 0.755. A similar question about family type is still present it the reliable items which will fulfill its gap.

#### 4.5. Correlations Analysis

Correlations			
		Travel time to school (in minutes)?	Travel time to the workplace (in minutes)?
Travel time to school (in minutes)?	Pearson Correlation	1	.156*
	Sig. (2-tailed)		.011
	N	267	267
Travel time to the workplace (in minutes)?	Pearson Correlation	.156*	1
	Sig. (2-tailed)	.011	
	N	267	267
*. Correlation is significant at the 0.05 level (2-tailed).			

#### Travel time to school (in minutes) and Travel time to the workplace (in minutes):

- The correlation coefficient (r) value between Travel time to school (in minutes) and Travel time to the workplace (in minutes) is .156\* which shows a low positive association between both the variables. So, we can say that increase in the level of Travel time school can also increase the travel time to workplace.

Validity:

The P value is < 0.05 which means the relationship is statistically significant.

Correlations			
		Are you aware of the word "climate change"?	Have you taken any initiative to address the potential impacts of climate change?
Are you aware of the word "climate change"?	Pearson Correlation	1	-.095
	Sig. (2-tailed)		.123
	N	267	267
Have you taken any initiative to address the potential impacts of climate change?	Pearson Correlation	-.095	1
	Sig. (2-tailed)	.123	
	N	267	267



**Are you aware of the word “climate change” and have you taken any initiative to address the potential impacts of climate change:**

- The correlation coefficient (r) value between Are you aware of the word “climate change” and have you taken any initiative to address the potential impacts of climate change is  $-.095^*$  which shows a high negative association between both the variables. So, we can say that increase in the level of Are you aware of the word “climate change” can also decrease the have you taken any initiative to address the potential impacts of climate change

Validity:

The P value is  $>0.05$  which means the relationship is not significant

Correlations			
		Occupation of the household head?	Household head education level?
Occupation of the household head?	Pearson Correlation	1	$-.203^{**}$
	Sig. (2-tailed)		$<.001$
	N	267	267
Household head education level?	Pearson Correlation	$-.203^{**}$	1
	Sig. (2-tailed)	$<.001$	
	N	267	267

**\*\*.** Correlation is significant at the 0.01 level (2-tailed).

**Occupation of the household head and Household head education level:**

- The correlation coefficient (r) value between the head of the household's occupation and the education level of the household head is  $-.203$ , indicating a weak negative relationship between the two variables. Therefore, we can conclude that an increase in the head of the household's occupation may also lead to a decrease in the education level of the household head.

Validity:

The P value is  $< 0.05$  which means the relationship is statistically significant

Correlations			
		No. of storey of building?	Adequate ventilation system in the house (exhaust fans, windows)?
No. of <u>storey</u> of building?	Pearson Correlation	1	$.038$
	Sig. (2-tailed)		$.537$
	N	267	267
Adequate ventilation system in the house (exhaust fans, windows)?	Pearson Correlation	$.038$	1
	Sig. (2-tailed)	$.537$	
	N	267	267

**No. of storey of building and Adequate ventilation system in the house (exhaust fans, windows):**

- The correlation coefficient (r) value regarding the number of storeys in a building and the presence of an adequate ventilation system in the house (exhaust fans, windows) is .038, indicating a strong positive relationship between the two variables. Therefore, we can conclude that a rise in the number of storeys in a building may lead to an enhancement in the adequate ventilation system in the house (exhaust fans, windows).

Validity:

The P value is >0.05 which means the relationship is not significant

Correlations			
		No. of storey of building?	Presence of front and backyard?
No. of storey of building?	Pearson Correlation	1	.151*
	Sig. (2-tailed)		.013
	N	267	267
Presence of front and backyard?	Pearson Correlation	.151*	1
	Sig. (2-tailed)	.013	
	N	267	267

\*. Correlation is significant at the 0.05 level (2-tailed).

**No. of storey of building and Presence of front and backyard:**

- The value of the correlation coefficient (r) between the number of storeys in a building and the presence of a front and backyard is .051, indicating a low positive correlation between the two variables. Therefore, we can conclude that an increase in the number of storeys in a building may also lead to an increase in the presence of a front and backyard.

Validity:

The P value is >0.05 which means the relationship is not significant

Correlations			
		Temperature is increased due to climate change?	Increase in the rate of waterborne diseases after climate change?
Temperature is increased due to climate change?	Pearson Correlation	1	.232**
	Sig. (2-tailed)		<.001
	N	266	265
Increase in the rate of waterborne diseases after climate change?	Pearson Correlation	.232**	1
	Sig. (2-tailed)	<.001	
	N	265	266

\*\* . Correlation is significant at the 0.01 level (2-tailed).

**Temperature is increased due to climate change and Increase in the rate of waterborne diseases after climate change:**

- The value of the correlation coefficient (r) between the increase in Temperature due to climate change and the rise in the incidence of waterborne diseases following climate change is .232, indicating a low positive relationship between the two variables.

Therefore, we can conclude that the rise in Temperature due to climate change may also lead to an increase in the incidence of waterborne diseases after climate change.

Validity:

The P value is  $< 0.05$  which means the relationship is statistically significant

Correlations			
		Community affected by Poor Water Quality?	The quality of the water changed?
Community affected by Poor Water Quality?	Pearson Correlation	1	.358**
	Sig. (2-tailed)		$< .001$
	N	265	265
The quality of the water changed?	Pearson Correlation	.358**	1
	Sig. (2-tailed)	$< .001$	
	N	265	267
**. Correlation is significant at the 0.01 level (2-tailed).			

#### Community affected by Poor Water Quality and the quality of the water changed:

- The correlation coefficient (r) value between the Community impacted by Poor Water Quality and the quality of the water altered is. 358 which indicates a slight positive relationship between the two variables. Therefore, we can state that a rise in the level of Community impacted by Poor Water Quality may also lead to an increase in the quality of the water altered.

Validity:

The P value is  $< 0.05$  which means the relationship is statistically significant

Correlations			
		Air pollution or smog increased?	Community affected by air pollution?
Air pollution or smog increased?	Pearson Correlation	1	.441**
	Sig. (2-tailed)		$< .001$
	N	263	263
Community affected by air pollution?	Pearson Correlation	.441**	1
	Sig. (2-tailed)	$< .001$	
	N	263	267
**. Correlation is significant at the 0.01 level (2-tailed).			

#### Air pollution or smog increased and Community affected by air pollution:

- The value of the correlation coefficient (r) between increased Air pollution or smog and the Community affected by air pollution is. 441, indicating a low positive relationship between the two variables. Therefore, we can conclude that a rise in the level of Air pollution or smog can lead to an increase in the Community impacted by air pollution.

Validity:

The P value is  $< 0.05$  which means the relationship is statistically significant

Correlations			
		Hot days increased?	Cold days increased?
Hot days increased?	Pearson Correlation	1	-.003
	Sig. (2-tailed)		.958
	N	263	262
Cold days increased?	Pearson Correlation	-.003	1
	Sig. (2-tailed)	.958	
	N	262	266



### Hot days increased and Cold days increased:

- The value of the correlation coefficient (r) between the increase in Hot days and the increase in Cold days is -.003, indicating a weak negative relationship between the two variables. Therefore, we can conclude that an increase in the number of Hot days may also lead to a decrease in the number of Cold days.

Validity:

The P value is >0.05 which means the relationship is not significant

Correlations			
		Availability of green spaces in the neighbourhood?	Presence of front and backyard?
Availability of green spaces in the neighbourhood?	Pearson Correlation	1	.043
	Sig. (2-tailed)		.485
	N	267	267
Presence of front and backyard?	Pearson Correlation	.043	1
	Sig. (2-tailed)	.485	
	N	267	267

### Availability of green spaces in the neighborhood and Presence of front and backyard:

- The correlation coefficient (r) value between Availability of green spaces in the neighborhood and Presence of front and backyard is .043 which shows a low positive association between both the variables. So, we can say that increase in the level of Availability of green spaces in the neighborhood can also increase the Presence of front and backyard

Validity:

The P value is > 0.05 which means the relationship is not significant

## 4.6. Regression Analysis

### Regression. 1

#### Dependent variables

- Flash flooding affects routine work.

#### Independent variable

- Travel time to school
- Travel time to the workplace
- Stagnant water drained out
- Facing water logging
- Govt. approach toward drainage problem

Table: 1

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.561 <sup>a</sup>	.314	.301	.99398

As shown in table no. 1, we observe that the R-square value is 0.314, indicating that our independent variable induces a 31.4% change in the dependent variable.

**Table: 2**

ANOVA <sup>a</sup>						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	114.572	5	22.914	23.193	<.001 <sup>b</sup>
	Residual	249.961	253	.988		
	Total	364.533	258			

Table no 2, Anova results indicate that the p-value is. 001b, which is lower than. 005b, therefore we conclude that there is a significant association between our independent variable and the dependent variable.

**Table: 3**

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.382	.367		1.042	.298
	Travel time to school (in minutes)?	.087	.136	.034	.637	.525
	Travel time to the workplace (in minutes)?	.142	.126	.060	1.127	.261
	Stagnant water remains in streets after rainwater drained out?	.105	.062	.104	1.677	.095
	Face any water logging in the area?	.420	.066	.395	6.336	<.001
	The drainage problem should be solved by Govt. ?	.217	.051	.229	4.282	<.001

The table no, 3 presents the coefficient results. As noted, the first beta value is. 034, which signifies that a change in travel time to school by one unit will result in a change in the Flash flooding affects routine work (gets late from work) by 0. 34 units. Additionally, the beta value is positive, which reflects the positive correlation between travel time to school and flash flooding affects routine work.

As noted, the second beta value is. 060, which signifies that a change in travel time to workplace by one unit will result in a change in the Flash flooding affects routine work (gets late from work) by 0. 60 units. Additionally, the beta value is positive, which reflects the positive correlation between travel time to workplace and flash flooding affects routine work.

As noted, the third beta value is. 104, which signifies that a change in Stagnant water remaining in streets after rainwater drained out by one unit will result in a change in the Flash flooding affects routine work (gets late from work) by 0. 104 units. Additionally, the beta value is positive, which reflects the positive correlation between Stagnant water remaining in streets after rainwater drained out and flash flooding affects routine work.

As noted, the fourth beta value is. 395, which signifies that a change in Facing any water logging in the area by one unit will result in a change in the Flash flooding affects routine work (gets late from work) by 0. 395 units. Additionally, the beta value is positive, which

reflects the positive correlation between Facing any water logging in the area and flash flooding affects routine work.

As noted, the fifth beta value is. 229, which signifies that a change in the drainage problem needing resolution by Govt by one unit will result in a change in the Flash flooding affects routine work (gets late from work) by 0. 229 units. Additionally, the beta value is positive, which reflects the positive correlation between the drainage problem needing resolution by Govt and flash flooding affects routine work.

### Regression. 2

#### **Dependent variable**

- Increase in the rate of waterborne diseases

#### **Independent variable**

- Availability of sanitation options
- Water comes to home
- Sewage remains on the ground
- Municipal activities changed

**Table: 1**

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.302 <sup>a</sup>	.091	.077	1.08170

Table No. 1 shows that the R-squared value is 0.091, meaning that the dependent variable changes by 9.1% as a result of our independent variable.

**Table: 2**

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28.742	4	7.186	6.141	<.001 <sup>b</sup>
	Residual	285.499	244	1.170		
	Total	314.241	248			

Based on the Anova results in Table No. 2, we conclude that there is a significant association between our independent and dependent variables because the p-value is 0.001b, which is smaller than 0.005b.



Coefficients <sup>a</sup>						
	Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.137	.295		7.236	<.001
	Sanitation options available are enough to deal with increased changes in rainfall patterns due to climate change?	.051	.056	.061	.907	.365
	Water comes into your home from the ground?	.109	.056	.128	1.943	.053
	Sewage remains on the ground after drainage of rain water?	.179	.058	.196	3.105	.002
	Municipal activities changed (sewerage cleaning, etc)?	.079	.054	.099	1.461	.145

**Table: 3**

Table No. 3 displays the findings of the coefficients. As can be seen from the first beta value of .061, a change of one unit in the sanitation options available to cope with the increased changes in rainfall patterns brought on by climate change will result in a change of .061 units in the rate of waterborne diseases following climate change. Additionally, the beta value is positive, indicating a positive correlation between the rate of waterborne infections following climate change and the availability of adequate sanitation solutions to cope with greater fluctuations in rainfall patterns brought on by climate change.

As previously mentioned, the second beta value is .128. This indicates that a one-unit change in the amount of water that enters your home from the ground will result in a .128 unit increase in the rate of waterborne illnesses following climate change. Additionally, the beta value is positive, indicating a positive correlation between the rate of waterborne infections following climate change and the amount of water that enters your home from the ground.

According to the third beta value of .196, increasing the amount of sewage that stays on the ground after rainwater drains by one unit will result in a .196-unit increase in the rate of waterborne illnesses following climate change. Additionally, the beta value is positive, indicating a positive correlation between the percentage of waterborne infections following climate change and the amount of sewage that stays on the ground after rainwater drains.

According to the fourth beta value of 0.099, a one-unit change in municipal activities (such as sewerage cleaning) will result in a 0.099-unit change in flash flooding's impact on everyday work (such as tardiness). Additionally, the beta value is positive, indicating a positive correlation between the rate of waterborne infections following climatic change and changes in municipal operations (such as sewerage cleaning).

### Regression. 3

#### **Dependent variable**

- Community affected by Poor Water Quality

#### **Independent variable**

- Changing water quality

- Access to safe drinking water
- Increase in the rate of waterborne diseases
- Diagnosed with Infectious Diseases

**Table: 1**

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.459 <sup>a</sup>	.210	.198	1.06065

Our independent variable produces a 21% change in the dependent variable, as shown by the R-squared value of 0.210 in table no. 1.

**Table: 2**

We conclude that there is a significant association between our independent variable and the

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	76.748	4	19.187	17.055	<.001 <sup>b</sup>
	Residual	287.995	256	1.125		
	Total	364.743	260			

dependent variable because Table No. 2's Anova results indicate that the p-value is .001b, which is less than .005b.

**Table: 3**

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.244	.340		3.664	<.001
	The quality of the water changed?	.248	.059	.259	4.223	<.001
	Households having access to safe drinking water (Water filtration plant)?	.361	.150	.133	2.401	.017
	Increase in the rate of waterborne diseases after climate change?	.225	.066	.216	3.404	<.001
	Diagnosed with Infectious Diseases (Malaria, Dengue, Cholera, Diarrhea)?	.125	.058	.124	2.145	.033

Results for the coefficients are displayed in table no. 3. Since the first beta value is .259, as previously said, a one-unit change in the water quality will result in a .259 unit change in the community afflicted by poor water quality. Additionally, the positive beta value shows a positive correlation between the improvement in water quality and the rise in the number of communities impacted by poor water quality.

As previously mentioned, the second beta value is .133, meaning that a one-unit increase in the number of households with access to safe drinking water (a water filtration plant) will result in a .133-unit increase in the number of communities afflicted by poor water quality. Additionally, the beta value is positive, indicating a positive correlation between communities impacted by poor water quality and households with access to safe drinking water (a water filtration plant).

According to the third beta value, which is .216, a one-unit increase in the rate of waterborne illnesses following climate change will result in a .216-unit increase in the number of communities impacted by poor water quality. Additionally, the beta value is positive, indicating a positive correlation between communities afflicted by poor water quality and the rise in the occurrence of waterborne infections following climate change.

According to the fourth beta value, which is .124, a one-unit change in the number of people diagnosed with infectious diseases (malaria, dengue, cholera, and diarrhea) will result in a .124-unit increase in the number of people in the community afflicted by poor water quality. Additionally, the beta value is positive, indicating a positive correlation between the community impacted by poor water quality and those diagnosed with infectious diseases (malaria, dengue, cholera, and diarrhea).

#### Regression. 4

##### **Dependent variable**

- Air pollution or smog increased

##### **Independent variable**

- Air pollution effects
- Municipal activities changed
- Humidity events increased
- Availability of green spaces

**Table: 1**

Our independent variable produces a 22.6% change in the dependent variable, as shown by

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.475 <sup>a</sup>	.226	.214	.92418

the R-squared value of 0.226 in table no. 1.

**Table: 2**

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	64.182	4	16.046	18.786	<.001 <sup>b</sup>
	Residual	220.358	258	.854		
	Total	284.540	262			

Based on the Anova results in Table No. 2, we conclude that there is a significant link between our independent and dependent variables because the p-value is.001b, which is smaller than.005b.

**Table: 3**

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.888	.327		5.781	<.001
	Community affected by air pollution?	.360	.057	.372	6.271	<.001
	Municipal activities changed(sewerage cleaning, etc)?	.027	.041	.037	.664	.507
	Humidity events increased (for the last ten years)?	.205	.067	.181	3.034	.003
	Availability of green spaces in the neighbourhood?	-.073	.114	-.035	-.641	.522

Results for the coefficients are displayed in table no. 3. The first beta value, as shown, is.372, meaning that a one-unit change in the community affected by air pollution would result in a.372 unit rise in smog or air pollution changes. Additionally, the beta value is positive, indicating a positive correlation between the growth in smog or air pollution and the community afflicted by it.

The second beta value, as shown, is.037, meaning that a one unit change in municipal operations (such as sewerage cleaning) will result in a.037 unit increase in smog or air pollution. Additionally, the positive beta value shows a positive correlation between the increase in smog or air pollution and changes in municipal operations (such as sewerage cleaning).

According to the third beta value, which is.181, an increase of one unit in humidity events during the previous 10 years will result in an increase of.181 units in smog or air pollution. Additionally, a positive beta value suggests a positive correlation between an increase in humidity occurrences (during the past decade) and an increase in smog or air pollution..

A change of one unit in the neighborhood's green space availability will result in a corresponding increase of -.035 units in smog or air pollution, as the fourth beta value of -.035 indicates. Additionally, the neighborhood's green space availability and increased smog or air pollution are negatively correlated, as seen by the negative beta value.

## **Regression. 5**

### **Dependent variable**

- Drainage system get worse



### Independent variable

- Financial Contribution toward upgradation
- Sewage remains on the ground
- Stagnant water remains in streets

**Table: 1**

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.576 <sup>a</sup>	.331	.324	.99885

Our independent variable produces a 33.1% change in the dependent variable, as shown by the R-squared value of .331, as shown in table no. 1.

**Table: 2**

Since the p-value in Table No. 2's Anova results is .001b, which is less than .005b, we can

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	128.595	3	42.865	42.964	<.001 <sup>b</sup>
	Residual	259.401	260	.998		
	Total	387.996	263			

conclude that there is a significant correlation between our independent and dependent variables.

**Table: 3**

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.402	.245		5.711	<.001
	Financial Contribution to the up gradation of area?	-.027	.048	-.029	-.562	.575
	Sewage remains on the ground after drainage of rain water?	.321	.056	.326	5.722	<.001
	Stagnant water remains in streets after rainwater drained out?	.367	.060	.355	6.162	<.001

The coefficient results are displayed in Table No. 3. According to the initial beta value, which is -.029. This indicates that a one-unit increase in the financial contribution to the area's upgrade will result in a -.029-unit deterioration of the drainage system following periods of intense rainfall. Additionally, a negative beta value suggests a negative correlation between the financial contribution to area improvement and the drainage system's worsening during periods of intense rainfall.

Since the second beta value is .326 as shown, a change of one unit in the amount of sewage that remains on the ground after rainwater drainage will result in a change of .326 units in the drainage system becoming worse after intense rainfall. Additionally, the beta value is positive, indicating a positive correlation between the drainage system becoming poorer following heavy rainfall and sewage remaining on the ground after rainwater has been drained.

The third beta value, as shown, is .216, meaning that a one unit increase in the rate of waterborne infections following climate change will result in a .216 unit increase in the drainage system's deterioration following excessive rainfall. Additionally, the beta value is positive, indicating a positive correlation between the drainage system deteriorating following excessive rainfall and the rise in the occurrence of waterborne infections following climate change.

### Regression. 6

#### **Dependent variable**

- Effects of temperature variation

#### **Independent variable**

- Hot days increased
- Temperature variation
- Provision of green spaces
- Ventilation system in the house
- Household members living on the upper floors
- Age of building
- Cold days increased

**Table: 1**

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.560 <sup>a</sup>	.314	.295	.78877

As indicated in table no. 1, we can see that R-square value is 0.314 which means that our independent variable causes 31.4% change in the dependent variable.

**Table: 2**

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	71.752	7	10.250	16.476	<.001 <sup>b</sup>
	Residual	156.782	252	.622		
	Total	228.535	259			

Since the p-value in Table No. 2's Anova results is .001<sup>b</sup>, which is less than .005<sup>b</sup>, we can conclude that there is a significant correlation between our independent and dependent variables.

**Table: 3**

<b>Coefficients<sup>a</sup></b>					
Model		Unstandardized Coefficients		Standardized Coefficients	Sig.
		B	Std. Error	Beta	
1	(Constant)	1.670	.378		4.414 <.001
	Hot days increased?	.433	.059	.454	7.349 <.001
	Temperature is increased due to climate change?	.165	.060	.169	2.737 .007
	Availability of green spaces in the neighbourhood?	.004	.100	.002	.044 .965
	Adequate ventilation system in the house (exhaust fans, windows)?	-.062	.115	-.028	-.536 .593
	Household living on the top floors of the building?	-.130	.102	-.069	-1.277 .203
	Building age?	-.032	.045	-.039	-.729 .467
	Cold days increased?	.056	.039	.079	1.450 .148

The coefficient results are displayed in Table No. 3. Given that the first beta value is .454, an increase of one unit on hot days will result in a corresponding change of .454 units in high or low temperatures for the community's residents. Moreover, a positive beta value suggests a positive correlation between the number of hot days and the impact of rising or falling temperatures on the community's residents.

As previously mentioned, the second beta value is .169, meaning that a one unit increase in temperature brought on by climate change would result in a .169 unit change in how the community's residents are affected by rising or falling temperatures. Additionally, the beta value is positive, indicating that there is a positive correlation between climate change-induced temperature increases and the impact of high or low temperatures on community members.

The third beta value, as shown, is .002, meaning that a one unit change in the neighborhood's green space availability will result in a .002 unit change in the community's residents' exposure to hot or low temperatures. Additionally, the neighborhood's green space availability and the impact of high or low temperatures on the local population are positively correlated, as indicated by the positive beta value.

It is shown that the fourth beta value is -.028. This indicates that a one unit change in the house's proper ventilation system (windows, exhaust fans) will result in a -.028 unit change in the impact of rising or falling temperatures on the community's residents. Additionally, a negative beta value suggests that there is a negative correlation between a home's proper ventilation system (windows, exhaust fans) and how residents are impacted by high or low temperatures.

As previously mentioned, the fifth beta value is  $-.069$ , meaning that a one unit change in the number of households occupying the upper levels of the building will result in a  $-.069$  unit change in the impact of rising or falling temperatures on the community's residents. Additionally, the beta value is negative, indicating that households on the upper levels of the building have a negative link with the impact of high or low temperatures on the community's residents.

According to the sixth beta value, which is  $-.039$ , a one-unit change in building age will result in a  $-.039$ -unit difference in the community's residents' exposure to hot or low temperatures. Moreover, the negative beta value suggests that there is a negative correlation between building age and the impact of high or low temperatures on the community's residents.

According to the seventh beta value, which is  $.079$ , an increase of one unit in the number of cold days will result in a corresponding change of  $.079$  units in the impact of hot or low temperatures on population members. Moreover, a negative beta value suggests that there is a negative correlation between the number of cold days and the impact of high or low temperatures on the community's residents.

## 5. SWOT Analysis& SWOT Matrix

### 5.1. SWOT Analysis:

The term "indicator" in a SWOT analysis is broad and primarily pertains to business administration. In an urban setting, though, it might differ even depending on the particular instance.

SWOT analysis is used in this study to examine an urban renewal initiative. As a result, definitions of threat, opportunity, and weakness are based on the urban context instance.

The urban area's resource is one of its strengths. It's a particular problem that changes depending on the location. The resource is appropriate for the area's physical attributes, location, and social structure. The resources found in metropolitan areas enable interventions to meet their predetermined objectives.

A project's limitation in an urban setting that prevents it from achieving its objectives or results is called a weakness. Weaknesses in this instance include the economy, land use, community involvement, and title issues with the houses.

An opportunity represents a project's potential to improve social, environmental, and financial circumstances. After the urban regeneration project is completed, it offers or permits more effective results.

An undesirable outcome of the urban redevelopment initiative is a threat. Results may have an immediate impact on the surrounding area and community. Threats are obstacles that prevent a project from reaching its objectives and reduce its efficacy.

An effective urban regeneration project typically incorporates SWOT analysis and relies on a strategic approach that leverages strengths to seize opportunities and mitigates weaknesses to assess threats.

Based on the responses given by the respondents and our survey conducted in this area we made SWOT and SWOT of this area given below.



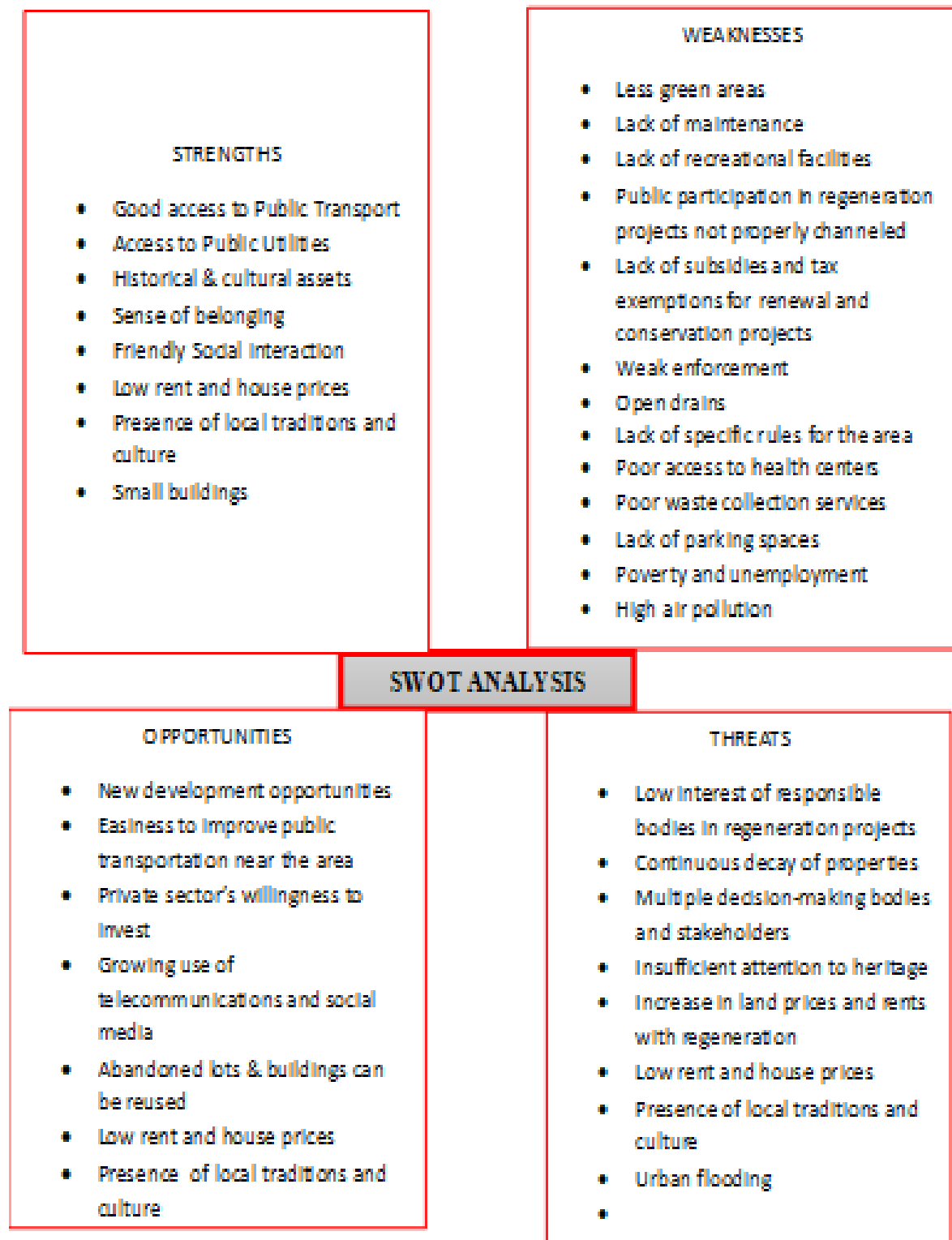


Figure 7 SWOT Analysis

## 5.2. SWOT matrix:

Businesses and people can use a SWOT matrix to determine their opportunities, threats, weaknesses, and strengths. It can support their future planning, teamwork, and accomplishment of strategic goals.

After conducting SWOT analysis SWOT matrix was developed as follows:



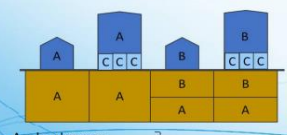
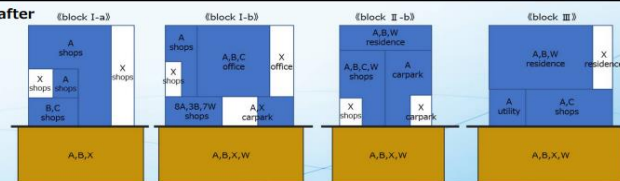
	Strength	Weakness
Opportunities	<ul style="list-style-type: none"> <li>• Vertical development along main road</li> <li>• Historical and culture assets to be use for tourism</li> <li>• Divide the area into 4 equal parts and committees that will work with inhabitants for the community</li> <li>• Employment opportunity SDG 1</li> </ul>	<ul style="list-style-type: none"> <li>• Rooftop gardens and small green plants in the balcony to start with</li> <li>• Proper guiding committee to work with the public</li> <li>• Sewerage work done properly</li> </ul>
Threats	<ul style="list-style-type: none"> <li>• Investors to invest in the development</li> <li>• Private investors to work for the development</li> <li>• Use the deployed properties for new development</li> <li>• People initiatives to stop from environmental hazards</li> <li>• Sustainable development goal 11 to make the community sustainable, safe resilient</li> </ul>	<ul style="list-style-type: none"> <li>• Take people to work with you</li> <li>• Town houses</li> <li>• New development</li> <li>• Cleaning schemes</li> <li>• Infill development</li> </ul>

Based on the swot analysis we made the strategies in swot matrix to deal with the weaknesses and threats of the area while using the strengths and opportunities of the area.

## 6. Recommendations:

The recommendations based on the strategies in the SWOT is given below:



The main strength of the area is its access to GT road while using this strength we suggest doing the vertical development along the outskirts of area as all building are already of two story (see map of building height) we can convert it into the multi story while providing the required infrastructure to not make it congested and a problem again for the inhabitants. This will help to accomplish the SDG 11 in the area. Like Japan has done in the “Futakotamagawa RISE”

Urban Renewal type 1	Outskirt renewal	"Futakotamagawa RISE"
BEFORE & AFTER		
 <p>Site area : approx.8.1ha Total floor area : 266,600m<sup>2</sup></p>		
 <p>Bldg types : offices, residences, hotel, shops, movie theatre, fitness club Number of bldgs : 12 Site area : approx.112,000m<sup>2</sup> Total floor area : 423,721m<sup>2</sup></p>		
RIGHTS CONVERSION PATTERN		
<p><b>before</b></p>  <p>A : landowner B : leaseholder C : tenant W : preceded buyer</p> <p><b>after</b></p>  <p>X : contracted union member → selling floor</p> <p>converted floor</p>		
<p>Project Formation : Authorization : Tokyo Metropolitan Government, Setagaya Ward Execution : Renewal Union</p>		


As there is only one park in the whole area we suggest making small green spaces along the multi-story buildings like we have suggested along the outskirts of the area. Japan's "Sakurajohsui Gardens"

Apartment Rebuilding Measure	Residence renewal	"Sakurajohsui Gardens"
PROJECT OUTLINE	It is a major project which involved the renewal of a cluster of 17 apartments (404 units) based on Apartment Rebuilding Measure in Tokyo. The fixed category of building group on a city plan was abolished and the project was led under district plans. 200 of the original trees are preserved and the former greenery environment is well maintained.	
APPEARANCE		
OVERVIEW & HISTORY	<p>Scheme : Apartment Rebuilding Measure Executor : Renewal Union Right holder : 359 landowners Location : Setagaya-ku, Tokyo</p> <p>1989 : Start of apartments renewal council 2001 : Establishment of pre-Union 2003 : Resolution of rebuilding execution 2005 : City plan project approval 2009 : Resolution of package rebuilding 2010 : Establishment of UR Union 2013 : Construction commencement 2015 : Completion</p>	

The dense part of the area can be saved by multi-story buildings take the above example.

Disaster Prevention Project	Improvement of dense urban areas	"Sprout Hikifune"
<p>BEFORE &amp; AFTER</p> <div>   </div>		
<p>RIGHTS CONVERSION PATTERN</p> <div> <p>before</p> <p>A : landowners B : leaseholders C : tenants</p> <p>converted floor</p> <p>after</p> <p>X : precede buyer → selling floor</p> </div>		
<p>Project Formation</p> <p>Authorization : Tokyo Metropolitan Government, Sumida Ward Execution : Urban Renaissance Agency</p>		

To cope with the economic problem of the area and to accomplish the SDG 1 we can make a commercial hub in the area like "Sogawa FERIO"

Urban Renewal type 1	Commercial Hub development	"Sogawa FERIO"
PROJECT OUTLINE	This project was aimed at the revitalization of a stagnant shopping street. The old department store was relocated and rebuilt nearby to improve the commercial facilities that form the core of the area. It was realized in an integrated manner with the adjacent Nishicho and Sogawa block with consolidated parking lots including an all-weather event square (Grand Plaza) with a roof between the two blocks. Various events are held there to contribute to the bustle and liveliness.	
APPEARANCE		
OVERVIEW & HISTORY	<p>Scheme : Renewal method type 1 Executor : Renewal Union Area size : approx.1.1ha Right holder : 48 landowners, 22 leaseholders 18 tenants Location : Sogawa, Toyama</p> <p>1992 : Establishment of Pre-Union 2001 : City plan project approval 2004 : Establishment of Renewal Union 2005 : Approval of rights conversion 2005 : Construction commencement 2007 : Construction completed, Facilities opened</p>	

We suggested the infill development on the land which were vacant left with no use of that land in the area. As to remove the congestion we suggest the high rise development in that area with area covered with the green space like the high density zone in Brasilia.





Reviewing the above information, we can propose high rise buildings along G.T road. By using orange train opportunity within the area, we can provide Transit Oriented Development (TOD) in area. Similarly, Park which is in deteriorating condition can be improved. Open solid waste dumping can be exhausted through waste collection and providing waste collection dustbin at each street corner. The below figures show the existing condition of area and proposed ideas.

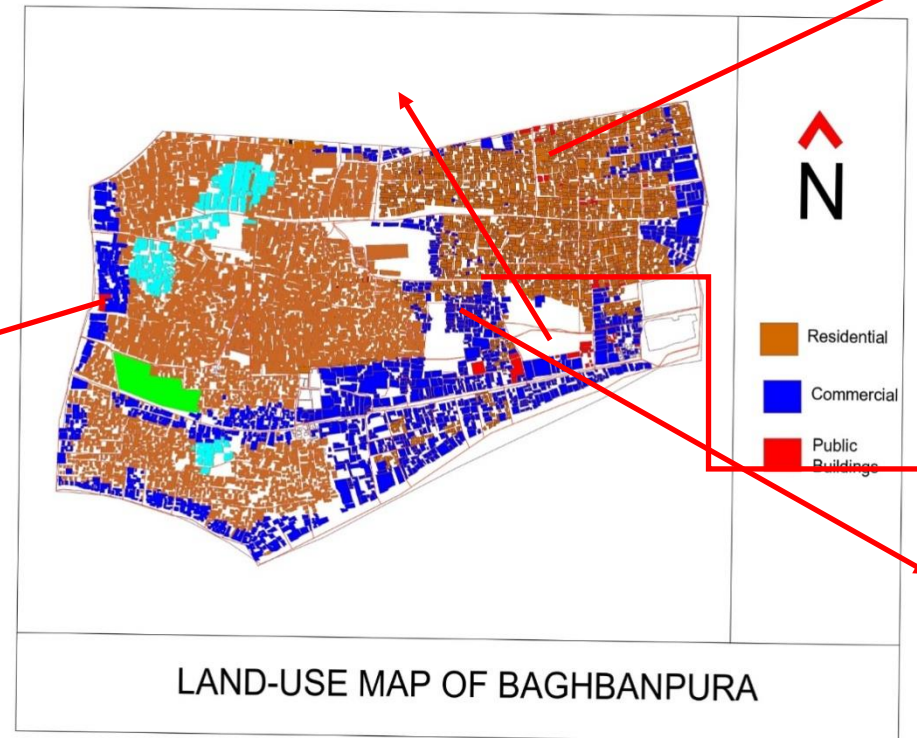
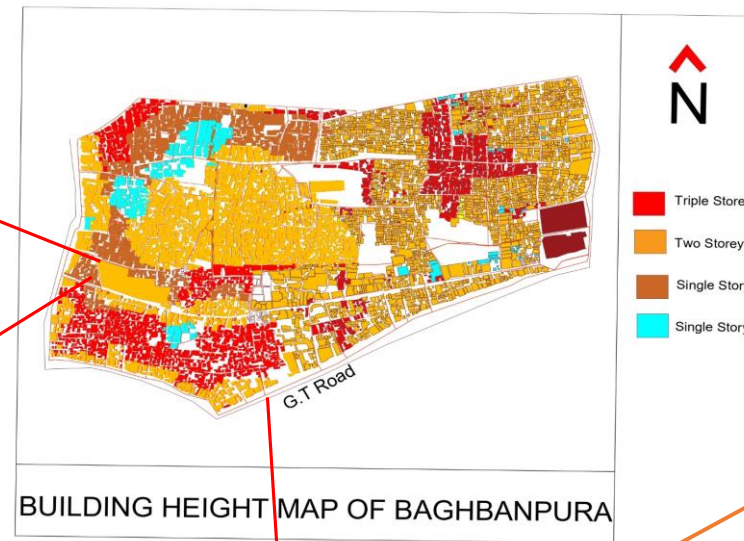


Figure 8 Existing Condition

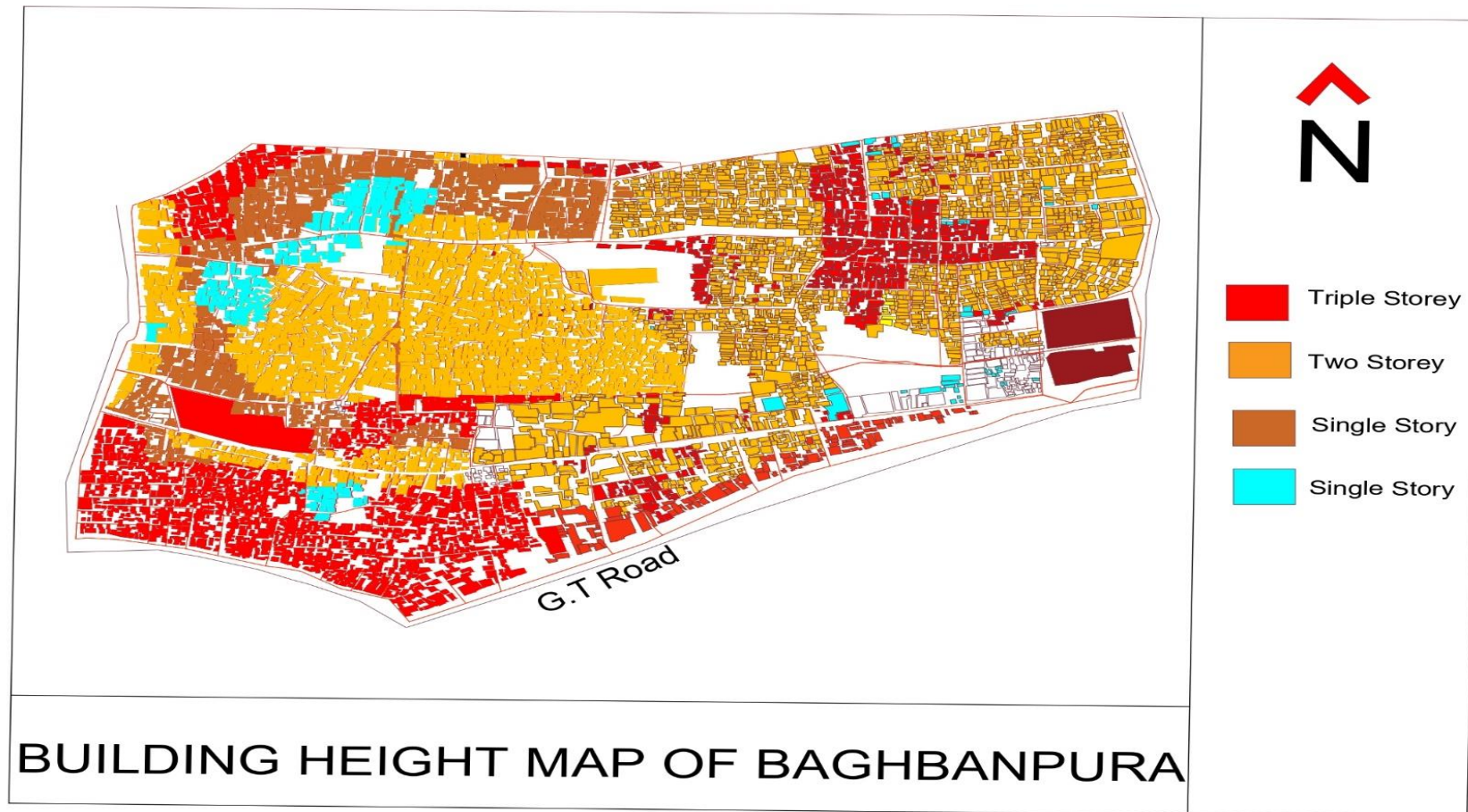




Transit-oriented  
Development(TOD)  
concept



Figure 9 Proposed Plan



*Figure 10 Proposed high rise buildings map*



## 7. Conclusion:

The actual physical setting in which human interactions and activities take place is known as the built environment. Therefore, alterations made at the architectural and urban scales have a significant impact on the social viewpoint. In order to lessen the susceptibility of its residents and users and to enhance their well-being through the realization of social benefits and the surmounting of vulnerability, urban regeneration in vulnerable areas ought to be given top priority.

The study highlights the benefits and drawbacks of neighborhood urban renewal projects. Therefore, the neighborhood benefits from the area's location. In addition to its advantages, the region's social and economic weaknesses include issues with poverty and unemployment, a lack of access to healthcare, recreational opportunities, and education, as well as social boundaries. Furthermore, rather than community, the urban redevelopment project's vulnerability is a lack of engagement. Strengths and weaknesses are products of present conditions of the place. Opportunities including social inclusion, physical health improvements, and enhanced public transportation are addressed by the initiative.

Drawing from the analysis, firstly urban regeneration project should fix its weakness with participation of citizen, then the project can develop on communities' strength point to overcome the weakness. As a result, the project's potential is attainable and offer sustainable urban development.

It may be argued that alternative approaches could result in different priorities about the optimal regeneration strategy for the settlement's historical fabrics and residents, even though the current study benefits from a sufficient number of respondents for the quantitative statistical methodologies employed. In any case, this study offers a thorough and basic diagnosis that should be pertinent for further research in this area and recommendations following the survey's analysis of the area, which will enhance the region's key physical, environmental, and economic features.

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## Appendix 2:

# HOUSEHOLD SURVEY

### Objective:

The purpose of this survey is to collect data from a predefined group of respondents to gain information and insight in various topic of interest. Another purpose is to collect comprehensive and diverse socio-demographic data pertaining to conditions under which people live- their welfare, demographic characteristics, cultural factors that influence behavior, social and economic change.

### Introduction:

Surveyor Name: \_\_\_\_\_

### Demographic Information:

Number of kitchens in the house? \_\_\_\_\_

How many members are there in the house? \_\_\_\_\_

For how many years have you been living here? \_\_\_\_\_

### Housing condition:

1. Family type ☐ Joint ☐ Nuclear ☐ Single
2. Building height (number of stories) ☐ Multiple ☐ Double ☐ Single
3. Housing type  
☐ Single ☐ Detached ☐ Semi-detached ☐ Combined
4. Building construction materials ☐ Katcha (mud cement) ☐ Pacca (brick, cement)
5. Travel time to school (in minutes) ☐ ≤15 ☐ >15
6. Travel time to the workplace (in minutes) ☐ ≤15 ☐ >15
7. Building age  
☐ <10 ☐ 10-19 ☐ 20-30 ☐ >30
8. Kitchen location in the house ☐ Outdoor ☐ Indoor

### Sensitivity:

9. Household living on the top floors of the building ☐ Yes ☐ No
10. Household with frequent hospitalization for heat-related symptoms ☐ Yes ☐ No

### Coping capacity:

11. Average monthly housing income (PKR\*)

☐ <45,000   ☐ 45,000-70,000   ☐ 70,001-95,000   ☐ 95,001-120,000   ☐ >120,000

12. Occupation of the household head

☐ Government   ☐ Private   ☐ Commerce

13. Household head education level

☐ Illiterate   ☐ Middle   ☐ Primary   ☐ High school   ☐ College   ☐ University

14. Number of windows in the house

☐ <5   ☐ 6-13   ☐ 14-22   ☐ >23

15. Are you aware of the word "climate change"?

☐ No   ☐ Just heard the name   ☐ A little bit knowledge   ☐ Yes, I have thorough knowledge

16. What do you consider yourself/ your family most at risk of?

☐ Water borne diseases   ☐ respiratory diseases   ☐ cardiovascular diseases   ☐ skin diseases   ☐ other

Sr. No	Statement	Yes	No
17.	Households having access to safe drinking water (Water filtration plant )		
18.	Households with access to the nearest medical facility within 1 km		
19.	Households having access to means of communication (TV, radio, internet)		
20.	Household access to means of transportation car, public transport, motorcycle		
21.	Adequate ventilation system in the house (exhaust fans, windows)		
22.	The presence of a veranda in the house		
23.	Presence of front and backyard		
24.	Availability of green spaces in the neighbourhood		
25.	Presence of a ventilation system in the kitchen		
26.	Have you taken any initiative to address the potential impacts of climate change? If yes, then what _____		

### Rate your answer against each statement:

1= Strongly disagree, 2= Disagree, 3=Neutral, 4=Agree, 5=Strongly agree

Sr.	Statement	1	2	3	4	5
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No.						
27.	Temperature is increased due to climate change					
28.	Hot days increased					
29.	Cold days increased					
30.	High or low temperatures affect the people in the community					
31.	Air pollution or smog increased					
32.	The quality of the water changed					
33.	Municipal activities changed(sewerage cleaning, etc)					
34.	Sanitation options available are enough to deal with increased changes in rainfall patterns due to climate change					
35.	Community affected by air pollution					
36.	Sewage remains on the ground after drainage of rain water					
37.	Community affected by Poor Water Quality					

### Rate your opinion against each statement

1= strongly disagree, 2= Disagree, 3=Neutral, 4=Agree, 5=strongly agree

Sr. No.	Statement	1	2	3	4	5
38.	Humidity events increased (for the last ten years)?					
39.	The drainage system gets worse after extreme rainfall					
40.	Water comes into your home from the ground					
41.	Face any water logging in the area					
42.	Stagnant water remains in streets after rainwater drained out					
43.	Increase in the rate of waterborne diseases after climate change					
44.	Diagnosed with Infectious Diseases (Malaria, Dengue, Cholera, Diarrhea)					
45.	Flash flooding affects routine work (gets late from work)					
46.	Financial Contribution to the up gradation of area					
47.	The drainage problem should be solved by Govt.					