



Royal Academy  
of Engineering

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# SHANTI COLONY

## SUMMARY OF RESULTS

FROM THE RESEARCH PROJECT

*CLIMATE-RESILIENT SLUMS:*

*A SYSTEMS APPROACH FOR INCLUSIVE CLIMATE IMPACT ASSESSMENT*

For further information see the online dashboard here:

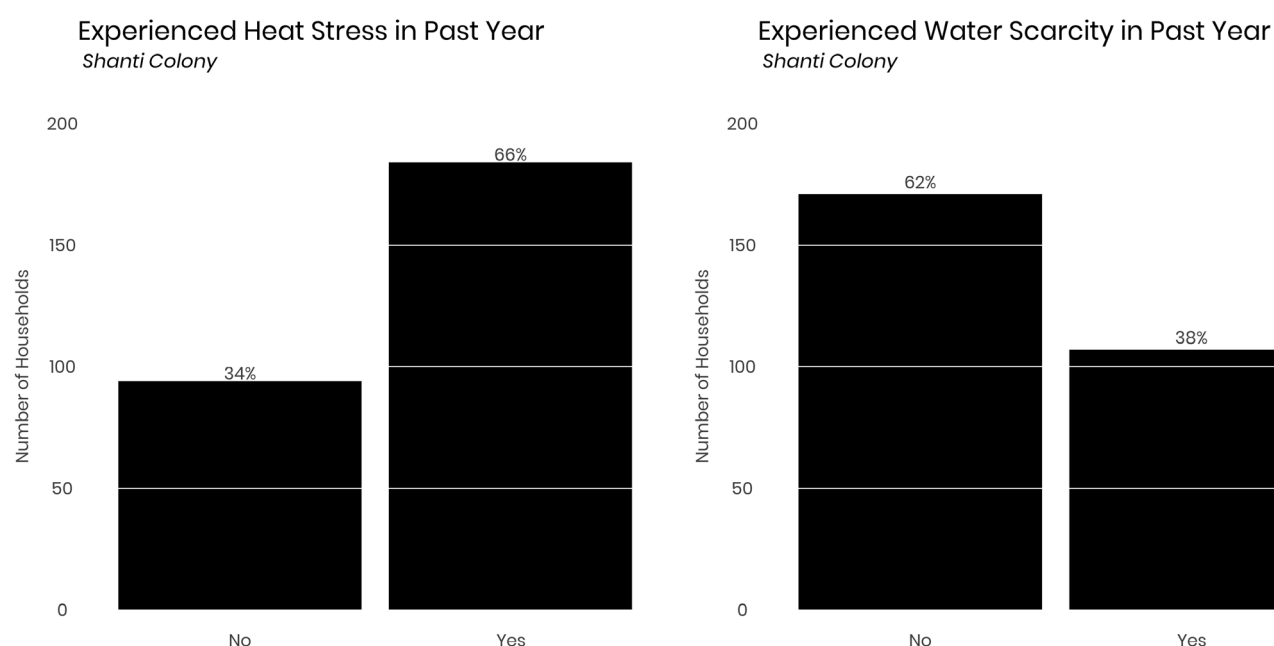
<https://waterresilientcities.shinyapps.io/RAEng/>

Or contact: [m.bedinger@hw.ac.uk](mailto:m.bedinger@hw.ac.uk)

## PROFILE

Shanti Colony is the largest area in the study. There were **278** respondents representing **1724** people. For every household, there are **6.2** residents, making this the 2<sup>nd</sup> densest area. All areas had a median age of ~37 years and mean age of ~39 years, roughly consistent with the overall means. In Shanti Colony, respondents' ages ranged from 21–69.

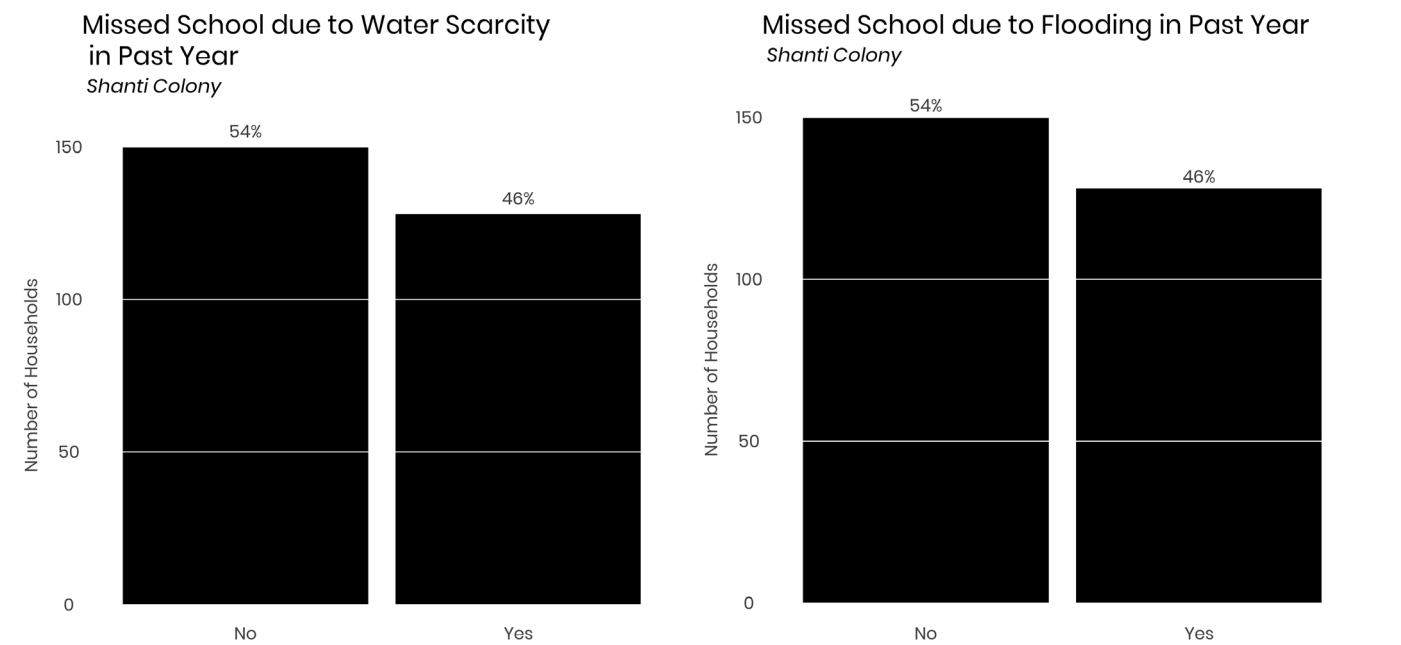
In the past year, **almost all (> 98%)** households experienced flooding, **66%** experienced heat stress, and **39%** experienced water scarcity. Thus the most widespread hazard was flooding, followed by heat stress, then water scarcity.



Collectively, Shanti Colony experienced **10,323 days** of water scarcity and **826 days** of heat stress. On average in the past year, each household experienced **37.1 days** of water scarcity, and **3.0 days** of heat stress. No information was gathered about number of days flooding was experienced. Thus the most severe hazard was water scarcity, followed by heat stress, though it should be noted no data around flooding was gathered for a comparison.

EDUCATION

In the past year, **46%** of households had a child miss school at least once due to water scarcity, **46%** had a child miss school due to flooding, and **27%** had a child miss school due to heat stress. Thus the most widespread threats to missing school were water scarcity and flooding, followed by heat stress.



Collectively, households in Shanti Colony experienced **637 days** of missed school due to flooding, **625 days** of missed school due to water scarcity and **315 days** of missed school heat stress. On average in the past year, each household had a child miss school due to flooding for **2.3 days**, water scarcity for **2.2 days**, and heat stress for **1.1 days**. Thus the most severe threat to missing school was flooding, followed by water scarcity, then heat stress.

## EMPLOYMENT

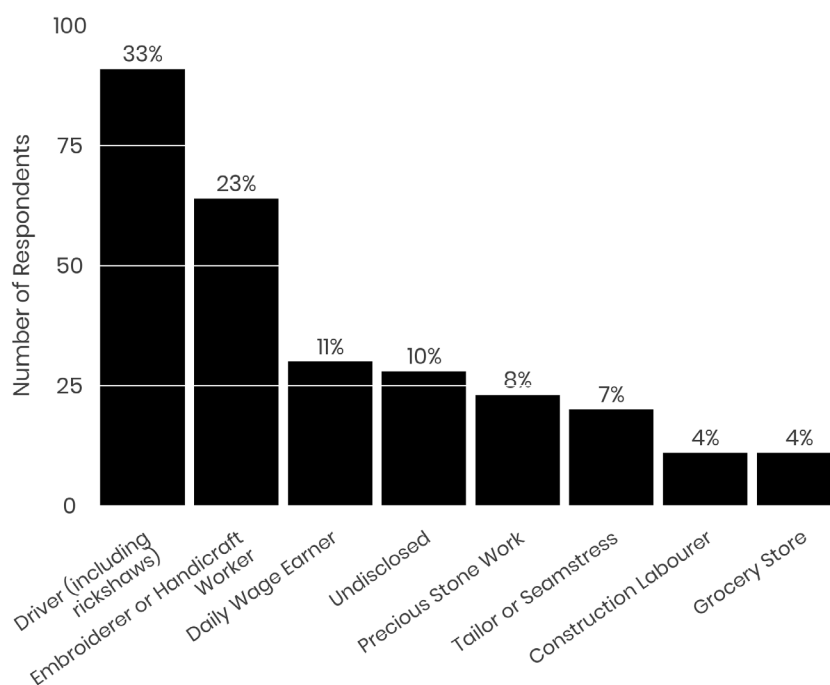
The most common job types in Shanti Colony were *Driver (including rickshaws)*, *Embroiderer or handicraft worker*, *Daily wage earner*, or *Undisclosed (other)*. In general, **31%** of respondents were informally employed. **75%** of respondents performed at least some of their work outside the slum.

In the past year, **63%** of households lost work due to heat stress. When compared to other areas, Shanti Colony had the highest proportion of households losing work due to heat stress.

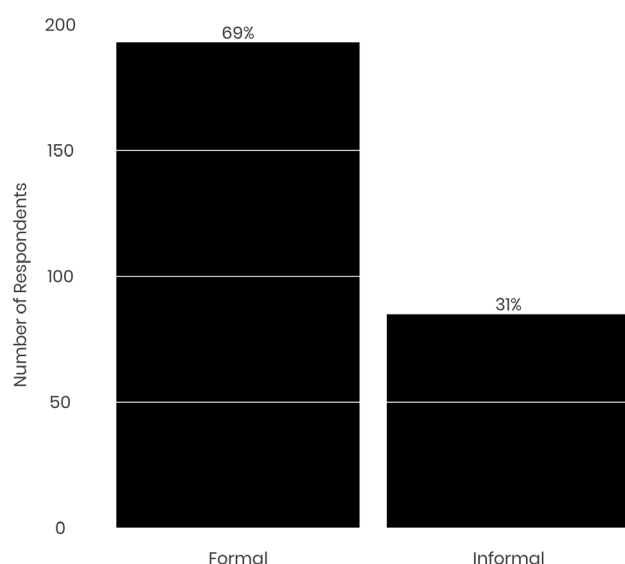
**58%** of households also lost work due to flooding and **38%** lost work due to water scarcity. Thus the most widespread threat to losing work was heat stress, followed by flooding, then water scarcity.

Collectively, households in Shanti Colony experienced **697 days** of lost work due to flooding, **~475 days** of lost work due to heat stress, and **380 days** of lost work due to water scarcity. On average in the past year, each household lost work due to flooding for **2.5 days**, heat stress for **~1.7 days**, and water scarcity for **1.4 days**. Thus the most severe threat to losing work was flooding, followed by heat stress, then water scarcity.

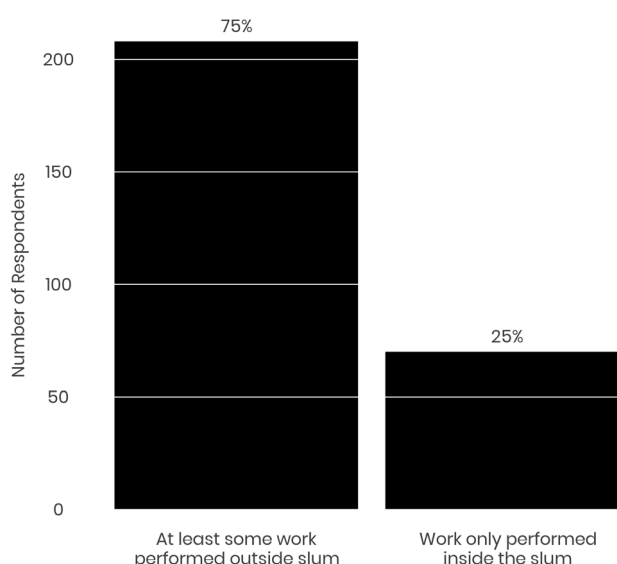
Most Common Job Types  
by Questionnaire Response, Shanti Colony



Formal vs. Informal Employment  
Shanti Colony



Typical Work Location  
Shanti Colony



## INFRASTRUCTURE

The main sources of drinking water and domestic water by far was *Tanker supplied privately*.

The main point of access to a toilet was *Own toilet within dwelling* or *Own toilet near dwelling*.

The main point of access to bathing facilities was a *Permanent bathroom (with wall and roof) within the house premises*. The main type of electricity connection was *Legal, metered*.

The most commonly reported set of impacts from water scarcity (37% of responses in Shanti Colony) were for all four uses *Cooking, Drinking, Household sanitation, Personal sanitation*.

The majority of households ( $\geq 96\%$  of responses in Shanti Colony) needed to purchase water *Daily, for drinking and domestic purposes*.

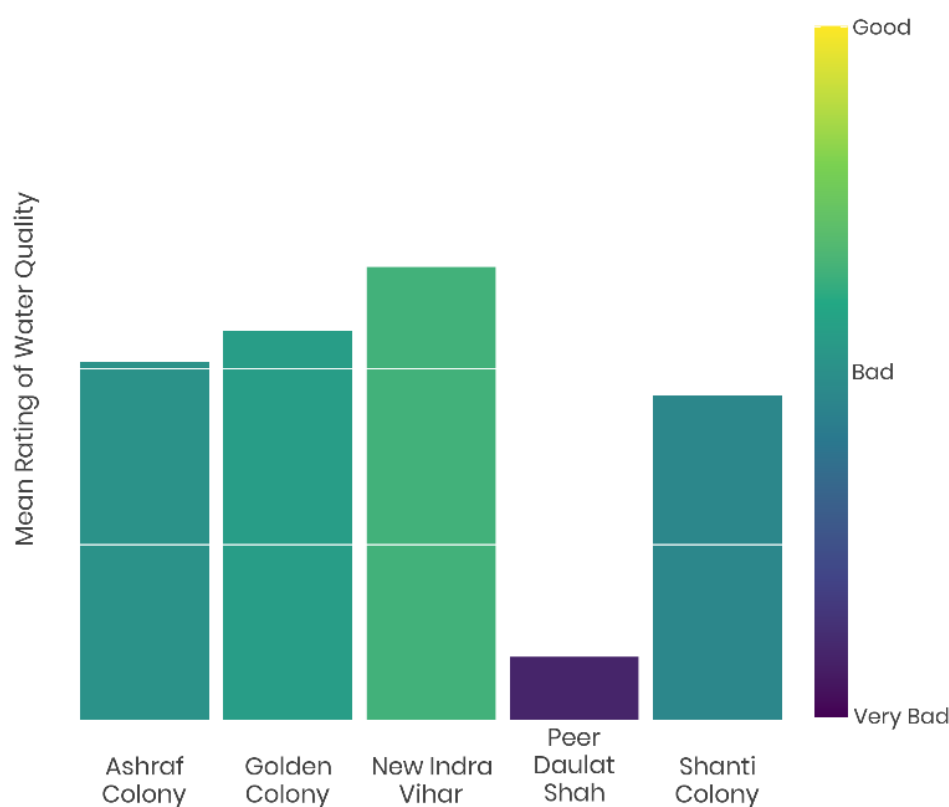
The most common coping measures taken to adapt to water scarcity were *Less domestic use, Less personal use, Less appliance use, More storage*, and *None*. This suggests uptake could be improved for *Used conservation tool* or *Used rainwater harvesting*.

**75%** of households experienced property damage because of flooding.

On average, residents rated their water quality as **Bad**.

### Perception of Water Quality in Past Year

By Area

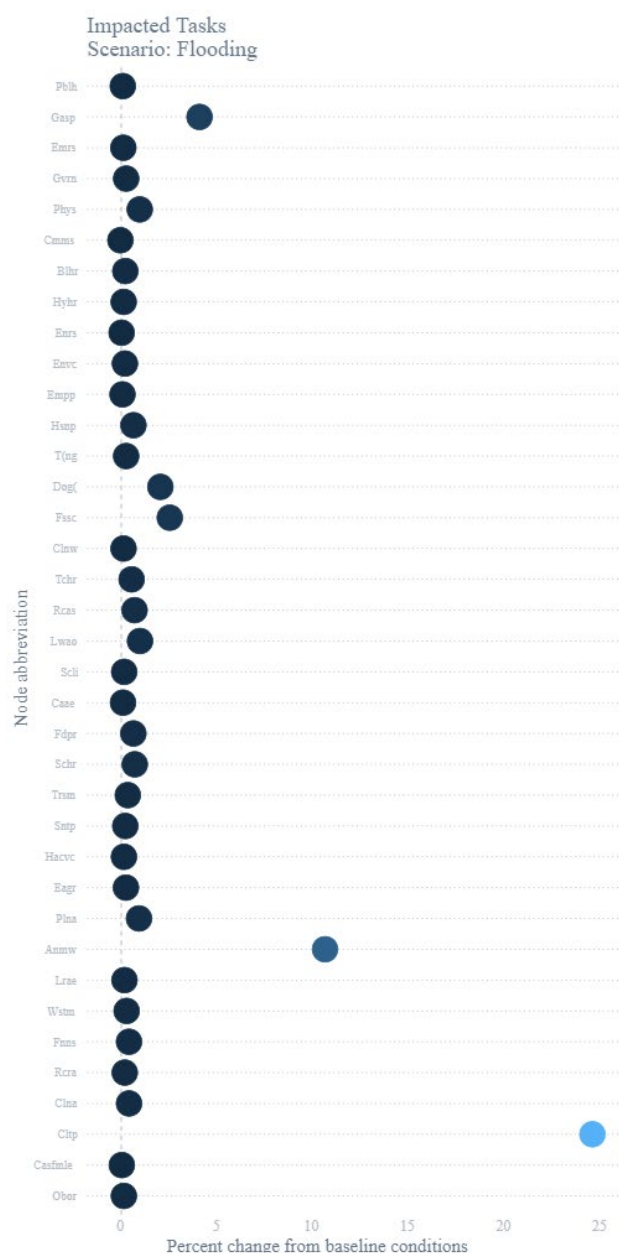


## URBAN SYSTEMS

*Outcomes* are goals for making cities and communities resilient to change. When outcomes are strained, it means the current situation has put these prerequisites for future resilience at risk. In Shanti Colony, only one of the three hazard types (**flooding**, **heat stress**, and **water scarcity**) was extreme enough to cause any substantial strain on resilience outcomes. For flooding, *Minimal vulnerability* was impacted with a **+1%** strain. This is about the extent to which everyone's basic needs are met (e.g. food, water, clothing, housing).

*Tasks* are the activities needed for a city to function. When tasks are impacted, it means those activities have been prevented from being performed to their normal level. The top three most impacted tasks varied by hazard, and included:

- *Clothing provision* (**+25%** more vulnerable than normal). This includes tasks that provide clothing through manufacturing, the supply chain, and maintenance services.
- *Animal welfare* (**+11%** was more vulnerable than normal). This includes tasks that contribute to the welfare of domesticated animals, livestock and wildlife.
- *Goods and services provision* (**+4%** more vulnerable than normal). This includes business activity that provides goods and services.
- *Learning and education* (**+2%**/**+2%** more vulnerable than normal). This includes tasks that enable learning and education in a formal capacity as well as informal capacity (e.g. from cultural and recreational learning).
- *Social interaction* (**+2%**/**+2%** more vulnerable than normal). This includes functions that support meaningful social interaction within a city.
- *Employment provision* (**+2%**/**+2%** more vulnerable than normal). This includes tasks that enable access to employment, provision of employment, and wellbeing in the workplace.



For Shanti Colony, flooding had the largest impacts on activities in the 'urban system', while heat stress and water scarcity had smaller and more evenly spread impacts. Flooding also had the only impact on resilience outcomes.