FACTSHEET

Bhopal

Key Findings

- Encroachments on hills and degradation of lake-ecosystem in the city have disturbed the natural micro-climate modification process and have led to higher daytime summer temperature.
- The projected rise in annual maximum temperature by 1.9- 2.4^0 C by the year 2050 may increase the direct impact on children's health like dehydration, low blood pressure, thermal stress, sun burn and susceptibility to vector borne diseases, etc.
- Changes in rainfall pattern will increase water scarcity which will directly impact children's education and health as most of the children, especially in low income households are involved in fetching water for the family compromising their education.
- Insufficient infrastructure of water supply, open drainage system, lack of sewerage treatment facilities, pollution of lake water, contamination of ground water, insufficient storm water management and solid waste disposal are existing challenges faced by the city, which may hinder the progress of the city towards achieving the goals of a Smart and Resilient City.
- Children in the slum pockets, fringe areas, children living near lakes, canals, in surrounding areas where Bhopal Gas Tragedy had occured and children near railway stations are found to be the worst affected by climate change impacts in terms of burden of diseases (heat stress, water and vector borne). Migrated children are more affected by malnutrition, child trafficking and child labour due to loss of livelihoods of parents.

Bhopal, also known as the "City of Lakes" is the capital of Madhya Pradesh. The two lakes called "Upper Lake" and "Lower Lake" are the major tourist attractions and are the major water supply sources for the city. The city has an uneven elevation and has small hills within its boundaries. The prominent hills in Bhopal are Idgah Hills and Shyamala Hills in the northern regions. Geographical location of the city and increasing climate variability in the region has close interrelations and may affect primary source of livelihood for hundreds and thousands of families. The city can be visualised in 2 parts - Old Bhopal and New Bhopal. Old Bhopal is densely settled area with insufficient infrastructure.

Climate change is an additional stress on ecological and socio-economic systems of the city that are already facing tremendous pressure from population growth, increased urbanization, resource use, and economic growth. The adverse impacts of changing rainfall patterns are being observed as drinking water scarcity and increased flooding in certain areas adversely affecting the marginalised populations especially children.

> ***My husband is a labourer and I am a domestic worker. We have tanker water supply every alternate day. My children support me in fetching water but the tanker schedule is not fixed and due to this the children miss their schools many times."***
>
> - Subhadraa, a resident of Abbas Nagar Slum, Bhopal

quick facts

Geography

Geographical Coordinates:
Latitude 23.25'^{0}N and Longitude 77.41 ^{0}E

Height from mean sea level:
460 feet to 625 feet

Area of Municipal Corporation:**
413 sq km

Wards:**
85

Demography

Population*:
17,98,218 (Census,2011)

Decadal Population Growth Rate*:
23.30% (from 2001 to 2011)

Population Density*
4,354 persons per sq km

Total Households**:**
3,84,775

Average Household Size***
4.6 persons

Slum Population %*
26.68

Slum Households**:**
135987

Floating Population:**
961940

Literacy Rate%*
83.47%

Sex Ratio*:
921

Climate

Climate
Tropical climate with three main seasons: Summer, Monsoon and Winter

Annual Rainfall
1027 mm

Major Disasters
Drought (moderate), Flood (moderate), Wind (low), Industrial Accident (high) and Earthquake (low)

Children

Child Population*:
0-6 years: 216088

Children currently attending school (Age 6-17 years, Bhopal-Urban)***
%- 94

Children aged 5-14 years engaged in work % (Bhopal-Urban)***
1.8

School Dropout % (Bhopal-Urban, Age 6-17 years)***
5.9

Crude Birth Rate (Bhopal-Urban)***
17.6

Crude Death Rate (Bhopal-Urban)***
5.3

IMR (Bhopal-Urban)***
44

U5MR (Bhopal-Urban)***
54

Sex Ratio at Birth (Bhopal-Urban)***
940

MMR (Rajgarh, Vidisha, Bhopal, Sehore, Raisen)***
19

Children Suffering from Diarrhoea (%) Bhopal-Urban***
16.1

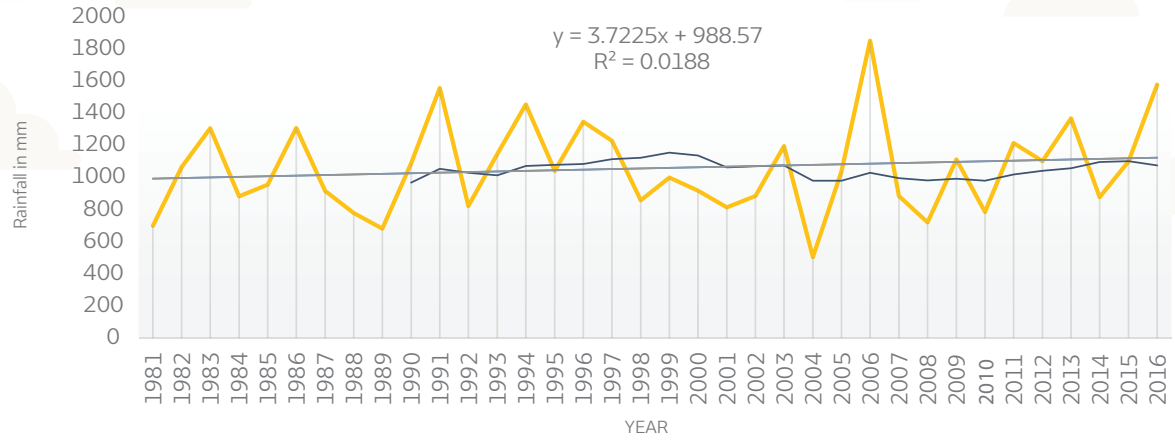
Children Suffering from Acute Respiratory Infection (%) Bhopal-Urban***
20

**Census 2011*
***City Sanitation Plan, Bhopal*
****Annual Health Survey 2012-13*
*****Bhopal Municipal Corporation*

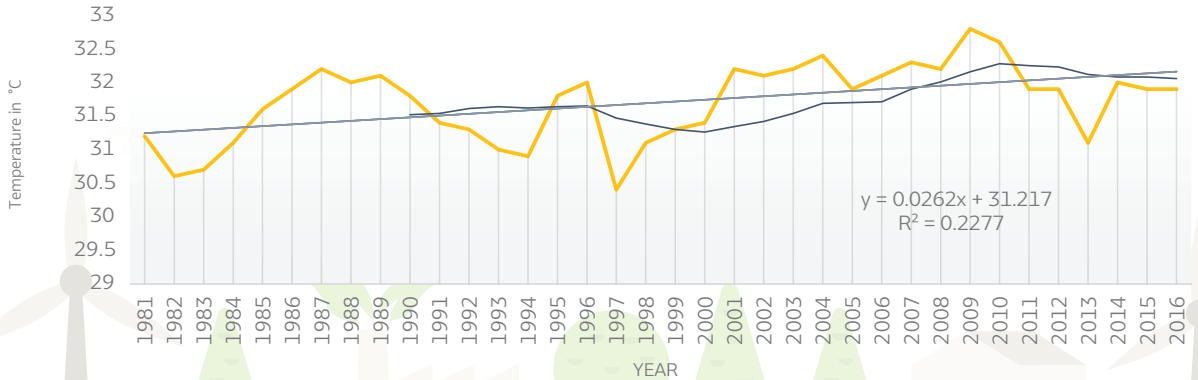
Climate Scan of the City:

Observed Climate	■ Humid subtropical climate, with mild, dry winters, hot summer and humid monsoon season. ■ Summers start in late March and go on till mid-June. ■ In summer average maximum temperature soars as high as 36.8 ^{0}C. ■ Winter season average minimum is 10.5 ^{0}C. ■ Annual mean rainfall is of 1027 mm.
Annual Climate Change Trend	■ Annual mean minimum temperature shows significant rising trend of 0.025 ^{0}C per year during last 36 years. ■ Temperature data analysis for period from 1981-2016 shows overall increasing trend for annual mean maximum temperature by 0.02 ^{0}C (per year). ■ Data for period 2001-2016 however show decreasing trend of rainfall during rainy seasons, particularly in month of July. Over all, significant decline of 2.5 mm per day rain is reported during rainy season.
Future Climate Change Projections	■ Annual maximum temperature projected to increase by 1.9 ^{0}C by 2050 ■ Annual minimum temperature projected to increase by 2.4 ^{0}C by 2050 ■ Hot days and warm night might increase. ■ Mean annual rainfall might increase by about (10-14 %). ■ Mean monsoon rainfall might increase by 125-130 mm by 2050. ■ Extreme rainfall events might increase by 10-20% by 2050

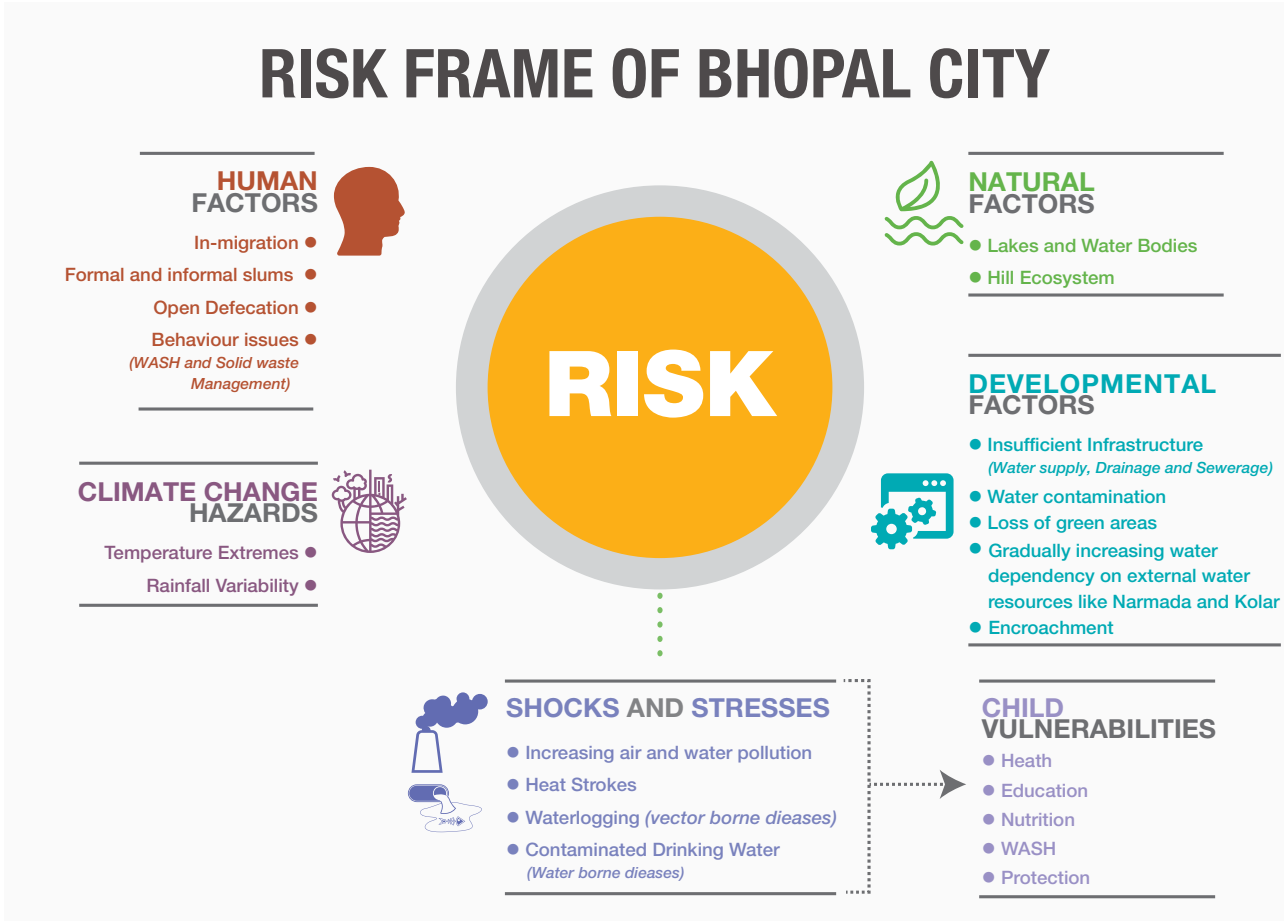
Annual Rainfall in mm, Bhopal (1981-2016)



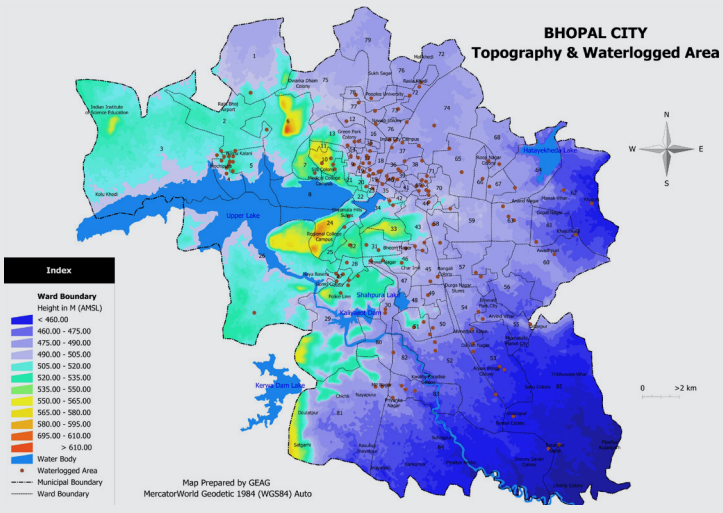
Annual Mean Maximum Temperature, Bhopal (1981-2016)



RISK FRAME OF BHOPAL CITY



Bhopal is a rapidly growing city attracting people from the surrounding cities of Madhya Pradesh as well as from other states. Migrant population is accumulating in existing slums and also creating informal slum pockets in different parts of the city. Lack of basic amenities like drinking water, sanitation and solid-liquid waste management are directly impacting the health of marginal communities. Insufficient and aging infrastructure is contributing to water contamination and pollution of lakes which is resulting in increased number of water borne diseases. Encroachment near lakes and hills are degrading the micro-climate of the city. For implementing different development plans and fulfilling the residential needs of growing population, green and forest areas have reduced drastically. These problems are further aggravated by climate change impacts on the city. For example, increasing events of urban flash floods and water logging are directly impacting the city's economy in terms of loss of assets and livelihood affecting marginalised population the most. Uncertainty of rains and temperature variation are compounding the vulnerabilities of slum population. The resulting situation due to the close inter-connectedness of such natural, developmental and human factors of urban system enhance the vulnerability of city in the events of climate variability (current and projected future) leading to enhanced shocks and stresses of urban people and hence the risk of the city. These shocks and stresses are further aggravating children's vulnerabilities, adversely impacting their health, education, water & sanitation aspects, nutrition and physical protection.



Climate change vulnerabilities of urban poor children

Key Issues	Responsible Factors	Special Categories of Affected Children
Health: • Heat Stress, Dehydration, Low Blood Pressure and Headache in summers. • Vector Borne Diseases (Malaria, Dengue especially in post monsoon season) • Water Borne Diseases (Cholera, Jaundice, Diarrhoea)	• Increasing daytime summer temperature • Increasing air pollution (Factories, Construction, Traffic, Transport, use of traditional wood stove for cooking) • Tin Shed Houses • Localised flooding and waterlogging • Inadequate drainage and sewerage system leading to pollution of lakes • Lack of immunisation due to migration	• Children living in slum settlements • Children living in fringe areas of the city • Rag pickers' children • Beggars' children • Children living in the areas affected by the Bhopal Gas Tragedy • Floating children (Climate change induced migration)
Education: • Possibility of accidents due to school building collapse • Seepage in school buildings • Filthy school surroundings • Involvement of children in fetching water • Increased burden of household chores on girl child	• Waterlogging in and around the school premises • Inadequate school infrastructure in terms of climate and disaster resilience • Lack of willingness among parents to send their children to schools due to lost family livelihoods • Lack of identity for school enrolment (Samgra ID) • Stagnant employment growth and stress migration	
Nutrition: • Diminishing food security • Malnutrition- protein energy malnutrition, • Mental Retardation • Iodine Deficiency • Birth Deficiencies • Anaemia • Underweight children	• Crop failures due to floods and droughts in peri-urban areas leading to unaffordable food prices resulting in reduced access to seasonal crops • Diminishing water quantity and quality due to higher evaporation and less rainfall. • Lack of awareness about nutritious and balanced diet. • Traditional food intake myths like Banana, lemon, curd etc will create the cold etc, while Vitamin "C" is very important for absorbing the micro nutrient	
WASH: • Poor quality and unsafe drinking water • Water Borne Diseases • Skin Infections • Open Defecation	• Lake pollution (High TDS, Iron, Nitrates) • Rationing of water due to less availability compromises basic hygiene and cleanliness • Lack of toilets at home and at public places forcing children to defecate in open • Inefficient drainage, solid waste management and sewerage system in the city resulting in filthy surroundings especially after monsoon.	
Child Protection: • Child harassment during fight between community members over water issues • Child Labour- rag pickers, evening news paper selling, furniture work, garage, hotels factories, domestic, mechanic, Seasonal work • Child Marriage-especially in migrant population • Drug abuse- high use of Tobacco	• Increasing anger among poor communities due to unavailability of water • Loss of livelihoods of parents due to climate change impacts (higher unemployment) • Domestic violence due to unemployment • Lack of education and awareness among parents about child safety issues • Desertion - illegal child, female child, more than single marriage of parents	

Strategic directions to build climate resilient and child friendly Bhopal City

Health	Education	WASH	Nutrition	Child Protection
- Real time surveillance system for water and vector borne diseases - Green/Cool Roof low cost technologies - Organise clean drives and campaign at community and school level - IEC and training program for stakeholders - Conservation of open and green spaces within the city and in the peri-urban areas - School timings can be changed to avoid extreme temperatures; Time and days modification (April and May should be vacation) - Awareness on water, vector and food borne diseases - Development of integrated underground sewerage system in the city - Linkages to govt. schemes like Ujjawala	- Implementation of school safety plans - Renovation of old buildings and construction of new disaster resilient school buildings - Awareness among school children on climate change and disasters and essentials of self-safety. - Trainings for risk related to climate change hazard - Develop IEC materials related to climate change impact on day to day life - Special facilities at schools for migrant children (enrolment, counselling and other essentials)	- Rainwater Harvesting in Schools, Households and Public Spaces. - Conservation of traditional water resources and conjunctive use of water - Treatment of drinking water at household/ school level - to ensure safe water - Develop STPs and ETPs and promote using recycled water for low end use - Awareness among children on good hygiene practices	- Awareness building - seasonal and local fruit consumption - Promotion of tradition food consumption - Promotion of organic farming - To increase employment opportunities planned development of the city should happen - Awareness on ill effects of tobacco consumption	- Strict enforcement of laws relating to child safety and protection - Awareness among parents and children on child safety and protection issues - Establish Nasha Mukti Kendra especially for children - Tracking status of migrated communities - Develop guidelines for registration of migrant labours by Builders and other Contractors - Develop resource centre to ensure basic education and provide skill based training

Climate Change and Disaster Resilience for Urban Children:
An Initiative of UNICEF, India and Gorakhpur Environmental Action Group, Gorakhpur, Uttar Pradesh

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