Adolescents at the Forefront for Urban Climate and Health Resilience: The Lessons Learnt from Surat, India

Anuj Ghanekar[1] Dr Vikas Desai[2] Dr Pradip Umrigar[3] Dr Ashish Naik[4]

❑ Abstract

Cities in India are witnessing resilience initiatives to promote climate-smart and health-conscious development. On another front, cities are also envisioning the status of child-friendly cities by adopting a range of measures that prioritise the needs of children in urban planning and development. The "Resilient cities" and "Child-friendly cities" visions overlap with their long-term goals. Indian cities aim to create sustainable settlements that nurture and inspire children today so that they can grow to create and protect the city's resilience in the future.

The authors of this paper facilitated two unique development sector projects pertaining to both of these visions, in Surat City of India. Based on the shared traits and complementary factors of the two projects, this paper suggests that adolescents (10-19 age group) can be focus points in developing climate-resilient health systems.

The four specific advocacy lessons for health systems in this regard were learnt: i) Health systems have a scope to identify the vulnerabilities of adolescents by utilizing multiple sources of evidence that overlap. ii) The health system can also locate and address contextual climate and health vulnerabilities in conjunction with adolescent issues. iii) The health system can consider high-priority focus areas to reduce the vulnerability iv) Adolescents' potential can be explored to act as "change agents" in promoting climate and health resilience.

Currently, a separate policy for "climate and health resilience" or "adolescent health" is absent in India. The present research generated information "for policy" where the research audience will be stakeholders involved in policy planning and implementation.

Keywords: Adolescents, Child-Friendly Cities, Climate Change, Health System, Resilience, Surat city, Urban Health

Introduction

Cities in India are currently facing multiple climate and health challenges. (1-4) They are experiencing frequent and intense urban floods, cyclones, harsh winters, and heat waves, which have detrimental effects on municipal infrastructure, livelihoods, and the economic well-being of the cities. Climate change worsens urban issues such as air pollution, water scarcity, and social inequality, leading to greater health vulnerabilities with new and resurgent infections, changing patterns of vector and water-borne diseases, respiratory diseases, and heat-related illnesses on the rise. The situation is further complicated by socio-economic stressors like rampant urbanization, disruption of livelihoods, migration, family displacement, food insecurity, and unsafe neighbourhoods. India's urban population is proliferating, with the National Commission on Population (NCP) predicting that by 2036, about 38.6% of Indians (600 million) will live in urban areas. (5)

Despite these challenges, several initiatives are being implemented to promote the climate-

smart and health-conscious development of cities. These include government activities under the National Program on Climate Change and Human Health (for example 6,7), and activities under Public Private Partnerships such as the "100 Resilient Cities" program. (8).

On the other front, urban administrators are also envisioning the status of child-friendly cities by adopting a range of measures that prioritise the needs of children in urban planning and development. For example, the Child-Friendly Smart Cities (CFSC) initiative within the urban agenda of building smart cities. (9) Such initiatives seek to create healthier and safer urban neighbourhoods for children including adolescents, considering the future of a nation.

The "Resilient cities" and "Child-friendly cities" visions overlap with their long-term goals. By focusing on the needs of children, Indian cities can create sustainable settlements that nurture and inspire children today so that they can grow to create and protect the city's resilience in the future. This vision is also in alignment with the broader Sustainable Development Goal 11 which aims to make cities and human settlements inclusive, safe, resilient, and sustainable. (10). The present paper is based on the advocacy lessons learnt in this dual context.

The authors of this paper facilitated two unique research, training, and advocacy projects in Surat City India. The first project was the "Urban Health and Climate Resilience Centre," which was conducted under the Asian Cities Climate Change Resilience Network (ACCCRN) initiative of the Rockefeller Foundation between 2013-2016 (11). The second project consisted of several initiatives with adolescents aged between 10 to 19 years, which were conducted under the "Child Friendly Smart City Knowledge Centre" umbrella initiative of Surat Municipal Corporation and UNICEF between 2016-2023.

Based on their shared traits and complementary factors with two projects, this paper suggests that adolescents (10-19 age group) can play a key role in developing climate-resilient health systems. There are two main reasons for this argument. Firstly, urban adolescents are particularly vulnerable to the long-lasting impacts of climate change on health in their adulthood. Secondly, adolescents can be trained, empowered, and given opportunities to contribute significantly to building climate-resilient health systems. This is indeed an opportune time to do so, as urban health and climate resilience are new arenas for urban agenda in the nation. This paper also attempts to expand the understanding already generated on this topic by the organization in relevant academic contributions like (12-14).

2 Methodology

2.1 The setting

Both the UHCRCE projects were carried out in Surat, a coastal city located in the Gujarat state of India. The city is vulnerable to multiple climate and health stressors. According to the World Bank Sustainable Development Network, Surat is one of the cities most affected by climate change. (15) Surat has experienced river floods since 1914, with 25 floods recorded to date. Creek and urban flooding during monsoons are also common. As a coastal city, Surat faces the impacts of climate change such as increased temperature and humidity (16), urban heat island effects when combined with urbanization, and heat stress-associated health effects (17). With long summers, the city's water requirements are rapidly increasing. The geographical and socio-demographic environment of Surat is conducive to vector breeding and vector-borne infections. Plague (1994) and leptospirosis (2006) have long-lasting footprints, as flood-linked health consequences.

Surat is recognized as the fourth fastest-growing

city globally (18), with a growth rate of 55.29% over the last decade. The city has a population density of 13,680 people per square km. From 1951 to 2011, the city's sprawl increased by 326 square km, with a buffer effect of neighbourhood village space, and the population grew by 4.1 million. Given that 30% of the city's population are migrants, with 60% of them residing in slums, Surat is known as a city of migrants. The migrant population have been settling in slums and informal settlements along the floodplain of the river since the 1950s, which makes them more vulnerable to health and climate impacts. As of 2018, the mid-census estimated total population of the city is 6,078,457, with around 37% of the population residing in slums and slum-like areas. According to the Family Health Survey of 2018, Surat has a total adolescent population of 646,459, which represents 10.6% of the total population.

2.2 Research question

With this background, the specific research question for this paper posed was: What lessons the health system in Surat can learn to develop climate and health resilience keeping adolescents as a focal point?

The research question is primarily explanatory in nature with implicit "Why" and "How" questions into it. In the research question, the term "health system" implied not just service providers or administrators but the community including adolescents, when viewed from a holistic perspective. The starting point for this research question assumes the positionality that the health system is a learning organization and is in the constant ongoing process of developing climate and health resilience. Currently, a separate policy for "climate and health resilience" or "adolescent health" is absent in India. The present paper intends to generate information "for policy" where the research audience will be stakeholders involved in policy planning and implementation.

2.3 Data analysis

For this paper, the existing data set was used to convince health systems about the utilisation of local data for local policy design. The same was complimented by findings derived from various studies and activities conducted under past UHCRCE projects (2013-2023). The project insights were organized into a matrix of activity, finding, and interpretation. The commonalities between the two sets of findings and interpretations (from both projects) were grouped into qualitative themes and sub-themes. These were ultimately described as the lessons learned in the given context, supported by relevant examples. Consensus coding was reached through the discussions between all the authors.

3 Findings and Discussion

The lessons for the health system to develop urban climate and health resilience can be categorized into two main themes if we prioritize adolescents. The first theme focuses on adolescents as a vulnerable population subgroup and highlights the role that the health system can play in attending to their needs. The recent national and state-level health programs like Rashtriya Kishor Swasthya Karyakram (RKSK) are also focusing on the needs of adolescents. (19) The second theme focuses on adolescents as valuable contributors to the health system, showcasing the various ways they can make a positive impact.

This section presents evidence supporting two themes, with the first three lessons under theme 1 and the fourth under theme 2.

Lesson 1 Health systems have a scope to identify the vulnerabilities of adolescents by utilizing multiple sources of evidence that overlap.

Although some primary and secondary studies conducted under UHCRCE projects belong to different timeframes, when combined, they provided a broad understanding of the vulnerabilities of adolescents.

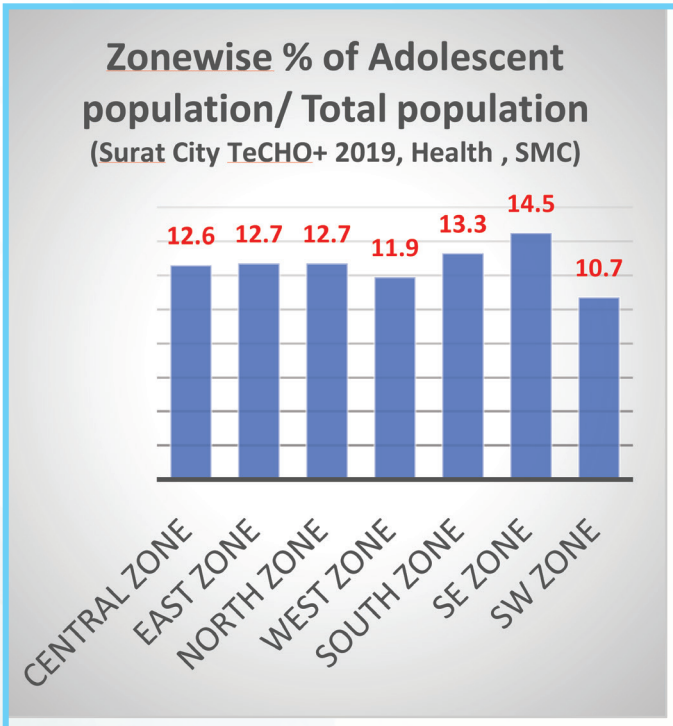


Fig. 1 The highest share of adolescents in the South and southeast zones [ii]

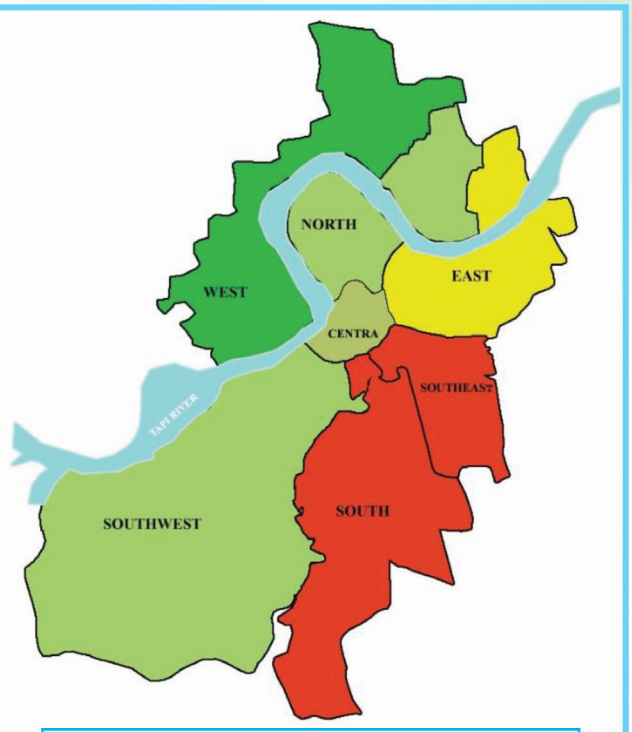


Fig. 2 Public health and climate vulnerability analysis by UHCRCE: Most vulnerable South & South East zones [iii]

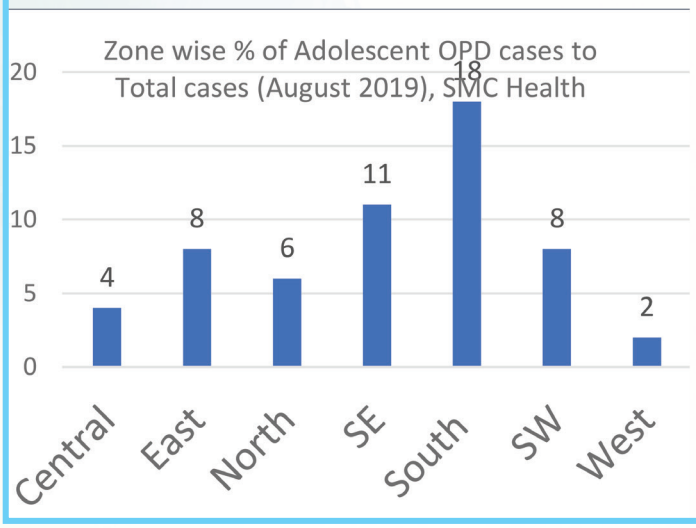


Fig. 3 Health burden study of adolescents: majority cases from South & South East zones [iv]

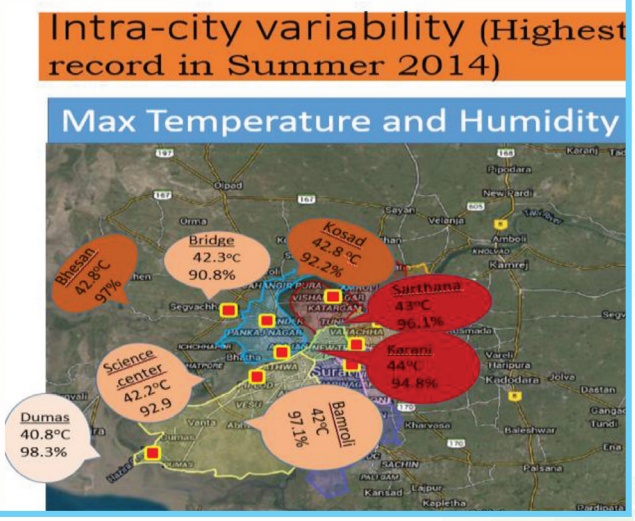


Fig. 4 Sample climate indicator as heat stress: Vulnerable South & Southeast zones (in red and orange weather stations) [v]

Surat City is mainly divided into seven administrative zones, which have recently been expanded. According to studies from UHCRCE, adolescents in the South and Southeast administrative zones are particularly vulnerable to climate as well as health concerns. These two zones have the highest number of adolescents in the city (as shown in Figure 1). The public health and climate vulnerability assessment revealed that these zones experience socio-demographic stressors, making them fall into the red category in general (as shown in Figure 2). Furthermore, the health burden among adolescents is also highest in these two zones, as indicated by their share of daily OPDs at the primary health centres (as shown in Figure 3). Climate indicators, like heat stress, put these zones in a vulnerable category due to reasons such as overcrowding, housing, the presence of industries, and the urban heat island effect (as shown in Figure 4).

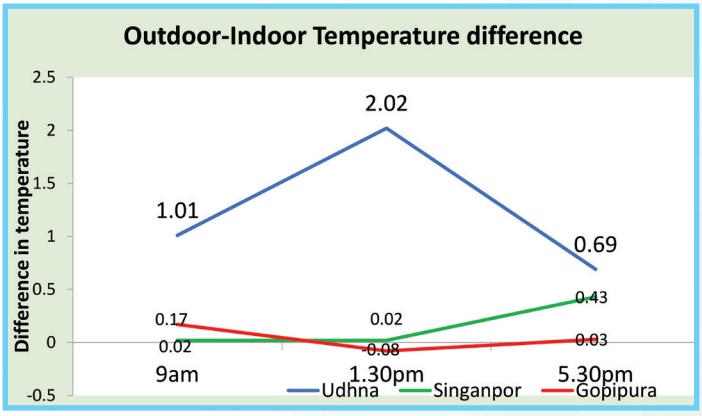
South and Southeast zones is to be of priority if the health system intends to plan adolescent-specific actions. It is possible to create maps of climate and health risks for adolescents by combining age-segregated and spatial studies. Routine data analysis can be utilized during emergencies. The importance of evidence generation in climate and health resilience has already been highlighted in the literature. (2, 20)

Lesson 2 The health system can also locate and address contextual climate and health vulnerabilities in conjunction with adolescent issues.

Urban adolescents, as a sub-group, are vulnerable to specific health risks that are unique to urban areas. These vulnerabilities are further exacerbated by the impacts of climate change. The "Children's Charter of Demands (2018)"[vi] process conducted throughout Surat compiled qualitative narratives by adolescents, demonstrating the human impact behind the statistical understanding of climate indicators. For instance, 13-year-old Khushi from the low-income settlement of Southeast zone narrated her experience of the urban flooding:

"The uncertainty of rainfall has increased over the last few years, making floods more frequent. If there is drainage water stagnation, it's even more problematic. Waterlogging makes our lives difficult for those few days. There is water everywhere, we are trapped in the house, unable to go to school or play. I am scared of waterlogging now when monsoon signs start."

Such experiences of vulnerability can be different for different sub-groups within the adolescents. During interactions with out-of-school girls in the South zone, it was revealed that many drop out of school after 8th standard due to financial constraints (13). Parents often prevent them



from leaving the house due to an increase in gender-based harassment cases. As a result, the daily lives of these girls are limited to intra-domestic activities household chores, taking care of siblings, and watching television. This was the same geographical area where one of the UHCRCE climate studies[vii] found high levels of intra-domestic discomfort, especially during afternoons as shown in Fig. 5. Taken together, these findings suggest that girls are one of the potential groups at risk of experiencing intra-domestic discomfort and the resulting health impacts.

Lesson 3 The health system can consider high-priority focus areas to reduce the vulnerability

Eight thematic workshops were held within two projects (2013-2023) involving 215 participants from various departments of urban local bodies, academic institutions within the city, and non-profit sector organizations. *(Some of the participants were common in workshops.)* During these workshops, stakeholders identified high-priority focus areas that are common for both "climate and health resilience" and "adolescent health" concerns. They also shared examples and UHCRCE also piloted some innovations, which can serve both agendas.

No.	Suggested focus area	Examples provided by stakeholders/ emerged during projects which apply to both agendas
1	Intersectoral coordination across the government departments	The education department working in collaboration with the Swachh Bharat Mission (Pan India Initiative for Cleanliness)
2	Urban local bodies actively work with the local academic ecosystem	Micro-scale evidence generation, identifying technological climate interventions, preparing a local team/ observatory for children-focused climate actions
3	Enhanced public-private partnership models	Private doctors contribute to child morbidity surveillance, contractors and urban planners contributing to child-friendly and climate-sensitive spaces, NGOs' role in disaster relief operations
4	Technology based innovations	Upgrading existing technology-based innovations like Urban Service Monitoring System (UrSMS) to capture adolescent health records as well as climate-induced health outcomes
5	Innovations in Education	Life skills education (LSE) integration with environment education: In 2018-19, a pilot model for LSE was demonstrated for children and adolescents in the context of climate change education. The model was executed as a joint action between schools, AWCs, health centres and NGOs in the most vulnerable zone of the city. The programme was implemented by creating a local pool of 30 master trainers and 170 teacher trainers. The programme impacted 5000 children. One of the components was- Relating abstract life skills with real-life climate change issues for children, for example, Decision-making for pre-monsoon flood preparedness, critical thinking for waste segregation and creative thinking (Fancy dress, posters) for climate change communication. More about this program can be read in (14)
6	Innovations in healthcare service provision	UHCRCE attempted some innovations in the Adolescent Responsive Healthcare Services Program like systematic holistic screening of adolescents who visit primary health centre OPD, exposure visit of adolescents to primary health centre for demand generation etc.

7	Capacity building of caregivers of adolescents	The caregivers like parents, families, and teachers are immediate contact points for the adolescents. The health system need to understand the importance of these stakeholders as "interconnecting links" when adolescents are to be reached for climate action. Some suggestions provided in this regard were: Systematic capacity building of caregivers with climate change-associated knowledge and skills, inter-generational dialogue between parents and adolescents, Social Behavior Change Communication (SBCC) strategies, supportive supervision of caregivers, and Promotion of traditional health and nutrition behaviour in the life-style.

Lesson 4 Adolescents' potential can be explored to act as "change agents" in promoting climate and health resilience.

It is unjust for adolescents to suffer the consequences of human-induced climate change caused by adults around them. Today's adolescents will become tomorrow's citizens, and their teenage years are a crucial time for promoting both healthy behaviour and climate action. This period presents a unique opportunity to instil a lifestyle that prioritizes climate and health resilience. Adolescents are in an emotional and energetic phase where they are receptive to appeals and are more likely to adopt new behaviours. By empowering and educating adolescents, we can create change-makers who will make a positive impact on society. Schools offer an ideal platform for reaching out to large numbers of adolescents, who are also tech-savvy. Therefore, including adolescents in efforts to promote climate and health resilience is a cost-effective approach.

Some experimental initiatives under two projects demonstrated this argument. For example, on the occasion of World Children's Day 2018, CFSCKC released the "Children's Charter of Demand". The charter was prepared after 30 empirical participatory interactions with 450 children (the majority were adolescents). Adolescents were found to have a voice for climate and health resilience demands such as Better green spaces that provide comfort during heat stress, Pollution monitoring and measures for cleanliness, Promotion of Rainwater harvesting systems, Flood Risk Management, Disaster warning systems, Systematic waste disposal, Water logging management and effective drainage systems.

Another example was the Climate Smart Healthy Children model[viii] where the Peer education (adolescent buddies) approach was used in three schools. The peer educator in-school students imparted the knowledge, skills and attitudes of "climate and health resilience actions" to out-of-school adolescents in creative ways. The "Adolescent to Adolescent" model created more interest and dialogue among recipient peers. Heat stress, flood resilience, Malaria-dengue fight, action against swine-flu, insist on motorbike pooling, food safety, healthy diet practices, green Surat, saving electricity – such resilience messages were discussed, demonstrated and acted upon by youngsters. "Earth leaders" were formed in schools, who exhibited enthusiasm for monitoring the climate indicators like heat index and air pollution using technology-based applications. Making the program more inclusive, 55 Students from the School for Deaf and Mute Children, were trained on Environment

Monitoring Kit. They were involved in weather monitoring assembling toolkits, noting the readings, and learning about air pollution and heat stress. The entire workshop happened in sign language with the help of interpreters. Students actively shared about air pollution causes and impacts. They talked about health impacts like respiratory problems, sneezing, coughing, irritation of eyes, skin problems etc. The reasons listed by them included factory gases, coal burning, tree cutting, and vehicular pollution. Noise pollution with high decibel frequency was another concern raised by them. They also shared how they are differentially vulnerable to these problems because of hearing and speech disabilities



Fig. 6 Adolescents handing over "Children's Charter of Demands" to city officials



Fig. 7 Adolescents learning to monitor vector-borne disease control activities in school

There are many existing programs under the urban local body system which already view adolescents as change agents. Desk research and stakeholder consultations under both projects resulted mapping of some existing programs which can be viewed as an avenue for adolescents' participation in climate and health resilience.

S. No.	Policy/Program Name	Description of the existing role of adolescents
1	Rashtriya Kishor Swasthya Karyakram (RKSK)	Peer Educators who are expected to play a role in the Knowledge dissemination to fellow in and out-of-school peers on 6 RKSK themes, information regarding existing adolescent-friendly health services, facilitation of Adolescent Health days and participation in the Adolescent Friendly Club meetings.
2	Mamata Taruni Abhiyaan	Mamta Taruni Peer Educators in ICDS Anganwadi centres are adolescent girls who are supposed to educate and bring adolescent girls to the Mamta Taruni Anganwadi health and nutrition education sessions and health care facilities for treatment.
3	School Health & Wellness Programme	Health and Wellness Ambassadors: Students force is created with the help of teachers to educate about health and wellness-11 thematic areas.
4	Swachh Bharat Abhiyaan	Swachhta Ambassadors: Celebrities who are responsible for creating awareness, participating in events, and sensitizing the public)

5	Integrated Child Protection Scheme (ICPS)	Nodal Organizations: They are academic institutes that volunteer their resources to develop Child Line Services (1098). Child volunteers are recruited for awareness campaigns and assisting in project management. They also research issues related to child protection.
6	National Health Mission	Mahila Arogya Samiti (MAS) works to organize local collective action for Health promotion, health resource mapping, and monitoring and facilitating access to public services. MAS can take the help of adolescent girls in their work.

The existing role of adolescents in these programs can be expanded to incorporate a "climate change associated health" lens in their topics of discussion, communication, capacity-building agendas, syllabus, and overall approach.

4 Conclusion

Human health is under serious threat from climate change, which affects the spread and severity of diseases. Urban areas are especially vulnerable, as they vary in their climate conditions, social factors and health impacts. While long-term solutions are needed to reduce greenhouse gas emissions, short-term actions are also necessary to adapt to the changing climate and build resilience. Urban adolescents are a group that faces high risks from climate change but also have great potential to contribute to adaptation and resilience. This paper shares key lessons for urban health systems to develop climate and health resilience with a focus on adolescents, based on experiences from Surat city of India. These lessons can be useful for other city administrators and policymakers working on this subject.

References-

1. Kumar, P. (2021). Climate Change and Cities: Challenges Ahead. Frontiers in Sustainable Cities, 3, 645613. https://doi.org/10.3389/frsc.2021.645613
2. Bush, K. F., Luber, G., Kotha, S. R., Dhaliwal, R. S., Kapil, V., Pascual, M., ... & Hu, H. (2011). Impacts of climate change on public health in India: future research directions. Environmental Health Perspectives, 119(6), 765-770.
3. Mukhopadhyay, P., & Revi, A. (2012). Climate change and urbanization in India. In Handbook of Climate Change and India (pp. 327-340). Routledge.
4. World Resources Institute India. 'Code Red for Humanity': Sinking Indian cities" WRI INDIA. https://wri-india.org/blog/%E2%80%98code-red-humanity%E2%80%99-sinking-indian-cities.
5. Observer Research Foundation (2021). https://www.orfonline.org/expert-speak/managing-india-urban-transition-2021/
6. National Program on Climate Change and Human Health. (2021). National Action Plan on Heat-Related Illnesses. 2021 July: pp1 https://ncdc.gov.in/WriteReadData/linkimages/NationActionplanonHeatRelatedIllnesses.pdf
7. National Program on Climate Change and Human Health. (2021). Health Adaptation Plan for Diseases due to Air Pollution. 2021 July: pp1 https://ncdc.gov.in/WriteReadData/linkimages/HealthAdaptationPlanforDiseaseDuetoAirPollutions.pdf

8. RockeFeller Foundation. 100 Resilient Cities Website https://www.rockefellerfoundation.org/100-resilient-cities/

9. National Institute of Urban Affairs. https://www.niua.org/cfsc/

10. United Nations' Sustainable Debelopment Goals https://sdgs.un.org/goals

11. Asian Cities Climate Resilience Network Website https://acccrn.net/country/india

12. Ghanekar, A. Desai V.K. Desai H. Rathi S. Acharya A. & Khatri K. (2014). Building Resilience to Urban Health and Climate Change: Can Adolescents in Urban Slums Be the Answer?. Asian Journal of Research in Social Sciences and Humanities, Vol. 4, No. 11, November 2014 https://www.indianjournals.com/ijor.aspx?target=ijor:ajrssh&volume=4&issue=11&article=001

13. Mistry R. Ghanekar A. & Desai V.K. (2020). Documenting The Lives of out-of-School Adolescents – A Study From Surat City Slums. Horizons of Holistic Education. Volume 7 : Issue 2 http://hhecu.org/home/ResearchPaperdetail?t=r6cflCKARmHx1iQCCTWI2g%253d%253d

14. Ghanekar A. & Desai V.K. (2022). Integrating Environment Education with Life Skills. Sustainability Education for A Better World. Cambridge Publications

15. Inter-Governmental Panel on climate change (2019) Working Group Reports https://www.ipcc.ch/working-group/wg2/.

16. Desai et al. (2015), Temperature and Humidity Variability for Surat Coastal City in India, IJES Vol. 5 No. 5

17. Rathi et al (2017), Summer Temperature and Spatial Variability of all-Cause Mortality in Surat City, India, IJCM

18. City Mayors Foundation. (2017). "The World's Fastest Growing Cities and Urban Areas from 2006 to 2020." http://www.citymayors.com/statistics/urban_growth1.html.

19. Ministry of Health and Family Welfare, Government of India. (2014). Rashtriya Kishor Swasthya Karyakram (RKSK). Operational Framework, Translating Strategies into Programs. Adolescent Health Division;

20. Centre for Policy Research (CPR) India (2023). How is India adapting to heatwaves? https://cprindia.org/briefsreports/how-is-india-adapting-to-heatwaves-an-assessment-of-heat-action-plans-with-insights-for-transformative-climate-action/