

Urban Health System and Climate Resilience— Surat Case Study

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Abstract

The demographic transition with rapid urbanisation corresponds with the challenges of urban infrastructure development. Urban health is an outcome of complex interaction of many urban factors including governance and finance. Coupled with this, climate change has overarching influence on these factors and a challenge to development, health and survival. Therefore, understanding impact of climate change with reference to urban health and development should be on high priority.

Changes in climatic patterns may alter the distribution of vector species and increase its spread in new areas. An increase in temperature and relative humidity may enlarge the transmission window. Effluent emissions to water bodies and salination of rivers through sea level rise may increase the incidence of water borne diseases. Deaths due to heat wave are reported from several parts of the country. Every city is different and success of city specific urban health programme depends on city specific planning as well as public health preparedness for climate change. Hence, study of Climate and Health brings out threshold levels of climate resilience.

Surat city experience of Urban health revealed that good governance and Finance were considered most important factors including Urban health system, community participation, Inter-sectoral convergence, disease surveillance, health information system, Public–private partnership, participation of academic institutions and cross learning. One of the major advocacy areas UHCRC is embarking in is ‘Inclusion of Climate resilience in Health and Health in Climate Resilience Planning’.

Keywords

Urbanization, Urban Health, Climate Change, Disease Surveillance, Surat

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Introduction

With increasing proportion of Indians living in cities, the slogan ‘80 per cent population living in rural India’ is changing to ‘30 per cent population of India is in cities and likely to reach to 40 per cent by 2030’. Even the slogan ‘growth of India is dependent on the agriculture in villages’ is changing to ‘growth of India with industrial development’.

The pattern of urbanization in India includes 54 per cent growth in number of towns (5,161 in 2001 to 7,935 in 2011) in the last decade. As per 2011 census records in India, the share of urban population is 31.16 per cent and a consistent rise in urban population has been reported since 1951 shown in Figure 1. Average annual urban population growth rate in last five decades (1961–2011) is 2.6 per cent. Spurt of urban population growth is noticed during the inter-census period 1971–1981 (3.43 per cent) and 2001–2011 (3.35 per cent). In India, during last decade (2001–2011) growth of total population was 2 per cent, urban population was 3 per cent, mega city population was 4 per cent and slum population was 5 per cent. The process of unplanned urbanization is accompanied by development of slums and shanty urban poor area as rural poverty shifts to urban poverty (Issues from Urbanization Trends in India).

This demographic transition with rapid urbanization coincides with the challenges of urban infrastructure development like water supply, drainage, solid waste disposal, roads, transport and housing. Urban health is a reflection of the balance between urban system, urban environment and community behaviour. Urban health is an outcome of complex interaction of urban factors like governance, finance, local leadership, urban planning, urban infrastructure, urban public health services, population dynamics and many more. Recently recognized and documented climate change has overarching influence on these factors. Slums are an inevitable component of urban set-up and have a great influence on overall city health statistics. Slums are also symbolize the challenge of inequity and migration. In addition to focus on accessible quality health services, urban health programmes need to focus on climate change and migrants.

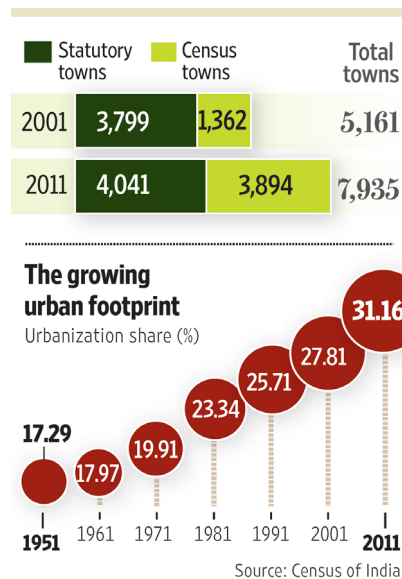


Figure 1. Pattern of Urbanization in India. Urbanization share (%)

Source: Urbanomics, Monday, July 25, 2011.

A natural process of climate change aggravated by human activity in urban areas is posing a threat to the cities. This upcoming change is an added threat to urban development as well as health. Intra-country rural–urban migration is an advantage to industrial growth and economy of the city. The challenge is to ensure their comfort, safety as well as health by providing them safe housing and working environment, quality health services with better reach and access. The same shall be supportive to their sustained optimum contribution to urban economy and development. It shall minimize adverse repercussions of migration on health, sanitation, safety and cohesion.

Urban health focus is a new arena in India. National Urban Health Mission (NUHM) is the recent introduction to the National Health Mission (NHM), with an aim to improve the health status of the urban population in general, but particularly of the poor and other disadvantaged sections, by facilitating equitable access to quality healthcare through a revamped public health system, partnerships, community-based mechanism with the active involvement of the urban local bodies. The core strategies of NUHM include (i) improving the efficiency of public health system in the cities, (ii) promotion of access to improved healthcare services through the community-based group, Mahila Arogya Samiti (MAS), (iii) strengthening public health through innovative preventive and promotive action, (iv) increased access to healthcare through creation of revolving fund, (v) IT-enabled services (ITES) and e-governance for improving access improved surveillance and monitoring, (vi) capacity-building of stakeholders, (vii) prioritizing the most vulnerable amongst the poor, and (viii) ensuring quality healthcare services (Ministry of Health and Family Welfare, 2013).

The impact of climate change is drawing attention of planners, governments and politicians worldwide. Climate change is now universally accepted as a challenge to development, health and survival. It is said that climate change is the greatest threat to human health in the twenty-first century. Understanding the impact of climate change in the context of health and development is the need of the hour.

It is observed that changes in climatic patterns may alter the distribution of vector species and increase its spread in new areas. An increase in temperature and relative humidity may enlarge the transmission windows. Effluent emissions into water bodies and salination of rivers through rise in sea level may increase the incidence of water-borne diseases. Deaths due to heat wave are reported from several parts of the country from time to time, particularly during the summer (Ministry of Statistics and Programme Implementation, 2013).

Health is just one part of the spectrum of impacts of climate change, but the risk of endangering health increases the motivation of decision-makers to act because there would be many benefits that strengthen the case. Health is an argument for action, but success depends on the current track record of disease control (Postigo, 2007).

Health is the most frequently used outcome indicator of climate change. Study of climate and health brings out the threshold levels of climate resilience to be achieved. In other words, in-depth understanding and evidence is required to test the hypothesis, ‘what is not good for health is not good for climate’.

Every city is different and success of city-specific urban health programme under NUHM depends on a city-specific planning, considering the complexity of the local factors. Urban health strategies are not much different than evidence-based public health strategies; urban health is all about innovation in implementation of strategy. Evidence-based, city-specific planning as well as public health preparedness for climate change and disaster need strong routine-integrated health surveillance and management information system.

Case studies bring the context and strategies to relate, brainstorm and learn from experiences. The same is also important in view of urban development including healthcare system in making in India. Further discussion reflects Surat city’s experience of urban health system.

In seven multi-stakeholder workshops of urban practitioners of Gujarat state organized by Urban Health and Climate Resilience Centre (UHCRC) in 2015–2016, the participants selected factors influencing urban health and climate resilience; they also assigned the relative score to the factors. Analysis revealed that good governance and finance were considered must and overarching factors. Other factors under the domain of health department of local self government (LSG) were urban health system, community participation, inter-sectoral convergence, disease surveillance, health information system, public–private partnership, participation of academic institutions and cross-learning.

Historical trade city Surat is located in southern part of Gujarat and the west coast of India. Surat is the 34th-largest city by area and 4th-fastest (The City Mayors Foundation) developing city in a study conducted by the City Mayors Foundation, an international think tank on urban affairs (*The Financial Express*). It is famous for its textile industries and diamond-cutting industries, which is one of the biggest in the world. The city registered an annualized GDP growth rate of 11.5 per cent over the seven fiscal years between 2001 and 2008 (Annual Survey of India's City-Systems [ASICS]). Surat city had a totally metamorphosed governance post-floods and plague outbreak in 1994 and was awarded 'best city' by the Annual Survey of India's City-Systems (ASICS) in 2013 (Ghosh, 2014). Surat is selected as the first smart IT city in India which is being constituted by the Microsoft CityNext Initiative tied up with IT services majors Tata Consultancy Services and Wipro (Surat City Disaster Management Plan, 2015). Surat is located on the bank of River Tapti which crosses the city from east to west and meets Arabian Sea on west coast. This coastal city is flood prone and have experienced 24 river floods in last century, latest was in 2013, and 3 creek floods in last five years (UHCRC, 2015a). Most devastating river floods were in the years 1968, 1998 and 2006. Post-floods, plague outbreak (1994) was the turning point in the history of Surat city governance, sanitation and health system reforms, enabling the city to achieve place in several top rankings of urban development, sanitation and health innovations.

Surat Municipal Corporation (SMC) is one of the exemplary good governance corporations with an annual budget of ₹470.0 million, around 15 per cent of which is for health (2015–2016). Taxation collection efficiency of SMC is more than 90 per cent. Surat Municipal Corporation is one of the municipal corporations with a record capacity to use national programme funds towards overall city development. It was first to bring in the climate agenda in urban planning with projects like alternative energy, water recycling, slum upgradation, tree plantation, public transport, spatial weather monitoring systems and early warning system of flood towards climate resilience.

The total population of the city (2011 census) is 4.5 million in an area of 326.5 sq km. The city population is almost doubling between each census interval since 1971 and 10 per cent of city's population resides in 334 slums.

Case Study: 'Surat City on Health and Climate Resilience Mode'

Surat case study describes health challenges of the city, evolution of health services in the city. Strength of the services include its administrative set-up, service network, intra- and inter-departmental integration, disease surveillance, health information system, public–private partnership, involvement of academic institutions, community mobilization, cross-learning system and an initiative to add climate focus in urban health programme as shown in Figure 2.

Surat health: The coastal city of Surat was famous for filariasis till 1960s, as the open drains provided huge breeding ground and temperature and humidity provided conducive environment for the survival of culex mosquitoes and disease transmission. After six decades of underground drainage



Figure 2. Health and Climate Resilience Components for Surat

(1958–1960) and vigilant activities under filaria control programme, Surat has reached to almost zero indigenous filarial infection transmission rate.

There was high malaria endemicity and high falciparum malaria infection rate in the city in the 1980s and 1990s. Surat Municipal Corporation also took a welcome step of upscaling and expansion of a small filarial control unit into a full-fledged vector borne disease control unit from corporation budget. Even under same favourable socio-demographic and physical environment and regular floods (3–4 years interval), since 1997 anopheles mosquito density and slide positivity rate has been maintained at the level of < 0.5/mh (per man hour) and < 2 per cent, respectively. Post-flood spurt of malaria and water-borne infections has been noticed, but active surveillance and evidence-based intervention ensures that it remains a short-term phenomenon and does not carry forward its impact on next year (UHCRC, 2015b).

Between 1988 and 1994, anopheles mosquito density and slide positivity rate ranged between 0.6 and 1.55/mh and 4 and 31 per cent, respectively; this indicates what Surat can face due to overall conducive environment.

This coastal and flood-prone city is under consistent threats of vector borne, water-borne, rodent-borne infections. The city health record also includes new and resurgent infections like plague, leptospirosis, dengue, H1N1.

Highest HIV infection rate was reported in 1990s in Surat city. Considering the seriousness and socio-demographic challenges in the city of migrants, likely repercussions of health and economy, health department of SMC took up the responsibility to manage targeted intervention (TI) projects through NGO partners and also initiated unique STD care project through all urban health centres (UHC). Initially, STD care project was supported by Gujarat AIDS control society, but since 2008 SMC is managing human resource of the project from its health budget. As per sentinel surveillance report, HIV infection rate has dropped from 10 to 3 per cent in High Risk Behavior (HRB) group in last two decades (Gujarat State AIDS Control Society, 2006; National AIDS Control Organisation, 2013).

Surat city is also facing challenges of lifestyle diseases. The assessment and interventions for Non-Communicable Diseases (NCD) are in progress. As per Medical Certification of Cause of Death (MCCD)

analysis of last decade, contribution of diabetes, hypertension, cardiovascular diseases to overall mortality in the city is consistently increasing and the increase in a decade is almost six times. NCDs are also emerging as co-morbidities adversely influencing case fatality rate of vector-borne and other resurgent infections and in the city (Desai et al., 2015).

Heat and health challenges in the city have been explored through analysis of climate trend and all cause mortality in the city. In the last 30 years, rise in average temperature by 0.8°C, maximum temperature by 0.4°C, minimum temperature by 3.7°C and 7.4 per cent in average humidity is observed. Decadal increase in number of days with a heat index of more than 41 (feel like temperature) during summer months has been observed; the same was 53 per cent in 1985 to 1994, 70 per cent in 1995–2004 and 78 per cent in 2005–2014. Average daily all-cause deaths increases by 4 when temperature reaches between 40 and 45°C and 6 deaths when heat index of more than 54 is observed (Desai, Patel, Rathi, Wagle & Desai, 2015; Desai, Wagle, Rathi, Patel, Desai & Khatri K, 2015; UHCRC, 2015).

Surat urban health system: In Gujarat state, municipal corporations manage health services of the city, including national health programme implementation. Thus, ownership and responsibility of health of the citizens is handed over to LSG. State urban health department provides strategic guidelines, technical support and financial support for routine, as well as disaster health services.

Surat urban health system is managed by public health qualified officers Deputy Commissioner Health and Hospital and Medical Officer of Health. Each national health programme is managed by a qualified and designated officer (Figure 3).

For administrative purposes, the city is divided into seven zones and at the zonal level health activity is managed by public health qualified Deputy MOH and Assistant Insecticide Officer.

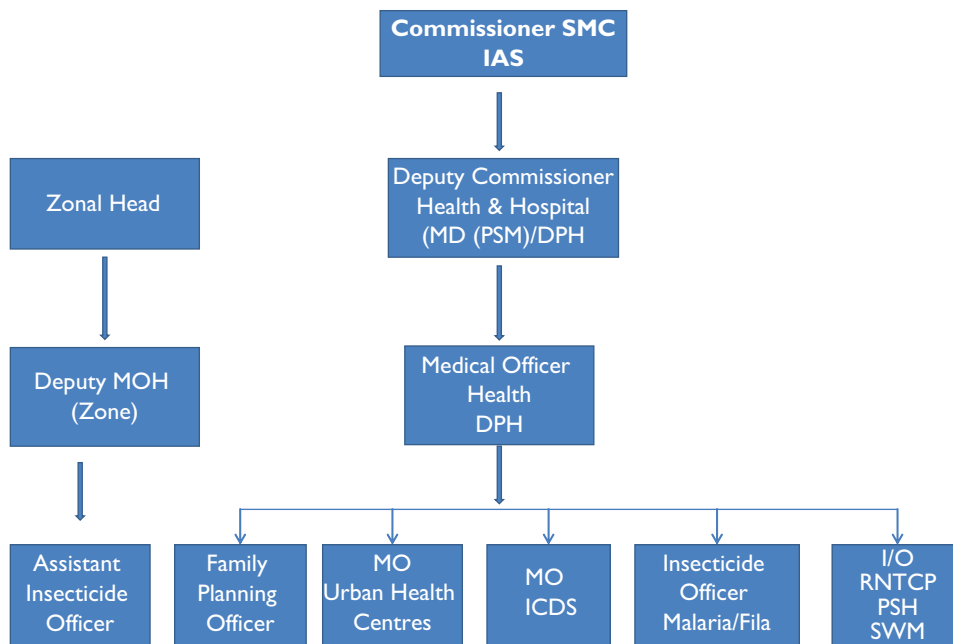


Figure 3. Organogram of Health Department of SMC, Surat

One of the advantages of the city-specific health cadre is retention of local experience, facilitating evidence-based interventions in routine and emergency situation and sustaining public–private partnership.

Urban health service network: There are total 43 urban primary health centres, majority in the vicinity of urban poor/slum area. Average population per urban health centre is around 116,000. There is a provision of two medical officers per urban health centre and visiting honorary consultants (physicians, obstetricians, paediatricians, skin VD specialists), two staff nurses, 4–5 Auxiliary Nurse Midwife (ANM), a compounder and an HIV counsellor. Ten UHCs have been upgraded as maternity homes. Surat Municipal Corporation runs a medical college—Surat Municipal Institute of Medical Education and Research (SMIMER)—providing tertiary care services. Trained urban Accredited Social Health Activists (ASHA) as per norms are in place and MAS have been formed and are under empowerment process. Thus it is a complete public service model of three-tier healthcare system.

Intra- and interdepartmental integration: Intra-departmental health and three tier medical care services is routine as facilitated by Deputy Commissioner Health and Hospitals. The city has shown exemplary interdepartmental co-ordination during flood events where every department is linked with data collection, sharing, planning, intervention and monitoring. The precedence is sustained at each event. Each department is conversant with its role and responsibility and is well spelt out in the ‘Surat City Disaster Management Plan’; this plan is revised every year. This emergency preparedness and participation has built better understanding of interdepartmental convergence and it is visible in routine also.

Disease surveillance: The major strength of the health department of SMC is its routine health information system. The national programme of Integrated Disease Surveillance Programme (IDSP) is further complemented by urban service monitoring system (UrSMS) (‘Big Data Climate Challenge’, UN Award winner in a project to watch criteria, 2014). The UrSMS provides real-time information collected and compiled daily from three public hospitals, 43 UHCs, 63 private hospitals and 475 private clinics and a few laboratories. Surat is the first city to adopt active vector and malaria case, house-to-house surveillance on a fixed day (15-day cycle). All households of the city are covered in 15-day cycles by 600 surveillance workers. This overall system not only provides real-time data for monitoring and action but keeps system alert for epidemics, resurgent/new infection, disasters and adverse weather events (UHCRC, 2015b).

Health Department of SMC daily monitors random five samples per ward at consumer end for free residual chlorine. This data is forwarded to MOH daily who can review and plan an action if required. Health Department shares details of defaulter samples to hydraulic and drainage department for action at their end. Joint review of water samples and waterborne disease report mapping emerges through UrSMS, for real time inference and action.

Public–private partnership (PPP): Surat city doctors in public and private sector learnt great lessons from 1994 plague episode. This shock had generated difference of opinions amongst medical and healthcare practitioners of the city which also resulted in confusion and anxiety at citizen level. It was not a time of confidence and cohesion. In background of this experience complemented by a Department for International Development (DFID)-supported PPP in urban malaria project (1997–2000) was a trigger to PPP in health medical care services. The health department of SMC further nurtured and sustained PPP environment. Today 500-plus private medical care units share their data with the SMC daily, in case of epidemic or disaster work as per mutually designed SOPs, provide honorary consultation services at UHCs, participate in health camps, run Directly Observed Treatment Short Course (DOTS) centres and provide maternal and child healthcare services under Chiranjivi and Balsakha Yojana (UHCRC, 2015b).

Academic partnership: Academic institutions in the city are the assets as they provide academic and research support to LSG. In turn, for academic institutes this is hands-on learning and contribution opportunity in the vicinity. This win-win situation has been well explored by the SMC and local engineering colleges, medical colleges, Centre for Social Studies which actively participate and contribute in operational research, monitoring, training and advocacy.

Community participation: Community is the answer for public health as well as climate resilience. A well-developed urban health system in the city can succeed in terms of reach and access when a community utilizes these services. Similarly, cooperation of the community is very important in sustaining initiatives of urban sanitation and environment. Surat citizens expect every elected body and administrators to sustain the programmes to keep the city clean. The element of pride in being a clean and prosperous city is visible amongst citizens. Contribution of citizens during floods to support the fellow citizens and the SMC is on the record. The contribution to city development by tax-paying (> 90 per cent) symbolizes satisfaction and commitment to contribute. Citizens who initiated and contributed to projects like CCTV cameras on roads for safety, now need to advocate projects of public health and climate resilience.

Health information system: Health information system utilizes all media including corporation website and application. Reach of Information, Education and Communication (IEC) messages under the guidance of national programmes and based on local needs are ensured. For multilingual slums, multilingual printed material is prepared. All cadres including street sweepers are involved to convey house-to-house messages during special campaigns of polio, filariasis as well as during disease outbreaks or disasters. A special SMS-based programme of child vaccination reminder has also been operationalized.

Cross-learning: The SMC has developed a well-equipped urban health training centre. All trainings of all cadres are organized at these centres. Training under national programmes are conducted by trained faculty of SMC and academic institutions. Local need-based trainings include multi-stakeholders' cross-learning. Private practitioner trainings are imparted through workshops and seminars.

Post-1994 reforms, the city metamorphosed into a good governance city, cleanest city of India, city with several operational protocols for disease surveillance and evidence-based action. This was the era of capacity building and sense of responsibility to win out from the health, environment and disaster stressors.

Urban health and climate resilience centre: Considering vulnerability of the coastal city due to its location, floods and climate variability reflecting on health and economy, this initiative was launched. The UHCRC strives to be a knowledge hub in the subject of urban health climate resilience. The first centre of its kind addressing public health and urban climate change adaptation and resilience issues in India, it has opened its doors in the western city of Surat, the latest in a series of health-related projects run by the Asian Cities Climate Change Resilience Network (ACCCRN). The UHCRC is executed by the Health Department of SMC, and governed by the Surat Climate Change Trust.

The UHCRC is a research, training, documentation and networking centre and has a focus on urban health and climate resilience. It is an academic and technical support to SMC. In this climate change alert era, much information on climate change is studied, reported and disseminated but similar efforts are needed for learning on health challenges due to climate change. The UHCRC has analyzed retrospective health and climate data to understand and document health changes due to climate change in the city and standardization of secondary data available with LSG and also prepared heat and health action plan for the city.

It is also important to assess city public health vulnerability as well as vulnerability to climate change. Vulnerability is a result of multiple factors there are likely inter-state, inter-city, intra-city, inter-zone and even inter-ward variations in vulnerability. As yet, there is no baseline for measuring

urban vulnerabilities; the UHCRC has undertaken vulnerability study of Surat city up to ward level and city-specific vulnerability of all million plus cities of Gujarat state. This study shall not only provide a vulnerability assessment of the cities of Gujarat state, but also a protocol of study for replication. The UHCRC is also preparing indicators to assess childhood friendly cities.

To facilitate community inclusion in urban health and climate resilience, the UHCRC has conceptualized community-based forums, initiated its activities and now handing over to local organizations for sustenance. These forums are (i) Surat Arogya Samvad (community interaction), (ii) Healthy Surat working group (multidisciplinary technical expert group), (iii) Hamraaz—climate smart children (school projects), (iv) Hamsafar—woman and child friendly city group, (v) SAUAR—Surat Alliance of Urban Agriculture and Resilience, and (vi) cycling promotion group.

One of the major advocacy areas the UHCRC is embarking in is ‘Inclusion of Climate Resilience in Health and Health in Climate Resilience Planning’.

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