



## Negotiating Urban Form in Mumbai

Urban Design Research Institute,  
No 43, V.B. Gandhi Marg,  
4th floor, Kalaghoda, Mumbai 400 023  
Email: info@udri.org Website: www.udri.org

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# Urban Design & Health of the City

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**Anita Patil**

Executive Director, PUKAR

### Aim of Urban Design

Urban planning, design and form recognize the role of built environment as a model for minds, intellect, creativity and health of its occupants and in turn must mirror their imagination, capability and aspirations. Therefore urban development is not a mere growth but an up-gradation of the physical, social, cultural and economic health of the citizens. The role of urban form has become critical in the rapidly urbanizing world where the lens of urbanization in itself becomes a determinant of health.

This paper seeks to illustrate various aspects of structural design of the urban settings, and how it can help create healthy and inclusive cities.

### Historical Perspective & Current Practices

Historically the disciplines of urban planning and public health both originated out of the need to resolve the problems of sanitation and disease in the 19th century cities of Europe. The first urban planning university course was introduced at the university of Liverpool in 1907.(UN Habitat-2009)<sup>1</sup> Despite this common origin, in the current times there is minimal cross over between the two disciplines (Corbun, 2004, Sloane, 2006).<sup>2,3</sup> But there is increasing recognition in the world of development for the need of overlap between the two.

The recent issue of Journal of American Planning Association devoted an entire issue (volume 72, Issue 1-2006) to urban planning role in building healthy cities. The editor, Marlon G Boarnet writes “The growing partnership with health bring the promise

of invigorating planning’s ability to understand and enhance the vitality of both places and the people”<sup>4</sup>

The Healthy Cities movement initiated in 1980s highlighted the relationship between urban environment and health and the role of local government in promoting health at a city scale. (Hancock & Duhl 1986.)<sup>5</sup>, WHO Regional office in Europe launched its healthy urban planning initiative in 1997 that led to Healthy Urban Planning- a WHO Guide to planning for People.<sup>6</sup> It has set of guidelines that provide 12 key objectives for the practioners.



### The Context: Urbanization: Today & Tomorrow:

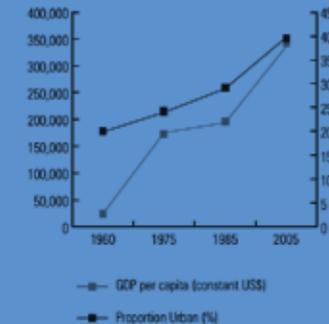
“The growth of the cities will be the single largest influence on the development of the 21st century”

1996- State of the World Population Report.

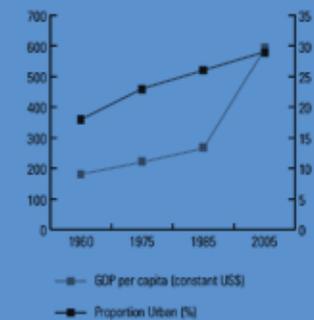
This prophetic statement seems to remind us that what will shape the

cities in the coming years will have a global impact on the economic, political, environmental, cultural and social fabric of our planet. In the year 2008, the human race entered a new Urban Millennium where, for the first time in human history, more than half its human population, 3.3 Billion people were urban inhabitants.<sup>7</sup>

Asia - Economic Growth and Urbanization



India - Economic Growth and Urbanization



Source: UNDESA, World Urbanization Prospects, 2007 revision-WB-World Development Indicators.

Urbanization is inevitable, is happening rapidly across the globe and has both positive and negative impacts. This trend of urbanization is unavoidable. UNFPA predicts that almost all the world’s growth in population over the next 2–3 decades will be in urban areas in developing countries (UNFPA, 2007)<sup>8</sup>. The population in these areas is expected to

grow from 2 billion in 2000 to 3.9 billion in 2030, while the total world population may grow from 6 to 8 billion, with the most rapid pace of growth expected in Asia and Africa. (UN Habitat, 2006)<sup>9</sup> While North America, Latin America and Europe are currently the most urbanized regions, the number of urban dwellers in the least urbanized region, Asia (1.8 billion), is already greater than that in North America, South America, Japan and Europe combined (1.3 billion).

An outstanding feature of the urban population growth in 21st century is that it will be composed of poor people. One out of every three, city dwellers - nearly one billion people - lives in a slum. Most of the slum dwellers in South Asia, 63% or almost 170 Million people, reside in India. (UN Habitat-2009)<sup>10</sup>

industrialization began. The prosperity of nation is intimately linked to the prosperity of their cities. (UN Habitat 2010-2011).<sup>11</sup> In this sense, urbanization, in a way similar to globalization, can be seen as a structural social determinant of health that can challenge the aspirations of equity due to the tendency for accumulation of wealth and power among the urban elite (Vlahov et al., 2007)<sup>12</sup>

On one hand cities have become the engines of growth, encompassing a large pool of talent, finance, labour and knowledge creation opportunities in concentrated areas, thus producing economies of scale. On the other hand they have also become places of increasing poverty, disparity, squalor and social disruption. Inequalities in the intra-city access to services, housing, health and health care, education & employment have socio-economic, environmental and political repercussions. The real challenge lies in recognizing flaws of the process and find solutions that will make the positive impacts more pronounced, the growth more inclusive and equitable and prevent and / or reduce the negative impact of this unprecedented growth.

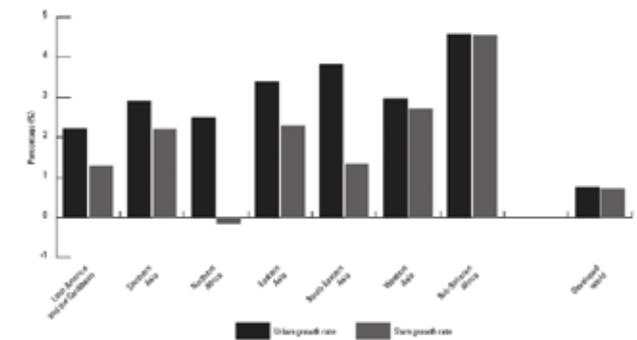
### Urbanization of Poverty & Planet of Slums

Industrialization, urbanization and associated migration have influenced the land use patterns in all cities and land has become the most precious and contested commodity. This is especially true in an island city of Mumbai, thus making Mumbai one of the most expensive real estate markets in the world. This has resulted in the growth of slums due to rapid growth of the population and the failure of the cities

to provide the necessary infrastructure, land and low cost housing to the marginalized sector. Cities as diverse as Nairobi, Johannesburg, Mexico, Rio and Mumbai have large number of residents living in slums. The slum population of Rio is almost the same as the total population of Helsinki (State of the World Cities 2007)<sup>13</sup> Mumbai's more than 6 million slum dwellers exceed the total population of Nairobi. These 6 million occupy a total of 8% land of Mumbai thus creating a density of 29,650 people per square kilometer compared to 2050 per square kilometer of New York.

Definition of slums differs from country to country and city-to-city therefore the exact number of people living in the slums in any country is difficult to estimate. The operational definition of slum as per the UN Habitat is as follows: A slum is a group of individual living under a same roof in an urban area who LACK one or more of the following five conditions

1. Durable Housing
2. Sufficient Living Area
3. Access to Improved water
4. Access to sanitation
5. Secure Tenure



### Various Dimensions of Urban Poverty

- Poor quality, hazardous, overcrowded and often insecure housing
- Inadequate provision of basic services which increases the health burden and the work burden
- Inadequate, unstable or risky asset base
- Inadequate public infrastructure such as schools, and hospitals
- Limited or No safety nets
- Inadequate protection of rights through the operation of the law
- Voiceless-ness and powerlessness within the non-responsive political system and bureaucratic structure. (Adopted from Satterthwaite 2004)

The annual growth rate of cities and slums

source: UN-Habitat, GLObal Urban Observatory 2004.

Share of national gdp and population of selected cities

Sources: Van Dijk, 2007. Johannesburg, Cape Town: Naude & Krugell, 2004.

### Role of Cities

Cities have traditionally been the engines of growth since the

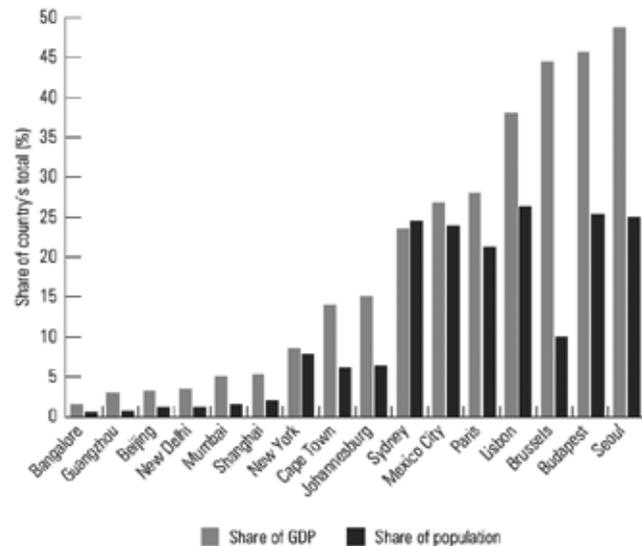
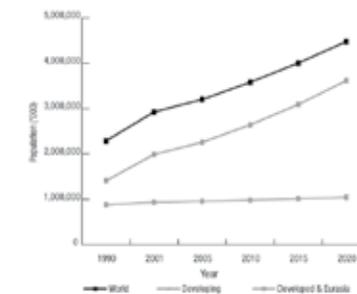


FIGURE 1.2.1 SLUM POPULATIONS, 1990-2020



Source: UN-HABITAT, Global Urban Observatory 2005.

## Urban Design & Health

“The urban setting is a lens that magnifies or diminishes other social determinants of health. Urban environments have a number of contextual and compositional attributes such as size, density, complexity and verticality that affects health equity in both positive and negative ways.” KNUS<sup>14</sup> While social and economic conditions are vitally important, there is a growing body of work across the disciplines that recognize the role of physical urban environment in shaping health and diseases and thus in contributing to health equities (Galea & Vlaho 2005)<sup>15</sup>

Visible and invisible spatial borders that transpire into segregation of the society according to socio-economic conditions often divide cities. According to UN Habitat 2010-2011,

*‘Closer assessment of the urban space in many cities of the developing world unambiguously exposes the fragmentation of the society with clear differences in the way space and opportunities are produced, appropriated, transformed and used’.*

Some areas features significant infrastructure, well kept parks, gardens and clean well built residential areas. In contrast, other areas are characterized by severe deprivation, inadequate housing deficient services, poor recreational and cultural facilities, urban decay and scarce capital expenditure. This kind of spatial injustice has tremendous impact on the health of the residents. It is in this context that the urban design has a critical role to play.

Urban planning and design or lack of it can create very different urban environments that can impact health in a positive or negative way. In all countries poor end up living in unhealthy places... down stream, down wind, in low laying lands, in flood plains, in landslides, over garbage dumps, near polluting factories. In the city of New York all the bus depots are located in Harlem, where the African American people are concentrated.

Most slum dwellers in Mumbai are located along the railway tracks, over the dumping grounds, or near flooding areas. It has been noted that ‘Disparities in health are increasingly linked to the physical and social environment that fall under the domain of planning (Corburn 2004)

The issue that can be moderated through urban design and planning:

Land use patters, designing of infrastructures, both soft and hard, density and location of facilities and safe neighbourhoods. Availability or lack of this has severe impact on the physical and mental health of the residents.

Urban planning and the regulatory framework it provides on land use, land development, housing and building standards and infrastructure standards should reduce inequities in living conditions. Their core purpose is to ensure health and safety, including land-use regulations that prevent buildings on unsuitable sites (for instance, flood plains), and ensure that land is available for infrastructure and services and open/public space (Barton & Tsourous, 2000)<sup>16</sup>.



## Six pathways for designing healthy cities

### 1. Equitable Access to Benefits of Urban life:

Assess to livelihood opportunities are critical to people's health. Long and expensive commute to working place and lack of easy access to transportation impact both the physical and the economic conditions of the family and makes urban poor vulnerable to unemployment. Spatial mismatch between job location and place of residence can leave more remote slum dwellers little alternative but to spend a night in public space, squat in the temporary unit devoid of services. In Rio some workers sleep on benches during week saving commuting time as well as transportation costs that consume 20% of their earnings. In Mexico city 20 % of workers spend more than 3 hours commuting to and from work everyday. (State of World cities 2010/11)

In an affluent country like US, traffic congestion cost \$ 4.27 Billion in extra fuel and person hours in Chicago

in 2003 (Urban Mobility Report, Texas Transportation Institute). On the other hand Victoria Transport Policy in Australia states that public transit in cities can save \$279 per capita in congestions cost savings. This identifies the importance of infrastructure. (GRNUHE)<sup>17</sup>

Traffic accidents are also on the rise in the cities. Between 1975 -1998 traffic fatalities increased by 237.1 % in Columbia, 243 % in China and 338% in Botswana. Many who die in traffic accidents are pedestrians. In Mumbai where 6.5 million workers travel on the commuter trains, 19 persons are killed each day in train related accidents (Uncovering the Myth of Urban Development in Mumbai' by Dr. S. Parasuraman)<sup>18</sup>.

Better urban infrastructure, pedestrian friendly streets and well planned transport system that provide safe options for getting around the city are needed to curb the rise in the traffic Deaths (UN Habitat, State of the World's Cities, 2006/7).

Other critical access is for the health care services and facilities. In poor areas there are no health care facilities available. In Kaula Bandar, a 40 years old unregistered slum in Mumbai PUKAR has found out that there is no primary school in this community of 15000-18000 people and the nearest health service delivery facility is 1.5 kms away with no public transportation available to reach that facility. (June 2010 Report to Rockefeller Foundation, Unpublished data). Research in higher income countries has revealed that in densely populated cities the

response time of the emergency ambulances and fire services is very long, leading to lower survival rates. (Campbell et al. 1993.)<sup>19</sup>, In Mumbai, there is no facility for a special ambulance lane and no traffic system existent for making way for an ambulance. (personal observations).

Access to schools, community places and parks are also important for community cohesions and physical activities.

## 2. Access to adequate housing

The link between health and housing has been known for centuries. Vast body of literature has explored the connections between housing and health impacts. (Thomson, Petticrew 2002).<sup>20</sup>

Most of the major cities in the world have been facing the constant crisis of lack of affordable housing for the urban poor and increasing health inequities created by the lack of shelter in the urban poor.

The Health Evidence Network, Europe produced a report in Feb. 2005

'Is Housing Improvements a potential health improvement strategy?'

The summary of that reports says- "The well-established links between poor health, poor housing and poverty suggest that housing improvements in disadvantaged areas or social housing may provide a population-based strategy to improve health and reduce health inequalities. Housing improvements that reduce exposure to specific hazards may lead to health improvements for current residents and prevent harmful exposure by future generations"

Smith's study in 1989<sup>21</sup> delineated specific health conditions that arise from poor housing structures, an area deeply related to urban design:

Each of these factors can be addressed by changing the structural design even within the restraints of the costs, material and land use by creative means.

The world Health Organization has identified nine critical features

Housing Defects	Health Risks
Inadequate heating	Bronchitis, Pneumonia Heart disease, hypothermia, Accidents, Dampness with growth of moulds
Inadequate ventilation	Respiratory diseases, CO poisoning
Lack of Hygiene Facility	Infectious diseases
Inadequate kitchen facility	Accidents, food poisoning
Disrepair	Accidents, Fires, Infections
Structural instability	Accidents
Inadequate lighting	Accidents
Use of hazardous materials	Cancer and respiratory diseases
Overcrowding	Infections, stress, Intra-family violence
Inadequate means of escape	Injury or death by fire

source: UN-HABITAT, Global Urban Observatory 2004.



Kaula Bandar: An unregistered slum in Mumbai- Lack of water, sanitation & garbage disposal: - PUKAR-HSPH- NYU Project.

of housing conditions that can have direct impact on health.

1. The house as structure that protects occupants from natural elements like heat, cold, rains flood, pests, noise, etc.
2. The extent to which there is adequate water supply, both quantitative and qualitative
3. The effectiveness of the provision for excreta, sewage and solid waste disposal and management of that disposal
4. The quality of housing site, the extent to which it is structurally safe for the housing and the extent to which provision is made to protect

5. Effects associated with overcrowding including household accidents, increased amount of air-borne infectious diseases including pneumonia and TB.
6. Indoor air pollution associated with fuels used for cooking and heating
7. Food safety including the extent to which the shelter had adequate provision
8. Vectors and hosts of other diseases associated with the domestic and peridomestic environment.
9. Home as a workplace- where occupational health questions such



Kaula Bandar: An unregistered slum in Mumbai- home as a work place 11 child labourers working and living - PUKAR-HSPH-NYU Project

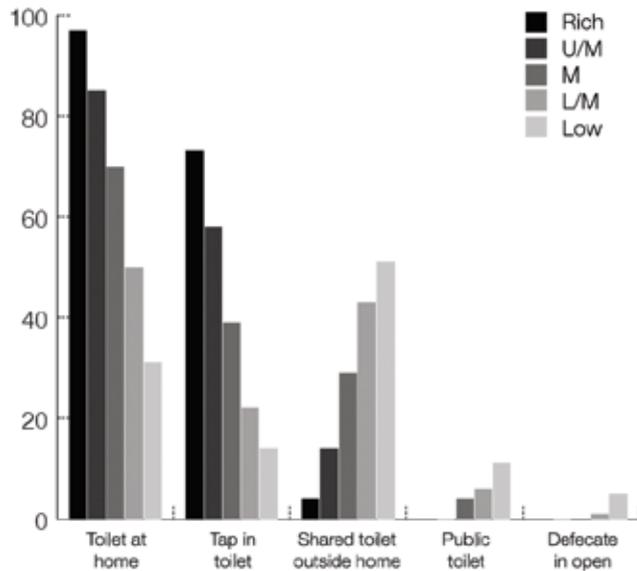
as storage of toxic or hazardous chemicals and health safety aspects of equipment used needs consideration.

A critical component of housing that has one of the largest impact on health, especially morbidity and mortality in children under five years is access to basic sanitation and water. Only 17 % of urban poor have individual toilets at home.

In Kaula Bandar, an unregistered slum in Mumbai where PUKAR has been researching on social determinants of urban health we found that only 3.0% of households had access to a toilet in their home. Of the 97.0% of households not having a toilet facility in their home, households made recourse to a variety of methods, including defecating in a pay toilet (59.0%), in a public toilet (39.6%), and outside in the open alongside the sea (13.7%). Given the

Provision of toilets by socio-economic group, Bangalore

Source: (Sinclair Knight Merz and Egis Consulting 2002)



sensitive nature of the question, it is probable that households underreported defecation in the open “wherever a hiding space can be found” (0.6%) and in the open alongside the sea.<sup>22</sup>

An urban planning strategy that facilitates access to clean water, toilets can reduce prevalence and minimize the impact of water born diseases. It is estimated that providing adequate sanitation and water can reduce the diarrhea morbidity up to 46%.

While talking about urban slums of kinetic city of Mumbai Professor Rahul Mehrotra, Chair of the department of Urban Planning and Design at Harvard Graduate School of Design says:

“Perhaps the only standard that should be applied for the evolution of these settlements are laws and infrastructure interventions that deal with HEALTH & SANITATION, and not deal with the form of the houses or dwelling unite per se” (www.timeoutmumbai.net, October 15, 2010)

There is plethora of literature, elucidating association between lack of toilets, lack of adequate water and diarrheal diseases. In developing countries, in an average two week period, an estimated 82 million children aged 0-5 years old have diarrhea and estimated 24,000 children die EACH DAY due to diarrheal illness that are related to lack of access to water and sanitation. (WHO 2008)<sup>23</sup>

The following diagram shows the prevalence of diarrheal illness in various parts of the world.



Childhood Diarrhea : How the world looks 24

### 3. Safe Living Environment:

The nature of urban planning leading to creating urban environment has major impact on the health through behaviour modifications and safety. Urban design has an important role to play in terms of physical activity, accessibility to open spaces, walkability around the neighbourhoods, and availability of easy fast foods, connectivity and finally safety. When talking about safety, it revolves around many issues again related to urban form and design. Safety on the roads for the pedestrians and elderly, children’s safety on the playgrounds, safety from violence and abuse for women, occupational safety and safety from natural and man-made disasters. Road traffic accidents lead to 1.2 million deaths in the world annually and 50 million more are injured or disabled. (WHO, 2002)<sup>25</sup> In India, road traffic accidents are almost always underreported and an addition to the pedestrians, the pavement dwellers often are the easiest victims of road injuries in city like Mumbai.

### 4. Physical Activity:

Well thought-out urban planning and design certainly has the potential to reduce the health impacts of new life style enhanced by the urbanization processes, increased physical activity and in doing so lead to increased social cohesion and community gatherings.

Two most famous examples of this spatial and distributive justice are Curitiba in Brazil and Bogota in Columbia. Bogata’s visionary mayor Enrique Penlosa executed one of the most ambitious plan of reducing the private automobile traffic, expanding and improving bicycles paths, increasing the easy accessibility of affordable bus rapid transit system (TransMilenio) and increase the open public spaces for people to connect. Bogata’s TransMilenio systems averages 1600 passengers per day by bus, reducing travelling time by 32%, reducing gas emission by 40% and decreasing accidents by 90%. The CicloRuta, the bicycle path of Bogata is one of the

longest bicycle network in the world, stretching 340 KM of bicycle only lanes. This has increased the physical activity for the rich, the connectivity for the poor and decreased of GHG emission of 36.6 tones of Co2 in Bogata. ( www.c40cities.org/bestpractices/transport/bogata\_bus.jsp) <sup>26</sup>

Cicloruta, Bogata

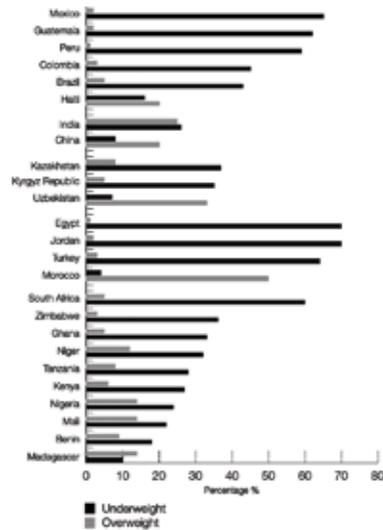


### 5. Food Security:

The large participation of women in the labour force combined with pervasive globalization has led to dramatic alterations of food habits across the globe. In many parts of the world the traditional diets of grains, pulses, fruits & vegetables have given way to meat intensive diets combined with excess of processed food. In US the availability of instant foods are easily available in poorer neighbourhoods where coke and hamburgers are cheaper than water and salads. This nutritional transition coupled with urban planning that is built around the automobile industry which discourages physical activity has led to the epidemic of obesity and diabetes with approximately 2 Billion people who are either obese or overweight.

Physical activity is strongly influenced by the design of the cities through the density of the residences, mix of the land uses, the degree to which the streets are connected, the ability to walk from place to place and the provision of and access to local public facilities and space for recreation and

Prevalence of under and over-weight among women aged 20-49 years in urban areas in select developing countries



Source: American Journal of Clinical Nutrition 81: 714–21, American Society for Nutrition, with permission

### FAST FOOD: CALORIES PER DOLLAR



play. (Report of Commission on Social Determinants of Health, WHO, 2008)<sup>27</sup>

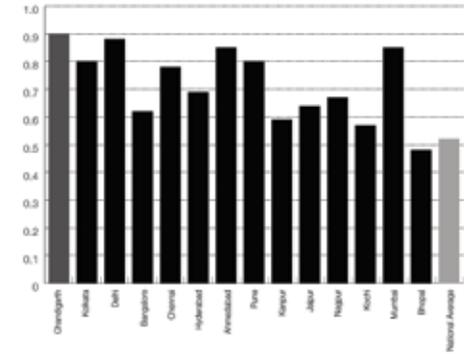
There has been no specific attention paid to the walkability part in the context of urban planning in India. A study commissioned by the ministry of Urban Development in India assessed footpaths and overall infrastructure and including pedestrian's rating of the facility. The national average walkability index was 0.52.

By comparison large international cities like London score 1.5 to 1.7. Even though most Indians walk, absence of footpaths and constant negotiation with traffic makes walking a hazardous experience in major cities in India.

It is important that urban planning gives priority to walking pathways, bicycling pathways and created affordable and easily accessible mass transport infrastructures in every city. Planning that focuses on open spaces, parks for recreations and playgrounds constitute a major contribution towards encouraging physical activities. All the the above mentioned planning strategies contribute towards making a city healthy.

### Access to Natural Environment

The natural environment in which people live and interact have large impact on both physical and mental health. This is where sound urban planning can play a large part. Environmental pollutions, including water, air, noise pollution has increased considerably due to rapid industrialization and automobile dependent life styles, increased need for energy and



Walkability index, select Indian cities

Source: (WWF 2008)

dependence on many chemical oriented products used in our daily lives. Some relationships between these factors and health are well studied. Noxious factory fumes and motor vehicles exhaust causing increased asthma and upper respiratory infections. Polluted drinking water causes gastrointestinal diseases and heavy metal poisoning. Staying in older home with lead paint has caused severe lead poisoning in young children in US. As per WHO (2010) indoor and outdoor pollution is a major health problem and is estimated to cause approximately two million premature deaths worldwide per year with most of the burden of diseases being in LMIC. <sup>28</sup>

In Kaula Bandar a small room of 100 square feet without ventilation hosts 10-15 people at a time who work with chemicals, (Tannery & Leather belt making) weaving, (carpets, zari embroidery), tailoring etc. There is large amount of suspended air particles, cotton fibers, threads, other fumes, in these congested spaces. This may lead to increased incidence of respiratory elements, asthma, allergic cough, other chronic lung diseases, Tuberculosis and other air-borne infections (personal observation). There are handfuls of studies coming out of India and

Pakistan that has looked at these but more empirical research is needed to establish the causal pathways in a more rigorous manner. In addition in KB we have observed continuous flooding of the homes during monsoons, thus giving rise to large number of vector born diseases.

Another critical part of urban design related to the Urban Heat Island effect secondary to climate change. The absorption of heat by the concrete surfaces results in urban areas having higher temperatures than surrounding non-urban areas (GRNUHE 2010). This indeed has a negative impact on the health. Therefore ensuring trees, open parks, greenery as a part of urban planning will provide both cool shade and carbon sinking capacity to the cities



### Healthy by Design

A planners' guide to environments for active living was released by the National Heart Foundation of Australia (Victorian Division) in 2004. The development of Healthy by Design was assisted by key stakeholders representing planning, recreation, health,

transport and community building sectors and with support from the Planning Institute, Australia - Victoria Division. This design tool has been widely adopted by local government and developers in Victoria, Australia. (Sutherland & Carlisle, 2004)<sup>29</sup>

Key Health Objective for Urban Planners: Urban Planning policies and proposal should encourage the following:

1. Healthy exercise
2. Social cohesion
3. Housing quality
4. Access to employment opportunity
5. Local low impact food production and distribution
6. Community and road safety
7. Equity & reduction of poverty
8. Good air quality and protection from noise
9. Good water & sanitation quality
10. Conservation and decontamination of land
11. Climate stability

### Conclusions

Urban planning and design has a large and critical role to play in creating healthy cities by providing creative and equitable urban built form. Through the medium of physical environment the urban planners can enhance the physical, mental and social health of the communities. This can be achieved through various means. From land use patterns, mixed zoning patterns, good connectivity, affordable and effective transport mechanisms, low cost housing, and accessibility to all advantages of urbanization. Building health equity through design and thus building healthy and wealthy cities should become a major goal of the urban planning and design processes.

### Bibliography

- <sup>1</sup> UN Habitat 2009, "Planning sustainable cities: Global report on human settlements 2009, Nairobi.
- <sup>2</sup> Corburn, J (2004): "Confronting the challenges in reconnecting the urban planning and public health" Am J Public Health 94 (\$) 541-549
- <sup>3</sup> Slone, D (2006) From congestion to sprawl: planning and health in historical context Jam Plann Assoc 72 (1) 10-18
- <sup>4</sup> Boarnet MG: Journal of American Planning Association. (2006) Volume 72, issue 1
- <sup>5</sup> Hancock, T and Duhi L (1986): Healthy Cities: promoting Health in Urban Context. Copenhagen, WHO Regional Office for Europe
- <sup>6</sup> Healthy Urban Planning in practice: experience of European Cities. Report of the WHO City Action Group on Healthy Urban Planning. Edited by Hugh Barton, Claire Mitcham, Catherine Tsouros.
- <sup>7</sup> UN Habitat 2008-2009: State of the World Cities, Harmonious Cities, Nairobi, United Nations Settlement Programme
- <sup>8</sup> UNFPA 2007: State of the world population: Unleashing the Urban Growth.
- <sup>9</sup> UN Habitat 2006: State of the world cities 2006/7. The Millennium development goals and urban sustainability. Nairobi, United Nations Settlement Programme
- <sup>10</sup> UN Habitat 2009: Planning sustainable cities: Global report on human settlements. Nairobi, United Nations Settlement Programme
- <sup>11</sup> UN Habitat 2010: State of the world cities 2010-2011. Cities for All: Bridging the Urban Divide. Nairobi, UN Habitat.
- <sup>12</sup> Vlahov et al (2007) "Urban as a Determinant of Health" Journal of Urban Health 84 (0) 16-26
- <sup>13</sup> Satterthwaite D (2004): Under-estimation of Urban Poverty in Low and Middleincome Nations. Human Settlements Working Paper Series. Poverty Reduction in Urban Areas No. 14. IIED, London.
- <sup>14</sup> KNUS: ([www.who.int/social\\_determinants/resources/knus\\_final\\_report\\_052008.pdf](http://www.who.int/social_determinants/resources/knus_final_report_052008.pdf))
- <sup>15</sup> Galea, S, Freudenberg, N. and Vlahov, D (2005) "Cities & population Health" Soc. sci. med. 60: 1017-1033
- <sup>16</sup> Barton, H and Tsouros, C (2000) Healthy Urban Planning: A WHO Guide to planning for people. London, WHO.
- <sup>17</sup> S. Parasuraman, Urban India: Understanding the maximum city: Uncovering the myth of urban development in Mumbai. Urban Age: India newspaper. November 2009 21
- <sup>18</sup> Campbell, et al. "Ambulance arrival to patient contact: the hidden comonant of prehospital response time intervals" Ann Emerg. Med. 22: 1254-1257
- <sup>19</sup> Thomson, H Petticrew, M (2007): "Housing & Health" British Medical Journal, Vol. 334, Number 7591, 334-434.
- <sup>20</sup> GRNUHE, "Improving Urban Health Equity through action on the social and environmental determinants of health" Final Report to Rockefeller Foundation, 2010
- <sup>21</sup> Lesser, A. Sawant, K. March 2010. "Urban Environmental Determinants of Health in Mumbai: A case study of Kaula Bandar slum". PUKAR-HSPH-NYU Project: Unpublished data.
- <sup>23</sup> WHO 2008: The global burden of disease: 2004 update
- <sup>24</sup> [www.worldmapper.org/](http://www.worldmapper.org/)
- <sup>25</sup> WHO 2002: World report on Violence & Health.
- <sup>26</sup> ([www.c40cities.org/bestpractices/transport/bogata\\_bus.jsp](http://www.c40cities.org/bestpractices/transport/bogata_bus.jsp))
- <sup>27</sup> Closing the gap in a generation: Health equity through action on social determinants of health. Report of Commission on Social Determinants of Health, WHO, 2008
- <sup>28</sup> WHO 2010 "Air Quality and Health" Kobe, WHO centre for Health development.
- <sup>29</sup> Sutherland, E. Carlisle R. NSW Public Health Bulletin, Vol. 18(12-13) 228-231