

Public Health Infrastructure Management Responding to COVID-19

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Abstract: The built-environment of public places in an urban area has significant impact on health behaviour and disease transmission. Adapting to the global pandemic is not just about maintaining individual safety but also about re-creating spaces which can respond to the public requirements of safety and convenience. Every step towards recovery helps to build a world beyond the COVID-19, and the success of these cities depends on anticipating global trends and transformations - and the result will be a new kind of city capable of withstanding shocks such as the COVID-19 pandemic in a more sustainable manner as well as adapting to the digital way of life. The present study is the review on the impact of Corona pandemic on public place design. The paper attempts to examine, what type of spatial / structural measures can be taken to make built-environment safe. Three context in Dhaka were selected for review. The chosen sites are typical of highly density spatial fabric and have the opportunity to be redesigned or to be retrofitted with urban health infrastructural component in place to control pandemic. This may be seen as the opportunity to reimagine the public places in terms of health safety. Spatial interventions are needed to provide physical environments that can allow the physical distancing. This study shows that the pandemic may be considered an opportunity to rethink of the planning, design and management of city's resilience to future crises.

Keyword: Pandemics, Health Infrastructure, Social Distancing, Built-Environment, Urban Space Management.

1. Introduction

The world is currently facing the global health crisis of COVID-19 pandemic, perhaps the worst in more than a century (Sara & Dalia, 2020) defining global health crisis of our time. The greatest challenge faced since World War-II, which resulted in the emergence of many challenges for cities' health infrastructure to face this pandemic.

COVID-19 is a highly infectious disease caused by a new strain of the coronavirus family, SARS-CoV-2 (Jones, 2020). It belongs to the same family as SARS-CoV-1, which was responsible for the severe acute respiratory syndrome (SARS) pandemic in 2003 (David, 2019). It was first identified in December 2019 in Wuhan, Hubei, China. It was initially reported to the WHO on December 31, 2019. On January 30, 2020, the WHO declared the COVID-19 outbreak a global health emergency. On March 11, 2020, the WHO declared COVID-19 a global pandemic causing millions of death all over the world (Ahmed & Liton, 2020). There is no clinically approved antiviral drug or vaccine as yet available to be used against COVID-19. It spreads from person to person, via several different modes, mainly when people are in close proximity to one another. It can transmit when

people are symptomatic, or even if a person never shows symptoms (asymptomatic transmission), which deepens the crisis. A June 2020 review found that 40–45% of infected people are asymptomatic (Ahmed & Liton, 2020). In Bangladesh it is spreading since March 2020, reaching its peak in August 2020 with no sign of decline. It is assumed that people will have to live with it for a long time and will need to adapt to it with prescribed methods (TBS, 2020).

As a pandemic i.e. the COVID-19, is not a single problem but poses a set of interrelated problems, it is much more than a health crisis, it's also an unprecedented socio-economic crisis. Stressing every one of the countries it touches, it has the potential to create devastating social, economic, and political effects that will leave deep and long standing scars. Cities around the world have faced the brunt of the COVID19 pandemic due to widespread international connectivity, the movement of people and goods, and commercial and recreational activities in constricted spaces. Bangladesh is not out of the chain. Bangladesh is now standing between a rock and a hard place, i.e. to continue the lockdown and face the punishing economic disaster, or to return to normal life and face the onslaught of the coronavirus, two equally dangerous extremes leading inevitably to disaster. None of the choices can now be discounted summarily no matter how unsavoury they are (Ahmed & Liton, 2020), strategy would be, perhaps a balance between the two. The country needs to act immediately to prepare, respond and recover through coordinated efforts including reviewing of the usual city-design strategies.

2. Materials and Methods

Rethinking Cities' infrastructure explores the relationship between the pandemic and urban health issues and infrastructure, to provide a potential direction for urban planning and design to mitigate the risks from future health crises. Strengthening urban healthcare infrastructure to handle the rush of patients with new infections, and disruptions in general healthcare services, will prevent urban populations from being exposed to additional infections and disease outbreaks (Sara & Dalia, 2020). It is a cross disciplinary study and an attempt to see how a city responds or should respond to pandemic situation like COVID-19, where social distancing and hand-wash is so far the best recommended process to break the chain. Dhaka being a high density city, is presume to be a fertile ground for spreading this virus. But it is much more than just density, it is how all people behave, how they move and gather. The objective of this paper is to review the COVID-19 context in terms of:

- Public Health Infrastructure in the Built Environment Design Responding to pandemics to mitigate the risk of community transmission among people.
- Analyse the currently available health infrastructural components and evolve strategies to respond in the selected public spaces as a model to follow under pandemic context.

2.1. Study Process: This study seeks to identify whether health infrastructural component can be integrated in urban places and see whether these changes promote sustainable resilience towards new normal life in relation to the existing built environment.

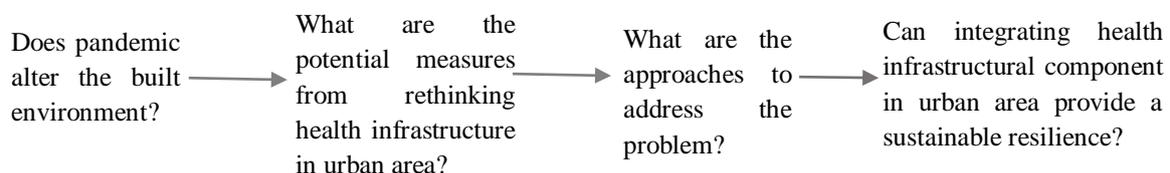


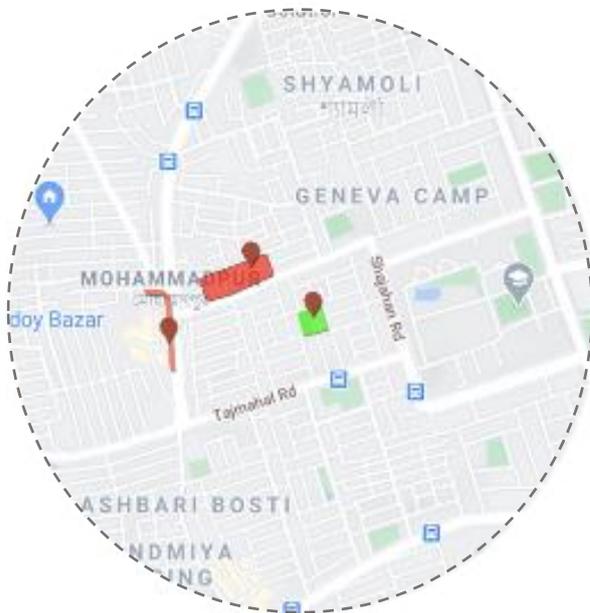
Figure-01: Flow chart of the study Process

2.2 Process of Sampling: In case of stratified sampling, the respondents were randomly selected through digital social network to get an idea of the public perception about the crisis. Measures of the built environment variables were collected via selected typical public places through a systematic direct observation and analysis. Most of the respondents were working professionals including a number of businessmen and students. Homemaker also participated in the online Questionnaire Survey.

Table 1: Behavioural domain, socio-demography and perceptual domain of people

Domain	Variables
Socio Demography	Gender
	Age
	Profession
Behavioural Domain	Difference of time spent outdoors currently compared to the previous normal context.
	Frequency of going out currently compared to the previous normal context.
	Mode of transportation currently used compared to the previous normal context.
Perceptual	What kind of challenges you face currently in using public places due to pandemic?
	Perception over the design implication to mitigate the risk of COVID transmission

2.3. Selection of Public Places as the study area: Mohammadpur area in Dhaka city is a typical high density area in Dhaka with an area of 11.65 sq. km and a population of 316,203. The study site is narrowed down into 3 general categories of public places based on public perception of COVID behaviour on public spaces such as Bazar, Community Park and a specific pedestrian walkway where maximum public contact takes place. The selected study sites are (Fig.02)



1. The Tajmahal Park is a community park. Majority of the users are the local community living around the park.

2. Streets of Krishi Market is one of the most used bazar/market of the locality as well as supplying wholesale kitchen product in whole Dhaka. It is established on an area of 5 acres.

3. The Mall (Tokyo square Shopping Mall of ring road) side pedestrian walk of Ring Road – The selected portion of the foot walk (as the study site) starts from the main entry of Japan garden city to Shekhertek Road-01. This chunk provides a dynamic pedestrian context.

The study only focuses to observing and identifying some design implication to be introduced in the selected sites to reduce the risk of COVID transmission.

Table 2: Parameters of built environment measurements

Urban Space Type	Variables helping Social Distancing
Community Park	Nature of transformation or adaptation required
	Availability of amenities (Hand and foot sanitizers) and hygiene/medical booths
	Green level and vegetation
	Pedestrian way widening
	Maintaining Social distancing and sitting areas
	Addition of markings/tape on seating to maintain physical distancing.
	Restricted entry and exit points limiting the flow of people
	Signage / communications to remind pedestrians of distance requirements.
	Provision and access to public toilet facilities with Hand and foot sanitizers.
	Provision of separate entry and exit.
	one-way circulation
Street Market	Additional cleaning regime and maintenance
	If there occurred any temporary transformation responding to COVID-19?

	Availability of separate lane for grocers, dry goods, meats, and vegetables
	Seating Pattern of the hawker whether maintain required distance or not?
	Availability of amenities (Hand and foot sanitizers) and hygiene booth.
	Provision of wide buyer spaces which can allow better physical distancing.
	Addition of markings/tape on road to maintain physical distancing.
	Signage / communications to remind pedestrians of distance and mask requirements.
	Provision and access to public toilet facilities.
	one-way circulation
	Additional sanitization, cleaning regime and maintenance
Pedestrian foot walk	Availability of amenities and hygiene booths.
	Provision of wide spaces which can allow better physical distancing.
	Addition of markings/tape on road to maintain physical distancing.
	Signage / communications to remind pedestrians of distance and mask requirements.
	Green level and vegetation
	One-way circulation and street furniture
	Additional sanitization, cleaning regime and maintenance

2.4. Criteria of selecting the Study Area: The selected study site bears the typical potentiality of integration of health infrastructural components which would help to achieve resilience to the COVID transmission. The method applied is through a detailed photographic, observational study and field survey.

3. Built-Environment Parameters Responding to Pandemics

The pandemic has turned the world outside our homes into a newly formed wilderness. Public spaces are now areas to be ventured into sparingly, except by essential workers, so for most of us our worlds have shrunk to the size of our homes (Sara & Dalia, 2020). Private lives, public lives, family lives and work lives have drastically shifted into what is now call the new normal. But based on the scientific evidences the world seems a long way off now. In the meanwhile, it is necessary to understand the problem in order to respond to that (Sayeeda, 2020).

From the preamble and the figure-3, it is clear that isolation, social distancing, restricted movement, personal hygiene, avoiding contact, being easily killed by soap in 20 seconds, Mask, digital technology, quarantine etc. are the main spatial issues to be addressed in outdoors as well as indoors. Besides, knowing that COVID-19 virus are relatively heavy and can't spread far with the wind. Virus's life time depends on materials were it is stuck normally ranging from 2 to 8 hours. It multiplies and severely effects the human respiratory system. As it can transmit when people are symptomatic as well as asymptomatic, the response to contain it should start from the personal awareness and precaution (social distancing, wearing mask and hand wash). Symptomatic severe cases needs to be physically isolated and be managed in negative pressure isolation rooms (Sayeeda, 2020). While measures like physical distancing, use of face mask, and identifying and isolating infected individuals play important roles in limiting transmission risk, addressing air flow and ventilation has received attention as another measure that can help promote safety of people who spend time indoors. Lifts and service shafts in a building are also vulnerable (Urban Design, 2020).

Another pertinent question having implications on settlement is if remote work persists into a long reopening period, how will centres of work/study (Educational institutes, business districts, corporate campuses, office parks, shopping and public places) will adjust? Will there be a regional migration from cities to outer suburbs / exurbs? (Blumberg City Lab, 2020). How can we support the neighborhoods and commutes of those workers without the privilege to work remotely (retail, manufacturing, service industrial or perhaps RMG)? As is observed, small businesses have been hit hard by social distancing, stay-at-home orders and capacity

restrictions. In Dhaka, significant migration of these people (students and small business or worker) to their home districts is already noticed. Will local efforts to reallocate the right-of-ways for businesses be enough to keep Main Streets profitable and customers safe? Two levels of spatial implications seems to be perceived in response to COVID i.e. indoor/micro level and outdoors/macro level, of which later is certainly more complicated being of multi stakeholders' domain. Public indoors, though easier to manage, public outdoors, if managed properly are less vulnerable than indoors with respect to spread of COVID-19 (Mowla, 2020).



FROM: CDC (USA)



The emerging scientific evidence on Coronavirus transmission:

1. Very low risk of transmission from surfaces.
2. Very low risk from outdoor activities.
3. Very HIGH risk from gatherings in enclosed spaces like offices, religious places, cinema halls, gyms or theatres.

These findings that have been emerging for a while need to be applied by people to manage the situation in the best possible manner. Time to reduce panic about surface transmission, and not be too eager to go back to office

- Q - Who is expected to catch CORONAVIRUS?
Q - What does it take to infect?**

TO SUCCESSFULLY INFECT A PERSON, THE VIRUS NEEDS A DOSE OF ~1000 VIRAL PARTICLES (vp)

- The typical environmental spread of activities:
- >Breath: ~20 vp/minute
 - >Speaking: ~200 vp/minute
 - >Cough: ~200 million vp (enough of these may remain in air for hours in a poorly ventilated environment)
 - >Sneeze: ~200 million vp

FORMULA

SUCCESSFUL INFECTION = (Exposure to Virus x Time)

SCENARIOS

1. Being in vicinity of someone (with 6 ft distancing): Low risk if limit to less than 45 minutes
2. Talking to someone face to face (with mask): Low risk if limit to less than 4 minutes
3. Someone passing you by, like walking/jogging/cycling: Low risk
4. Well-ventilated spaces, with distancing: Low risk (limit duration)
5. Grocery shopping: Medium risk (can reduce to low by limiting time and following hygiene)
6. Indoor spaces: HIGH RISK
7. Public Bathrooms/Common areas: HIGH FOMITE/SURFACE TRANSFER RISK
8. Restaurants: HIGH RISK (can be reduced to medium risk by surface touch awareness)
9. Workplaces/Schools (even with social distancing): VERY HIGH RISK, including high fomite transfer risk
10. Parties/Weddings: VERY HIGH RISK
11. Business networking/conferences: VERY HIGH RISK
12. Arenas/Concerts/Cinemas: VERY HIGH RISK

RISK FACTORS

The bottom line factors you can use to calculate your risk are:

- indoors vs outdoors
- narrow spaces vs large, ventilated spaces
- high people density vs low people density
- longer exposure vs brief exposure

The risks will be higher for former scenarios.

Figure-03: Coronavirus Transmission (Source: Sayeeda, 2020 quoted CDC-USA)

Cities with a high concentration of urban poor and deep inequalities are apparently more vulnerable than those that are better resourced, less crowded and more equal. However, concentration of population also means concentration of services and infrastructure (including health infrastructure) enabling people to have quick access to those facilities in case of emergency. Digital age has dawned on us for almost two decades, but suddenly under COVID context it has become a very important tool to enable people to maintain social distancing or isolation (Mowla, 2020). Responding to pandemics, how might design the cities of tomorrow, so that the outdoors remains a safe and habitable space?

3.1. Structural Response in the Urban Area:

3.1.1. Public Health Infrastructure: Infrastructure traditionally denote networks and systems that provide us with essential services such as water, electricity and transport. Public health infrastructure provides communities the resilience against challenges to health (Jones, 2020). Along with the development of hospitals and health care centres, inclusion of health criteria e.g. appropriate water and sanitation systems, combination of proactive surveillance on sanitization and isolation, routine communication, widening streets and free space for pedestrians and active pedestrian mobility and creating more lane for bicycle etc. can be a healthy

alternatives for reducing the risk of pandemic spread and creating the opportunity to adapt to the new normal situation.

Table 1: Pandemic infectious diseases and their implications for the built environment

Epidemiological Disease	Behaviour or Structural Responses	Built Environment (Urban Areas, Green Spaces)
Infectious diseases in the Roman Empire	Isolation tents near hospitals	Infrastructure: Aqueducts, public baths, division of water and sanitation systems
Black Death fourteenth century	Quarantine and restrictions on movements. Closure of public baths and advice to avoid contact with animals.	Urban planning begins to create more space between buildings. Elimination of dirty and cramped neighbourhoods. Larger public spaces with more organised layouts.
Cholera (nineteenth century) -Six outbreaks between nineteenth and twentieth centuries	Quarantine for individuals and cargo arriving at ports.	<ul style="list-style-type: none"> ▪ Green areas: Parks in the middle of cities. ▪ Urban design: Long avenues and open spaces (e.g., Paris). ▪ Sanitation: Creation of infrastructure with improved sewage systems
Spanish Flu (twentieth century, 1918–1919)	<ul style="list-style-type: none"> ▪ Social distancing closure of public spaces (churches, theatres, schools). ▪ Use of gauze masks. 	<p>Separation of road traffic.</p> <p>Larger public spaces with more organised layouts.</p>
SARS-CoV-1 (twenty-first century, 2003–2004)	Quarantine and social distancing.	Improved ventilation and drainage systems in specific areas of Asia (e.g., Hong Kong).

3.1.2 Historic Structural Responses during Pandemics: COVID-19 is not the world's first pandemic, there have been other pandemics that have hit the world and took lives of millions. From reviewing the history of pandemics, beginning from the Athenian plague in 430 BC to the Black Death in Europe in the 14th century. We can notice more insights into the effects and consequences of changing the design of cities, the city's zoning laws, and the concept of quarantine (David, 2019). One of the main reasons for cholera outbreak in the 19th century was the mixing of clean drinking water with contaminated water. When it was discovered it was brought under control by planning appropriate water supply and sanitation infrastructure (Mowla, 2020). Pandemics not only affected the health field but also urban spatial impacts. Table 1 summarizes historic pandemics and structural responses to contain them. From history we know that things will never be as it was before pandemics, therefore, the new normal needs to be manifested spatially in our cities. The pandemic may be a probe to remind us to optimize cities by integrating the social behaviour through health perspective in planning and design.

a. Streets Design: Spread of COVID is assumed to be in gathering places and pedestrian ways. To respond to that, several cities, such as Vienna, Boston, Oakland, Philadelphia, have closed some roads to increase the area for pedestrians and cyclists as a kind of response to the social distancing. In another example, Bogotá has expanded bicycle lanes and added more temporary lanes. Mexico City has a similar plan by developing bicycle infrastructure to address varied issues like health, safety, economy, etc. In addition, when redesigning the streets and taking into account increased pedestrian spaces and active mobility, many more public health and environmental goals can be achieved.

b. Public Transport: The health effects of social distancing on transport were to reduce aviation and motorised traffic and to restrict movement. Also, it may appear that there is a need for public transport to differentiate between entering and leaving the transportation stations. These stations will always need frequent purification, transit risks can be minimized by restricting crowding, proper cleaning and sanitising hygiene of employees and passengers, and safety of operators (Mowla, 2020), and this really happened in many cities such as Cairo, Wuhan, Rome, Milan, Washington and elsewhere. At the time of pandemics, the use of public spaces such as stadiums and conference centres can repurpose for emergency hospitals. The most rapid practical approach is to adapt to existing buildings. Around the world, the scenario is the same. No matter how

primitive these temporary buildings may seem, they are our best choice instead of constructing new facilities. However, the vast majority of those hospitals are being designed in open areas that describe as arenas as the isolation which is the main mantra.

3.2. Contextual Study and Observation

The COVID-19 pandemic has forced a reevaluation of how we experience the world around us. Current pandemic preparedness was categorized in two major categories i.e.

1. **Socialization Recommendations:** Maintaining Social Distance of minimum 6 feet between 2 people, avoid gathering, wearing face mask in public places.
2. **Maintaining Personal Hygiene:** Home quarantine, wearing mask, Practice of sanitization, Practicing respiratory hygiene, practice of avoid touching eyes nose and mouth, wearing self-protective equipment like PPE, avoiding handshake these are potential measure at individual level.

3.2.1 Observation: Of the total 50 recipients of the link through social network, 32 opened the survey link and agreed to complete the survey. The age of the respondent ranging from 21 to 33. Almost 28.1% respondents are from the age group 27 of them 66% are working professionals where 53.1% are male and the rest of are female (Fig.4). According to the responses almost 90.6% respondents are spending less time outside their homes than before COVID-19 and 60% respondents' difference between the scenarios is 3 hours+ daily. Weekly time spent outside is significantly low among the respondents than before. People mostly stay home and about 54% respondents go out less than 5 times in a week as opposed to almost 50% respondent used to go outside 6+ times in a week (Fig.5-8).

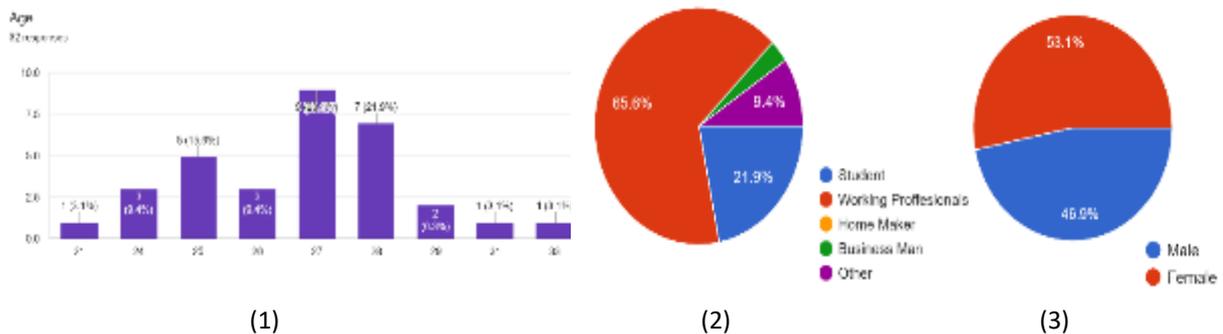


Figure 4: The percentage of age (1), profession (2) and gender (3) of the Respondents

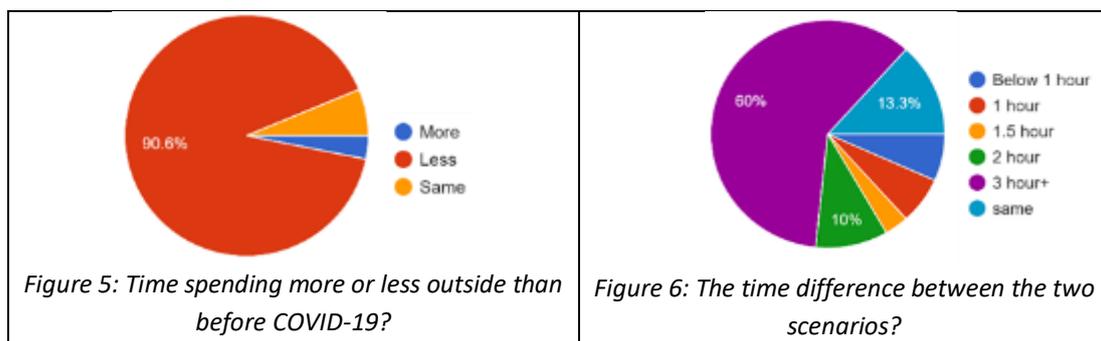


Figure 5: Time spending more or less outside than before COVID-19?

Figure 6: The time difference between the two scenarios?

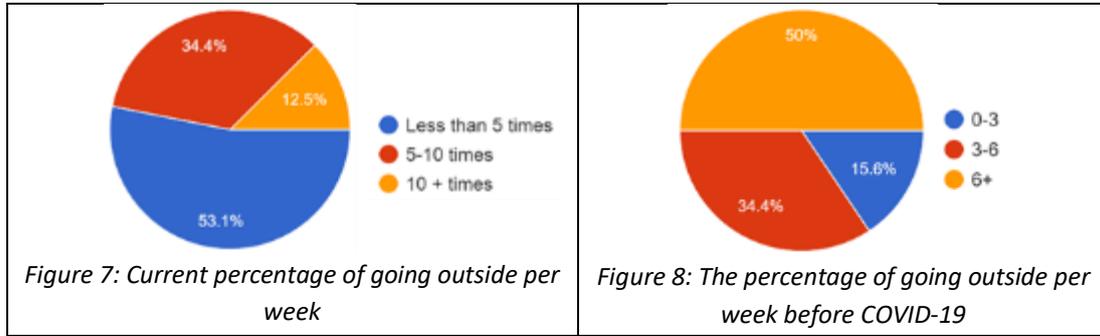


Figure 8: The percentage of going outside per week before COVID-19

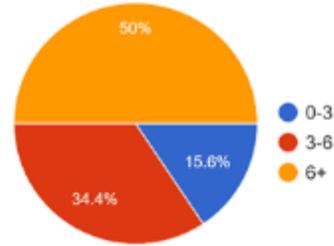


Table 4: Situation analysis and preventive measures in the built environment from spread of COVID.

Study Context	Attributes	Existing Scenario	Proposed Future interventions for adapt to New Normal
Community Park TAJAMAHAL PARK	Nature of transformation	Nothing mentionable	
	Availability of hygiene station	Not working	Hygiene stations such as hand washing can be integrated after a certain interval.
	Green level	<ul style="list-style-type: none"> Moderately present Less maintained 	Continuous networks of green spaces will still be more valuable than isolated patches (Forman, 1995).
	Footway widening	Available	
	Maintaining Social distancing	Nominal	<ul style="list-style-type: none"> Creation more spaces for individualized and introspective use over team sports. Green space planning to where individuals might be able to exercise within green spaces.
	Addition of markings/tape on seating to maintain physical distancing.	Nominal	<ul style="list-style-type: none"> Marking circle after 6 feet or grid pattern, signage can be integrated
	Restricted entry and exit points limiting the flow of people	Nominal	Restricted entry /scheduled entry can be proposed
	Availability of Signage / communications to remind pedestrians of distance requirements.	Nominal	Integration signage can be proposed to promote awareness as to provide guideline
	Provision and access to public toilet facilities.	Available	Maintain regular hygiene
	Provision of separate entry and exit.	Available	Enhance
one-way circulation	Nominal	One-way circulation may act helpful to mitigate transmission rate.	
Additional cleaning regime and maintenance	Nominal	The mandatory factor to be resilient with COVID 19	
Street Market OF KRISHI MARKET	If there occurred any temporary transformation	Yes <ul style="list-style-type: none"> The street market was 	Online shopping may be encouraged. Hygiene protocol may be enforced more regourasly in the physical shopping.

Study Context	Attributes	Existing Scenario	Proposed Future interventions for adapt to New Normal
		partially closed during 3 months of lockdown, <ul style="list-style-type: none"> initially maintained grid pattern seating layout of the hawker 	
	Availability of separate lane for grocers, dry goods, meats, and vegetables	Available	
	Seating Pattern of the hawker weather maintain distance or not	Nominal	<ul style="list-style-type: none"> can Introducing parallel tracks for movement Halting spots in both the rows can be staggered Maintaining unidirectional movement through strong visual indication on floors is necessary to streamline the crowd.
	Availability of hygiene station	Few, Not ADEQAUTE	
	Provision of wide buyer spaces which can allow better physical distancing.	Nominal	<ul style="list-style-type: none"> Limiting individual seller spaces wherever possible and opening buyer spaces Can control crowding, where one row is for customers who are strolling to find their suitable shops the next row immediate to the sellers will allow people only to buy.
	Addition of markings/tape on road to maintain physical distancing.	Initially Maintained (from March-May 2020) Currently not available	Grid of six-foot circles. Differently painted for different users maintain 6 feet distance may act as a soluble way to maintain social distancing
	Availability of Signage / communications to remind pedestrians of distance requirements.	Nominal	Application of well designed, functional signage.
	Provision and access to public toilet facilities.	Available	
	one-way circulation	Not Available	
	Additional cleaning regime and maintenance	Not Available	

Study Context	Attributes	Existing Scenario	Proposed Future interventions for adapt to New Normal
Pedestrian foot walk	Availability of hygiene station	Not Available	Hygiene stations such as hand washing can be integrated after a certain interval.
	Provision of wide spaces which can allow better physical distancing.	Not Available	<ul style="list-style-type: none"> Widening the walkway, making the provision by bicycling, addition of green plants
	Addition of markings/tape on road to maintain physical distancing.	Not Available	Marking grid /circle after 6 feet interval
	Availability of Signage / communications to remind pedestrians of distance requirements.	Not Available	Implication of awareness signage
	Green level	Not Available	Initiating Soft PAVE
	One-way circulation	Not Available	
	Additional cleaning regime and maintenance	Not Available	

Table 5: Respondents' reaction over the Perception in Design Modification

Design modification perception	Respondent's reaction	Measures	Description
Perception Over redesigning Public place		<ul style="list-style-type: none"> Strongly Agree Agree Neutral Disagree Strongly Disagree 	53.1% respondents strongly agree and 31.3%in proposal to redesign of public places whether 15.6% placed their opinion as neutral.
Providing hand washing facilities, public cleansing stations in public places to mitigate the risk of transmission.		<ul style="list-style-type: none"> Strongly Agree Agree Neutral Disagree Strongly Disagree 	Most of the respondents strongly agree over the design implication to mitigate the risk of transmission.
wider walkway or footpath for pedestrians		<ul style="list-style-type: none"> Strongly Agree Agree Neutral Disagree Strongly Disagree 	
provision of seating by maintaining physical distancing in community park/bus stop		<ul style="list-style-type: none"> Strongly agree Agree Disagree Neutral Strongly Disagree 	

Providing separate entry and exit routes for pedestrian with clear sign in public Bazar, super shop and community park?		<ul style="list-style-type: none"> ● Strongly agree ● Agree ● Disagree ● Neutral ● Strongly Disagree 	
major challenges are faced in using public places		<ul style="list-style-type: none"> ● Risk of being affected with Corona Virus ● Lack of the provision of hygiene station ● Lack of the opportunity to maintain social distancing ● 1 and 2 ● 2 and 3 ● 1 and 3 ● All ● Nothing 	Almost 67.7% agrees all 3 as the major challenges they are facing in using public places

4. Conclusion

Contemporary cities weren't designed to cope with life during a pandemic, and this upside-down way of living has turned them into a disorganised array of disconnected bedrooms and studios and confined to their houses, particularly during lockdowns. Now that isolation and social distancing is necessary to prevent COVID spread and also that there is digital technology at hand enabling us to work remotely, we must rethink ways to adapt to the new context and decentralize. Some cities around the world have already begun planning for adjustments.

The built-environment of public places in an urban area has significant impact on health behaviour and disease transmission. Adapting to the global pandemic is not just about maintaining individual safety but also about re-creating spaces which can respond to the public requirements of safety and convenience. The present study is the review on the impact of Corona pandemic on public place design and management. The survey show that spatial interventions are needed in the physical environments that can facilitate physical distancing. Every step towards recovery helps to build a world beyond the COVID-19, and the success of these cities depends on anticipating global trends and transformations - and the result will be a new kind of city capable of withstanding shocks such as the COVID-19 pandemic in a more sustainable manner as well as adapting to the digital way of life for decentralization. This study shows that the pandemic may be considered an opportunity to rethink of the planning, designing and management of resilient cities.

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Appendix-A

Taj Mahal Park:



Figure 91: Map Of the study site Tajmahol Park



Figure 10: Availability of wide Sidewalk in Tajmahal Park



Figure 11: Existing green level

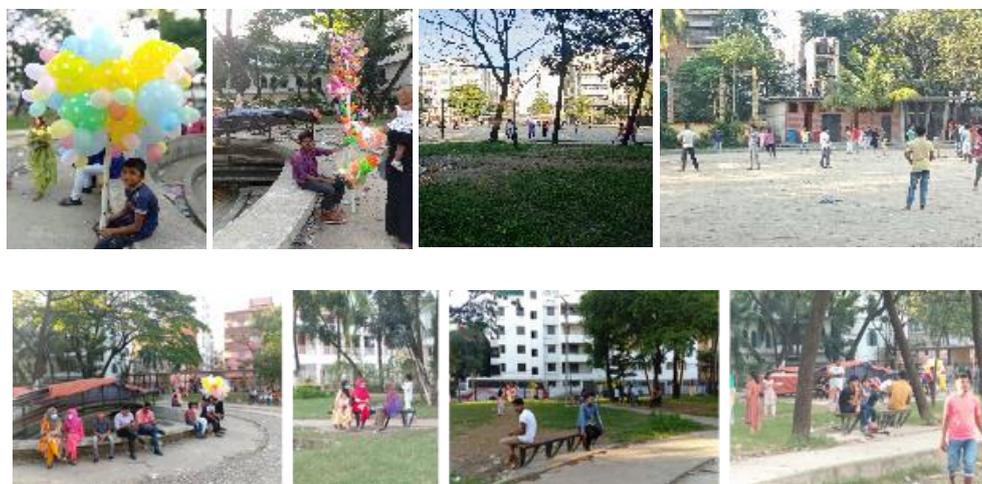


Figure 12: Seating, street hawker and provision of toilet and other services of the Tajmahal Park

The Taj Mahal Park is the most used park by the nearest institution and residential community. “Almost 200 - 300 people visits the park each day and the number increase in weekend and the major flow happens at afternoon time”- says the guard Abdullah of the Tajmahal Park. Though the community park has potential opportunity to integrate design implication due to pandemic, there found no available implication of health infrastructural component in response with COVID-19.

Street of Krishi Market



Figure 13: Site Image

Krishi Market is comprised of wholesale, grocery, dry and wet market established on 5-acre land. The study site is street market portion of the Krishi market.

The study site is extremely dense and crowded public places. The majority number of users of this market are the community from the surrounding residential area.



Figure 14: Existing Condition of Selected Sites

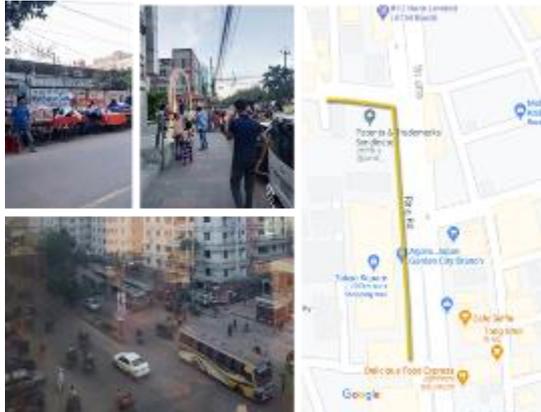


Figure15: Plan showing the seating and circulation in the street market



Figure16: Perspective image of the street market

FOOT WALK FROM TOKYO SQUARE MARKET SEKHERTEK ROAD 1:



The selected foot walk is along with the ring road which is a very dense and vehicular road.

Due to the entry towards the shopping mall, a residential housing and bus stopages this specific pedestrian walkway experiences a whole day crowd. But due to pandemic no hygienic social solution or socialize solution are completely absent.

Figure17: Pedestrian walkway map

INFO:-

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