

International Journal of Policy Sciences and Law

Volume 1, Issue 4

Urbanization and Transmission of Covid-19 **with a Focus on Developing Countries: India** **as a Case Study**

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Abstract

Around the world, global cities played an important role in the transmission of the COVID-19 disease at its early stages. But the impact of the spread was much severely felt by the cities of the developing world, than by those in the developed countries. The unique aspects attributed to rapid urbanization and high population growth in the developing countries, make the cities of this part of the world distinct from those of the developed countries. Therefore the COVID-19 protocols propagated by the high-income countries not only were a challenge to implement in these cities but were also effective only for a segment of the society. In this paper, we explore the distinct features of cities in the developing world against the challenges posed by the COVID-19 pandemic and the importance of context-based solutions to help the cities of developing countries successfully handle a pandemic like the COVID-19.

Keywords: *Urbanization, congestion, good urban planning, good urban governance, COVID-19, population density, Developing countries*

1.0 Introduction

Since the age of the Industrial Revolution, cities on one hand have represented growth and development through the generation of opportunities and resources. On the other hand, Urban centres are often seen as hot spots for inequality and exclusion (Véras, 2006). People belonging to the low-income groups and economically weaker sections of society become inherently vulnerable in an urban environment; especially in the case of disasters, as they lack the option to avoid, mitigate, and adapt to threats. This is true of developing countries as well as the poor and marginalized communities within developed countries (Levison, 2020).

Urbanization is on the rise all over the world. While in the 1950s, only 30 per cent of the world's population lived in urban areas; by 2018, 55 per cent of the population lived in urban areas (*Population Facts*, 2018). As the human race marches on in the 21st century, urban areas of the world are expected to continue scaling up with the global population that is expected to continue growing (National Geographic Society, 2019). Evidence from today's developed countries and rapidly emerging economies also shows that urbanization and the development of cities is a source of dynamism that can lead to enhanced productivity.

In 2019, the emergence of a novel coronavirus disease in one global city of the world and its eventual spread to all corners of the globe placed cities all over the world at the frontline of the COVID-19 crisis and the efforts to curb the impact of the pandemic. Cities were thus forced to confront the fact that unplanned urbanization creates conditions where many of the residents lack access to adequate facilities that challenged their lives and productivity even before the pandemic (*OPINION: COVID-19 Demonstrates Urgent Need for Cities to Prepare for Pandemics* | *UN-Habitat*, n.d.), and that the pandemic had merely exacerbated this situation. It has particularly emphasized the prevalent structural imbalances and inequalities of urban environments, and the strong need for sustainability, resilience, and inclusion in these environments. To solve these issues, as well as achieve these widely discussed goals, the impact of urbanization needs to be looked at more critically, especially in the context of COVID-19 spread.

In the developing world, the distribution of urban gains like access to infrastructural development, employment opportunities, and economic growth have always been uneven. The age of the COVID-19 pandemic and the global efforts to contain the spread of infection has thrown light on truly how wide this divide is, as it continues to reveal that in many parts of the developing world the protocols like sanitization and social distancing are impossible to follow owing to the nature of urbanization that tends to change with social and economic inequalities. The impact of the COVID-19 pandemic offers an opportunity to identify the weakest links in the process of urbanization. By doing so it has also provided us with the opportunity to actively work towards a better future for urban environments around the world and their inhabitants, where poor urban planning and policies don't stand in the way of safety, stability, and sustainability. This paper aims to contribute as a step in that direction.

2.0 Urbanization and Covid-19

2.1 A Global View

According to Johns Hopkins University, as of 21st April 2021, the overall number of global coronavirus cases had surpassed the 142 million mark, while the number of infection-related-deaths had increased to over 3 million. Countries with the largest cities and urban areas like the USA, India, Brazil, France, and Russia are among the most affected countries of the

The world today (Yadav, 2021) (*City Mayors: World's Largest Urban Areas in 2020 (1)*, n.d.).

Globally, with about 90% to 95% of all reported COVID-19 cases coming from urban areas, they are said to have become epicentres of the pandemic (*OPINION: COVID-19 Demonstrates Urgent Need for Cities to Prepare for Pandemics | UN-Habitat*, n.d.) (Policy Brief: COVID - 19 in an Urban World, 2020). A policy brief by UNSDG observes that the remarkable growth of cities in recent decades has intense (Yadav, 2021) find several of humanity's most pressing challenges and that it has also presented many of our greatest opportunities to protect people, prosperity, and the planet. It asserts that COVID-19 has laid bare – and indeed heightened – both these challenges and these opportunities (*Policy Brief: COVID - 19 in an Urban World*, 2020).

2.2 Warning and Experiences of the Past

Despite the progress of the health care system in the 21st century, which has evolved much to protect and promote human health through the growth of technology and research (Rupp, 2018), the world continued to be confronted by longstanding, emerging and re-emerging infectious disease threats (*8. Historical Context: SARS, MERS, and Ebola | ATrain Education*, n.d.). The outbreaks of Ebola, A(H1N1) Influenza, Zika, Dengue, Middle East Respiratory Syndrome (MERS), Severe Acute Respiratory Syndrome (SARS), and Influenza, as well as the Antimicrobial Resistance (AMR), brought out the fact that changes in the way humanity inhabits the planet make the emergence of more new diseases inevitable (*How the 4 Biggest Outbreaks since the Start of This Century Shattered Some Long-Standing Myths*, 2015) (Bloom & Cadarette, 2019) (*8. Historical Context: SARS, MERS, and Ebola | ATrain Education*, n.d.) (*20th and 21st Century's Major Pandemics*, 2020).

These infectious disease epidemics of the past have suggested that the emergence of pathogenetic zoonoses in rapidly developing and urbanizing regions have become a paradigmatic component of the urbanization and globalization processes in the 21st century. (Ali & Keil, 2020) While global health systems were acknowledged to play an important factor in the containment and spread of infection, the important role that the global cities and transport networks of the world play, remains relatively overlooked.

2.3 Global Cities Network and the spread of infectious diseases

Due to limitations in the transportation networks up until half a century ago, it is said that new infectious diseases could spread only as fast and far as people could walk. As air, sea, and land transport networks continued to expand in reach, speed, and capacity; it was inferred that pathogens and their vectors could also move further, faster, and in greater numbers than ever before through these networks. Three important consequences of the global transport network expansion are said to be infectious disease pandemics, vector invasion events, and vector-borne pathogen importation (Tatem et al., 2006). These transportation networks connect global cities. The “Global City Network”, covering the globe and including many globalized cities, is defined in the book “A study on Globalizing Cities” by Zhenhua Zhou as “The network infrastructure by which the highly sophisticated global city maximizes its strategic coordination functions to the fullest and the globalizing city grows, especially, the network infrastructure by which many general cities are involved into globalization operates.” (Kobo, 2014)

The rapid economic development in the Asian cities of Beijing, Shanghai, and Hong Kong had led to their increased importance in the global cities network—a development said to have been bolstered by the strong and conscious efforts of the Chinese state to integrate these cities into the globalized economy (Ali & Keil, 2006). Along with Singapore and Taipei, these networks are said to have played an important role in the chain of events that contributed to the spread of SARS in Canada, through Toronto in 2003 (Public Health Agency of Canada, n.d.) (Ali & Keil, 2006). Despite the recent experience of these epidemics, which spread through urban centres including Hong Kong and Toronto, UN-Habitat notes that many countries around the world were caught by surprise by the COVID-19 pandemic, while some countries were better prepared. On this, the UN-Habitat observes that in general, there is said to be a lack of planning for hazards and disasters at all levels (*OPINION: COVID-19 Demonstrates Urgent Need for Cities to Prepare for Pandemics* | UN-Habitat, n.d.).

2.4 Urban phenomena for conduits of infection

In urban environments, it is seen that the spread of infection is widely aided by the phenomenon of Super Spreading Events, through Hotspot, Hubs, Sources, and Superspreaders.

2.4.1 Super spreading events

In the Coronavirus Disease and many other infectious diseases, it is said that a small percentage of people cause most of the transmission and that most people don't infect anyone else (Enserink, 2020). The transmission of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), the etiological agent of the COVID-19 disease, that has spread rapidly around the globe, infecting millions and killing hundreds of thousands- is said to be stochastic, often dominated by a small number of individuals, and heavily influenced by 'Super Spreading Events' or SSEs (Althouse, 2020).

Many explosive SSEs that have occurred in indoor settings, such as long-term care facilities, prisons, meat-packing plants, produce processing facilities, fish factories, cruise ships, family gatherings, parties, and nightclubs, are observed to have stoked the pandemic and shaped its spread (Althouse, 2020) (Enserink, 2020). Many of these major SSEs, as documented by the media globally, take place in urban environments (Khare, 2021) (Slater, 2020) (*Outbreak at Missionary School as South Korea Reports 437 New Covid-19 Cases*, 2021). It is said that these SSEs demonstrate the urgent need to understand routes of transmission, while also posing an opportunity to effectively contain outbreaks with targeted interventions to eliminate SSEs (Althouse, 2020) (Enserink, 2020). According to a research article estimating the overdispersion in COVID-19 transmission using outbreak sizes outside China, an estimated 80% of secondary transmissions may have been caused by a small fraction of infectious individuals (~10%). As most infected individuals do not contribute to the expansion of an epidemic, it is inferred that the effective reproduction number could be drastically reduced by preventing the relatively rare superspreading events (Endo et al., 2020).

2.4.2 Hotspots, hubs, sources, and superspreaders

Geographic transmission of infectious diseases is emerging said to be facilitated by hotspots, hubs, sources, and superspreaders. Although hubs may vary from sources and superspreaders, all three may sometimes coincide (Kissler et al., 2019).

- 'Hotspots' of spread which, in addition to other elements, can be cities or countries that act as sites where an epidemic first becomes established.

- A ‘hub’ is defined as a type of hotspot which is a site of epidemic establishment that contributes substantially to the onward geographic spread of disease.
- ‘Sources’, are sites where a new genetic variety of a pathogen first emerges.
- ‘Superspreaders’ are sites that spread the infection to many immediate neighbours.

2.5 Geographic Transmission of COVID-19 and the role of Urban Environment

Almost all Sustainable Development Goals (SDGs), and especially Goal 11 recognised the important role that urban areas played in achieving sustainability (United Nations, n.d.). The end of 2019 on one hand marked our arrival in the “Decade of Action” - the ten-year period in which the efforts to deliver on the promise of the SDGs would be accelerated on a global scale. On the other hand, on 31 Dec 2019 Wuhan Municipal Health Commission, China, reported a cluster of cases of pneumonia in Wuhan, Hubei Province- one of the largest Chinese cities and a major transportation node with national and international connections (Keil et al., 2020). A novel coronavirus was eventually identified (World Health Organization, 2020). The disease was called the “Coronavirus Disease” (COVID-19) (World Health Organization, n.d.). At about the same time, China was facing its Spring Festival travel rush (Shen, 2020).

In January 2020, Zhong Nanshan, head of the National Health Commission of China confirmed human-to-human transmission saying that patients may have contracted the new virus without having visited the central city of Wuhan where it was discovered before spreading across China and reaching three other Asian nations (Al Jazeera, 2020). It was said that a quick diagnosis, quarantine, and integrated interventions will have a major impact on the future trend of the spread of infection (Shen, 2020). During the first 2 months of this outbreak, COVID-19 spread rapidly throughout China and caused varying degrees of illness. The initial cases diagnosed among non-residents of Wuhan showed 72.3% had contact with residents of Wuhan, including 31.3% who had visited the city (New England Journal of Medicine, 2020).

In January 2020 authorities in the US, Nepal, France, Australia, Malaysia, Singapore, South Korea, Vietnam and Taiwan confirmed COVID-19 cases. By early February new cases were confirmed in India, the Philippines, Russia, Spain, Sweden and the UK, Australia, Canada, Germany, Japan, Singapore, the US, the UAE and Vietnam. The end of February 2020 marked

the confirmation of the first cases in several other countries across the world, including Kuwait, Bahrain, Iraq, Oman, Qatar, Norway, Romania, Greece, Georgia, Pakistan, Afghanistan, North Macedonia, Brazil, Estonia, Denmark, Northern Ireland and the Netherlands, Lithuania and Wales. In early March Saudi Arabia announced its first coronavirus case, followed by Palestinian officials in the besieged Gaza Strip announced the first two coronavirus cases (Al Jazeera, 2020). On March 11, 2020, the World Health Organization (WHO) declared COVID-19 a pandemic (World Health Organization, 2020). By the end of March 2020, the infection had spread rapidly to most parts of the world. Thus, what began as a health crisis in one corner of the globe, quickly affected all of humanity.

Globally connected urban centres through air traffic were a major facilitator in the initial spread of the infection (Lau et al., 2020). On the same, Maimunah Mohd Sharif, Under-Secretary-General and Executive Director of UN-Habitat, said “In our rapidly urbanizing and globalized world, the virus has spread to virtually every corner of the globe; first, among globally connected cities, and now, through community transmission, from the city to the countryside.” But ‘Global Cities’ are not the only contributors to the spread of infection. Secondary cities and other urban hubs are also considered facilitators for the spread of infection (World Economic Forum, 2020). In the document ‘Strengthening Preparedness for COVID-19 in Cities and Urban Settings’ published by WHO, cities including megacities, are described as highly complex settlements that are regionally and globally dependent on each other and on neighbouring towns, rural areas, and places where migrants come from. They are said to often serve as subnational, national, and international hubs, with major points of entry in the form of airports, seaports, ground crossings, etc., and transport routes, often serving as foci for transmission. Given the high population density, it is emphasized that the risk of spread of infectious diseases is often elevated in these environments, especially in congested areas like crowded sidewalks, supermarkets, mass gatherings including cultural, sporting, and religious events, in view that their people often rely on extensive and crowded public transportation networks to get from one place to another. The document notes that there are also communities with crowded and substandard housing, having shared toileting facilities, and lacking access to safe water, sanitation, and hygiene (*Kennisgeving voor omleiding*, n.d.).

Scholars have found that pandemics often emerge from the edge of cities. Transmission hubs are often thought to coincide with locations with high connectivity and population density (Kissler et al., 2019). Viral outbreaks are frequently incubated and transmitted via peri-urban communities and transportation corridors at the outskirts of cities before they spread into the downtown core. It is not just cities, but also their local and global supply chains, travel networks, airports, and specific neighbourhoods that are sources of contagion through enclosed spaces, high contact rates, and several hand touch surfaces (World Economic Forum, 2020). Media reports have shown crowds of people in spaces such as these across the globe without any prescribed safety precautions (Collyns et al., 2020) (International Airport Review, 2017) (Kissler et al., 2019).

As much as cities aided in the transmission of the infection, they had also borne the brunt. Elaborating on the important responsibility that urban areas have in the pandemic, António Guterres, Secretary-General of the United Nations says “Our rapidly urbanizing world must respond effectively to this pandemic and prepare for future infectious disease outbreaks. The most vulnerable to disease are those living on the margins of our cities. Unplanned urban living leaves people vulnerable. The COVID-19 pandemic has exposed deep inequalities and demonstrated that tackling the virus is more challenging in urban areas, where access to quality healthcare is uneven, housing inadequate, water and sanitation lacking, transport infrastructure patchy and jobs precarious”

3.0 Developing countries and COVID-19

At the onset of the pandemic, it was quickly evaluated that the less developed countries of the world might be disproportionately affected by the transmission of the virus. The UN Secretary-General in March 2020 said “Let us remember that we are only as strong as the weakest health system in our interconnected world.” He emphasized the importance of developed countries immediately assisting those less-developed nations to bolster their health systems and their response capacity to stop the transmission of the virus; as otherwise, he explained, the world will face the nightmare of the disease spreading like wildfire in the global South with millions of deaths and the prospect of the disease re-emerging where it was previously suppressed (United Nations Secretary-General, 2020).

Today the COVID-19 pandemic continues to impact people across the world. Cases of the COVID-19 coronavirus have been detected – except for a handful of countries – in all of the world’s three vulnerable country groups (the three sub-groupings of developing countries) namely the Least Developed Countries (LDCs), Landlocked Developing Countries (LLDCs) and Small Island Developing States (SIDS) (United Nations Secretary-General, 2020). Going by population density, the transmission of the virus in developing countries will have a larger impact on humanity, as developing countries currently account for 80 per cent of the world's population with 61 per cent of the global total accounted for by Asian countries, particularly driven by China and India (Coast, Esterna 2002).

3.1 Global public health intervention and its effects on developing countries

The public health interventions upheld globally proved effective in reducing viral transmission and preventing healthcare systems from being completely overwhelmed by a surge of COVID-19 cases in wealthier countries. However, such solutions were often difficult to implement in developing countries.

3.1.1 The “One-size-fits-all” approach

Outside the borders of China, the first cases of COVID-19 were reported in developed countries like South Korea, Taiwan, the USA, and Singapore (Kantis, 2021). In the early phase of the pandemic, several perspective pieces published in 2020 noted that a vast majority of all reported deaths from COVID-19 - almost 79% as of 23rd May 2020 - had been in the world's High-Income Countries (HIC) (Schellekens & Sourrouille, 2020). Despite the disproportionate death toll, just as in many other disasters, the wealthy countries of the world issued guidelines to control the transmission of the virus - possibly based on the needs of the HICs that reported heavy death tolls. These guidelines eventually shaped the global public health responses to COVID-19. Thus it is argued that the policies developed to help the hardest-hit wealthy countries, became “a one-size-fits-all message for all countries.” (Cash & Patel, 2020). Some of these measures included social distancing, use of face masks, hand sanitization, stay-at-home and work-from-home measures, isolation of infected individuals and quarantining their contacts, closure of educational institutions, and economic lockdowns (Levison, 2020).

The focus on widespread lockdowns can be seen at the core of deepening this polarity. When attempted by less-resourced countries with distinct population structures, public health needs, limited healthcare resources, socio-economic inequities, marginalization, and fragile economies, the implementation and outcomes differ (Cash & Patel, 2020) (Levison, 2020). All age groups have been affected by the crisis. It is important to consider the fact that the older populations are the most vulnerable to the pandemic itself, while the youth face new barriers to social mobility, strains on mental health, uncertain economic prospects, and the continued degradation of the planet (World Economic Forum, n.d.). This is a context that must be extensively looked at as the population demographics between the developed and developing countries contrast starkly.

On one hand, low-income and lower-middle-income countries have a distinct demographic profile. Their populations are noted to be much younger. For instance: While 41% of Africa's population is under the age of 15 and only 3% of the population is over the age of 65. In North America, only 18% of the population are under the age of 15, with 17% accounted for by the population above the age of 65 (Statista, 2021). On the other hand, many low-income and lower-middle-income countries also differ from High-Income Countries in social arrangements to care for the elderly (Jacobs, 2013). Families are the main providers of care for the disabled elderly everywhere. Although the nursing home population in developed countries like the USA is said to have declined as a percentage of the elderly for some years now (Shetty, 2020), it is still higher than what is seen in developing countries (World Health Organization, n.d.). In many developing countries filial piety and a strong sense of obligation towards parents is not only culturally expected, but is also legally mandated (Shetty, 2020). Therefore, here the majority of the elderly population is cared for at their homes (Cash & Patel, 2020). Differences like these mean a lower risk of COVID-19 mortality in the population of the Developing Countries (Cash & Patel, 2020) (The Print, 2020), but higher risks in terms of several other emerging barriers for the youth (Cash & Patel, 2020) (The Print, 2020). While globally, one in every 5 jobs can be done from home, in low-income countries, it is observed to be only one in every 26 jobs (World Bank, 2020). It is evaluated that restrictions on movement brought in during the pandemic internationally, may jeopardize opportunities for the world's 232 million migrant workers and their dependents (Leighton, n.d.).

In developing countries where employment shares in sectors where people can work from home are low, these restrictions in mobility can bring other adverse effects. Talking about the distinct outcomes of the lockdowns in developing countries, researchers Debraj J and S Subramanian iterate that “The lockdown meets all international standards so far; the relief package none.” They note that in advanced economies, the cost of achieving a reduction in visible deaths is merely a dramatic reduction in overall economic activity, coupled with far-reaching measures to compensate those who bear such losses. But in a developing country like India with great sectoral and occupational vulnerabilities, they assert, the dramatic reduction is more than economic. It meant “lost lives”. They emphasize the fact that these lives lost, through violence, starvation, indebtedness, and extreme stress are invisible (Ray, 2020). These realities call into question the relevance of measures like the closure of educational institutions, isolation, and the widespread economic lockdowns in developing countries.

4.0 Urbanization in Developing Countries and the spread COVID-19

Urbanization is considered one of the most powerful anthropogenic forces on Earth in the 21st century (*A Comparison between Developed and Developing Countries in Terms of Urban Land Use Change Effects on Nitrogen Cycle: Paris and São Paulo Metropolitan Areas*, n.d.). Another undermined, yet an important point of distinction of the developing world is their rapid rate and unplanned nature of urbanization (Population Division, Department of Economic and Social Affairs, United Nations Secretariat, 2001). Unlike urbanization in the developed world, developing countries face the severity of many challenges like solid waste management, disparities in development, rapid urbanization, poor infrastructure, severe housing shortages, and the proliferation of slums and squatter settlements (Sinha, 2018).

Data from the World Economic Forum shows that limitations in the availability and quality of infrastructure are at the core of many of the challenges faced by rapidly urbanizing cities in developing countries (Zurich, 2015). Aligning with the same, the Global Risks Report 2021 mentions that mismanaged urban sprawl, poor planning, and/or under-investment, that result from inequitable and/or insufficient public infrastructure and services can negatively impact, among others, public health (World Economic Forum, n.d.). Fueled by factors like rural-urban migration, low death rates, and high birth rates, the rapid and often unplanned

urbanization witnessed in developing countries, along with other risks -like profound social instability, risks to critical infrastructure, and potential water crisis- also bring with them the potential for devastating spread of disease (Zurich, 2015). The guidelines prescribing social distancing, sanitation, and isolation measures struggle to succeed in this part of the world. Godfrey Maringira, an associate professor and researcher from South Africa talks about the difficulties faced by people living in the black townships of South Africa, in observing the guidelines recommended for curbing viral transmission via respiratory excretions:

“During the lockdown, I made a few calls to people living in black townships to find out how they were coping with the pandemic. Most of them live in shacks built out of boards and corrugated iron sheets, often with shared or communal toilets, but without running water. The shacks are also built less than one meter apart from each other and are poorly ventilated with small windows.

Within each shack, there is hardly any room to relax, only to sleep. Most times, people choose to eat outside their shacks, often on the street. Living in dire social and economic conditions makes it difficult for people in black townships to observe global “gold standard” measures aimed at curbing the spread of the COVID-19 pandemic, such as social distancing and isolation. This poses a great challenge to attempts to curb the spread of the pandemic in such contexts.” (Maringira, 2020)

5.0 A Case Study on India

5.1 COVID-19 and India’s International Response

India’s first COVID-19 case identified was in late January 2020 at Thrissur in Kerala. As was the situation around the world, the infection was traced to imported origin through a history of travel from Wuhan (Andrews et al., 2020). Similarly, it was reported that the other early outbreaks in Indian states and cities could all be traced back to well-known international pathways. As anticipated, India's initial response to the pandemic was different from that of developed countries. Dr Jayaprakash Muliyil, epidemiologist and chairperson of the Scientific Advisory Committee of the National Institute of Epidemiology in June 2020 confirmed the same (Rukmini S, IndiaSpend.com, 2020):

“It is spreading much faster here, and the infection rates are higher. The general population’s anxiety about the disease is low. People will willingly go out into the market today, and take fewer precautions to protect themselves. Consequently, at least in cities, the epidemic is growing very rapidly. And we know it is spreading in rural areas too. The whole trajectory of the infection is moving upwards more sharply than in many other countries. What happened in many Western countries is that when a big city like London was affected, other cities reacted strongly and reduced transmission. So, everywhere else, the doubling time got longer, but in some Indian cities it is short.”

Owing to the widely projected fear of a highly disastrous impact that the spread of COVID-19 could potentially have on a country like India (Bhatia, 2020), the government of India imposed surveillance as early as mid-January (Bharati et al., 2020). Gradually the government implemented other measures including governance and socio-economic measures, lockdown, movement restrictions, public health measures, and social distancing (*COVID-19 - Government Measures*, n.d.). In line with the immense complexities and differences within the subcontinent, an analysis carried out by Duke University’s Center for Policy Impact in Global Health and the Public Health Foundation of India in mid-2020 assessed that India’s response to the pandemic has been varied across the states (Bharati et al., 2020). Factors like the identification of the first infection, the infection rate, resources, preventive measures, and control measures taken by the country’s States and Union Territories were generally varied (Eysenbach et al., 2020). Similarly, the impact of the infection also varied from state to state.

5.2 Community spread in India

The spread of COVID-19 infection is noted to be either linked to travel history or by contact with an already infected person. When the source of transmission for a large number of people is not traceable, it is then referred to as community transmission (Business Standard, n.d.). John Hopkins University defines community transmission as being evidenced by the inability to relate confirmed cases through chains of transmission for a large number of cases, or by increasing positive tests through sentinel samples (routine systematic testing of respiratory samples from established laboratories). Local transmission is said to indicate locations where the

source of infection is within the reporting location (John Hopkins University, 2020).

In the first phase of the spread of infection in India, when cases were traced to foreign origins, measures like screening, travel advisory restrictions, and closing of borders were implemented to curtail the further spread. At this stage, contact tracing revealed those at risk, and quarantine was easily imposed (Ghosh et al., 2020). However entering the local transmission stage of spread of infection, it becomes difficult to trace the course of the infection spread. It was feared that at this stage, the spread of infection could easily spiral out of control posing extreme challenges to policymakers (Arora, 2020). This also suggests the virus is widespread in a community (Deutsche Welle, n.d.).

5.2.1 At the onset of community spread

By mid-2020, with the exponential rise in the number of infections, it is noted that experts on the subject found it hard to accept India's silence and denial of the possibility of community spread (Maya, 2020). Only a few state governments like Karnataka and Assam had considered the infection's spread through community transmission in areas of their respective states (Urs, 2020). Kerala was reported as one of the states that failed to acknowledge and act on community transmission at its early stages. On the same, public health experts noted that early acknowledgement of community transmission followed by focussed surveillance studies and testing would have made the public more aware of the importance of safety precautions and helped the state limit the spread of the infection in a much better manner (Maya, 2020).

“The government's first serosurvey estimated that about 0.73% of India's population had antibodies. Now, if we apply that percentage to the population in rural India excluding tribal areas, some 750 million people, that means about 5 million people have been infected and recovered in these areas.” opens Epidemiologist Jayaprakash Muliylil on this speculation in late June 2020. According to him the only way this phenomenon could be explained, given that most rural Indians don't travel abroad, was by “Community Transmission”. (Pulla, 2020)

5.2.2 Unclear patterns of COVID-19 transmission

By the end of 2020, it became increasingly clear that the COVID-19 spread in India had entered the stage of community transmission. Yet, this revelation did not explain the uneven

spread of transmission between different states and union territories of the country like New Delhi and Puducherry or Maharashtra and Bihar with similar population density and age demographics. In August 2020, a few Indian states had linked Covid-19 cases to travellers and contacts of infected persons. By August, a state-wise analysis and prediction of COVID-19 spread in India reported Maharashtra, Delhi, Gujarat, Madhya Pradesh, Andhra Pradesh, Uttar Pradesh, and West Bengal in the severe category. Among the remaining states, Tamil Nadu, Rajasthan, Punjab, and Bihar were said to be in the moderate category, with Kerala, Haryana, Jammu and Kashmir, Karnataka, and Telangana in the controlled category. (Eysenbach et al., 2020) (Health Check, 2020). By mid-July, Tamilnadu had featured only second to Maharashtra (Health Check, 2020). It is said that by November, half of all reported cases in the country were of unknown origin (Rukmini S, IndiaSpend.com, 2020), indicating community transmission and local transmission of infection. This could mean that states in the severe category had conditions conducive to community and local transmission, among other factors.

5.3 Urban India and the impact of COVID-19

In India, about 34% of the population lives in urban areas (The World Bank, n.d.). By mid-2020, some of India's most important cities had accounted for roughly half of all COVID-19 cases in the country, signifying the devastating impact that the novel coronavirus had on urban metropolitan centres (The Financial Express, 2020). As early as June 2020 Metropolitan cities like Mumbai, Delhi, Chennai, Kolkata, Ahmedabad, Surat, etc. were seen as the spreading hub of the virus (Sarkar & Rai, 2020). At this point, the cities of Mumbai, Delhi, Chennai, and Ahmedabad were estimated to contain about 43% of the country's overall cases and more than half of all fatalities (The Hindu, 2020). By July 1, 82.3% of the country's infections were identified in urban districts (Gera, 2020).

The COVID-19 pandemic had exposed several faultlines of urbanism in India. It was noted that the unprecedented challenges that COVID-19 had brought to India's metropolitan cities, yet again highlighted their limited capabilities to self-govern (Vachana, 2020). Among them poor urban planning - that is reflected in improper housing and sanitation infrastructure for the urban poor - may be an important contributor to the spread of infection when evaluated

against WHO's assessment that crowded places with many people nearby were settings where COVID-19 can spread more easily. The failure of Metropolitan Planning Committees (MPCs) in India again reiterates this fact. An opinion piece on *The Hindu* talking about the correlation between the absence of comprehensive and integrated urban planning, and the effect of the pandemic notes (Vachana, 2020):

“The Constitution mandates formation of Metropolitan Planning Committees (MPCs) in all metropolitan areas with a million-plus population. MPCs are envisioned to ensure integrated planning for the entire metropolitan area, and are responsible for the preparation of draft development plans, synthesizing priorities set by local authorities, State and Central governments. In reality, MPCs are either not constituted or are defunct. *Janaagraha's Annual Survey of India's City-Systems (ASICS) 2017* report found that only nine out of 18 cities assessed had constituted MPCs even if on paper.”

5.4 Urban factors and the nature of COVID-19 spread in India

In December 2020 when India had reached a 10 million mark for the number of COVID-19 infections, in an analysis by the *Hindustan Times* it was observed that at least half of all the confirmed COVID-19 cases were reported from only 47 of India's 700-plus districts. 11 of New Delhi's revenue districts were clubbed together into one single unit for this analysis. The other 46 districts were identified across 16 states and Union territories. Delhi, as a single unit was estimated to have the highest caseload with 6.3% of the country's total cases. This was followed by Bengaluru, Pune, Mumbai, Thane, and Chennai. These six urban centres had together accounted for nearly 22% of the country's total infections with more than two million confirmed cases (Kawoosa, 2020). As of April 2021, Maharashtra with 42,28,836 cases was the worst-affected state in India, followed by Kerala with 13,77,187 COVID-19 cases, and Karnataka with 13,04,397 cases. The states of Tamil Nadu, Uttar Pradesh, Andhra Pradesh, Delhi, West Bengal, Chhattisgarh, and Rajasthan followed (Sethi, 2021). Delhi and Maharashtra have featured on top of the most affected regions in India throughout the pandemic.

The following factors are evaluated against the course of COVID-19 spread in some of the consistently most affected states in India:

1. Population Density

Several studies on the spread of COVID-19 suggest that population density is a primary factor contributing to the spread of infection. In countries like Algeria and Turkey, this was proved by numbers (Coskun et al., 2021) (Wong & Li, 2020) (Kadi & Khelfaoui, 2020). However, in India, the pattern of spread of infection does not strictly align with the population density of Indian states:

According to the last available census from 2011, Bihar was the most densely populated state in the country, followed by West Bengal, and Kerala. Delhi was identified as the most densely populated among union territories, followed by Chandigarh and Puducherry (Census 2011, 2011). Maharashtra and Tamil Nadu featured much behind on the census. If it may be assumed that the population density has remained similar to the data collected in 2011, the correlation between population density and spread of COVID-19 is not established in the context of the Indian Subcontinent.

2. Age as a determinant

In late September, a report published by Princeton University based on a study of more than a half-million people in India who were exposed to the coronavirus disease suggested that the virus's continued spread was driven by only a small percentage of those who become infected. It was also found that children and young adults were potentially much more important in transmitting the virus, especially within households (Princeton University, 2020). The demographics of India studied in 2020 showed that about 43.8% of India's population was below the age of 25 and that a mere 6.72% represented people older than 65 years of age (*India Age Structure - Demographics*, n.d.). A 2011 census and a 2036 census projection showed Uttar Pradesh, Maharashtra, and Bihar as the states with the highest percentages of young population (*Census Of India 2011 Population Projections for India and States 2011 – 2036 Report Of The Technical Group on population projections 2019*, November). Yet Bihar and Uttar Pradesh did not share the rapid rate of transmission of infection as Maharashtra, Tamil Nadu, and New Delhi.

3. Crowding in enclosed spaces

People's proximity is said to be the first advanced factor to explain the transmissibility of pandemic viruses. (Kadi, N., & Khelifaoui, M. 2020). Identifying settings where COVID-19 can spread more easily, WHO ruled that transmission can occur easily in crowded places with many people nearby, in close-contact settings -especially where people have conversations very close to each other, and in confined and enclosed spaces with poor ventilation. It was observed here that the risk of COVID-19 spreading was higher in places where these conditions overlapped (World Health Organization, 2020). Indian cities provide conducive environments for crowded indoor settings. India's New Delhi and several cities of Maharashtra have constantly featured as the world's most populous cities, simultaneously experiencing the downsides to mass urbanization, like pollution and overcrowding (Koop, 2021). These facts might explain the trend of COVID-19 transmission in India consistently featuring Delhi and Maharashtra at the top (Urban Gateway, n.d.).

5.5 COVID-19 spread in close-contact settings like Delhi and Mumbai

Delhi and Mumbai are two of the world's largest and most populous cities (Austin, 2019). Delhi is estimated to have a population of 31 million inhabitants (World Population Review, 2021), while Mumbai is estimated to have a population of about 20 million people (World Population Review, 2021) in 2021. The population density of Mumbai, however, is said to be much higher than Delhi (S, 2020). In Delhi's crowded environment, Journalist Rachel Nuwer in her article "Is the world running out of space?" published in 2015 mentions "When in Delhi, it can be hard to fathom the idea that the world will become more populated"(Nuwer, 2015). Contributing to this impression further was the UN's estimate in 2018 that Delhi might become the most populous city by 2028 (Elmjid, 2018). Over the years, Mumbai too has climbed up the ladder of the most crowded cities of the world.

Talking about the situation in cities like Mumbai, John Bongaarts, vice president and distinguished scholar at the Population Council explains that these cities face tremendous challenges. On the same, population expert Joel Cohen adds, "People buy water at great prices from street vendors, human waste is all over the place and garbage is just abandoned – not to

even speak of green spaces around the city or quality of habitation...” (Nuwer, 2015) Adding to the growing list of challenges, today is the COVID-19 pandemic that seems to bring to light the challenges of following safety protocols in these cities (Desk, 2021).

5.5.1 Pattern of spread in Delhi and Mumbai

A Google Graph based on Data Repository by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University, showed that the spread of infection in Delhi and Mumbai followed a similar pattern as many other Indian cities. In New Delhi as well as in Mumbai, the first peak in cases was observed in June 2020. The number of infections continued to surge, peaking to about a hundred thousand in both cities by Mid-September, and then began a steady decline. Both Delhi and Mumbai marked a plateau in the declining curve of infections in November. Then began a clear and steady improvement that seems to have lasted till February in the case of Mumbai and mid-March in Delhi. By mid-February 2021, around 1,000 cases and 10-15 deaths were reported in a week in Delhi. Comparing these figures with previous highs of over 50,000 cases and 800 deaths a week, the scale of this improvement seemed monumental, even as the city opened up and life went back to some kind of normality (Banaji, 2021). However, before the end of February, the number of infections identified started growing again at a slow, yet steady phase (GitHub, n.d.).

By April 2021, Delhi had averaged around 23,000 positive cases a day. This number was almost three times higher than ever seen in 2020 despite speculation over an increasing fraction of infections going unrecorded. This was reported to be Delhi’s fourth COVID-19 surge (Banaji, 2021). Mumbai on the other hand had been recording an average of 8,000 cases daily since the beginning of March (Tare, 2021). By the end of April Mumbai began recording a significant drop in the average - about 5888 cases as of 24th April (Tare, 2021), while Delhi on the other hand continued to see a surge surpassing Mumbai by mid-April (Press Trust of India, 2021). The Government of Maharashtra attributed success to strict lockdowns, this again indicates the city’s poor planning and infrastructural capacity to handle the spread of infections independent of lockdown measures.

6.0 Slums in the COVID-19 battle

Slums on one hand make cities available to people in the Low Income Groups and Economically Weaker Sections of society. They keep the doors of a city open to the migrant population. They are the first stopping point for immigrants and a place of residence for low-income employees (United Nations Human Settlements Program, 2003). On the other hand, these features also make slums home to the poorest and most vulnerable people in cities.

There is increasing concern over the impact of COVID-19 on large urban slums in the developing world. This concern primarily stems from the nature of dwelling arrangements in developing cities, where large proportions of the population live in densely populated slums and shanty towns (Sahasranaman & Jensen, 2021). While density, a key feature of urbanization (Effen, 2020), is said to have many benefits in terms of sizable economic returns, higher productivity, shorter commutes, cheaper provision of public services, better green space, and a lower carbon footprint (G.M n.d); without adequate investments in planning and infrastructure, density can have several downsides, in particular contagion and congestion. The downsides of a city's density are often most visible in its slums (Effen, 2020). The high population density achieved under typical living conditions in slums creates an environment conducive for epidemic spread through air or water (Sahasranaman & Jensen, 2021).

Studies on the spread of COVID-19 across neighbourhoods of cities in the developing world find that small numbers of neighbourhoods account for a majority of cases. Of the cities considered, neighbourhoods with slums were found to contain the highest density of cases, revealing that slums constitute the most at-risk urban locations in this epidemic (Sahasranaman & Jensen, 2021).

6.1 The Dharavi model- A case of good urban governance

According to the World Bank Organization, 35% of India's total urban population lives in slums (The World Bank, n.d.). It is estimated that every sixth urban Indian life in slums unfit for human habitation and they are said to be found in 65% of Indian towns. Yet slum dwellers are the most overlooked section of society. Six out of 10 slum dwellers live close to unsanitary drains and almost four of every 10 do not get treated water (Maurya & Pandey, n.d.).

A national serosurvey of May-June 2020, before the first peak was observed in the spread of COVID-19 in India, estimated that the likelihood of testing positive in the Urban Slums was at 1.90%, followed by a 1% possibility in rural areas, and a 0.93% possibility in urban non-slum areas. In August, when there was a gradual increase in the spread of infection, the likelihood of testing positive for COVID-19 had increased in all three groups. According to the survey, there was an estimated 15.60% likelihood of testing positive in urban slums, while in urban non-slum areas and rural areas the likelihoods were estimated at 8.2% and 4.40% (Murhekar, 2020) (Infogram, n.d.). It seems to have been clear from the beginning that the novel coronavirus would have a bigger impact on slum settlements than in any other part of a city.

In Mumbai, a study by NITI-Aayog, Municipal Corporation of Greater Mumbai (MCGM), and the Tata Institute of Fundamental Research (TIFR) in June 2020, designed to capture exposure to SARSCoV2 infection in slum and non-slum areas from (a) age & gender stratified samples from the general population and b) Health care workers in three wards (R-North, M-West, and F-North), identified a drastic gap in the spread of infection with an estimated 57% prevalence in slums against only a 16% prevalence in non-slum areas (NITI-Aayog et al., 2020). Similarly, another study conducted by Lancet on the seroprevalence of SARS-CoV-2 in slums versus non-slums in Mumbai, showed that the proportions of positive tests were markedly higher in the six slum communities than in the non-slums (Malani et al., 2020). These studies, coupled with the history of Dharavi's struggle with many epidemics including a widespread plague in 1896 which killed over half of the population of Mumbai (The Business Standard, n.d.), and the general impression on the population density of Dharavi - reportedly at 2,27,136 persons per sq. Km making it one of the most densely populated settlements in the world- seemed to point at a possible disaster of great proportions in what was infamously known as one of Asia's largest slums sprawling over 2.1 sq. Km maze of narrow lanes, ramshackle buildings, shanties, and open sewers (Nair, 2018) (*Success Story of Dharavi against COVID-19*, 2020) (Government of India, 2020).

On April 1st, 2020, when Dharavi reported its first corona positive case, it was feared that the slum would become the biggest hotspot of COVID-19 in India considering its geography, health inequalities, and flaring economic and social disparities (Golecha, 2020). About a week

from the first reported COVID-19 case, the slum gradually reported nine infected cases and one death. While most of the infected cases were said to have contracted the infection from people who had travelled abroad; locals, as observed, feared that a community-level transmission was imminent in the densely packed slum (Kapoor, 2020).

Dharavi had reported a total of 491 cases in April, showing a 12% growth rate and a case doubling period of 18 days. However, against all odds, by May the growth rate had reduced to 4.3%, and 1.02% in June. An improved case doubling time to 43 days in May 2020 and 78 days in June 2020 was also achieved (Government of India, 2020) (Golecha, 2020). On the 7th of July 2020, the slum had recorded just one new case. At this point, there were 2335 positive cases, 352 active cases, and 1735 recoveries (Government of Maharashtra Public Health Department, 2020). In explaining the efforts that had ‘chased the virus’, a report by PIB Delhi reads:

“Several challenges presented themselves to BMC in Dharavi where 80% population depends on community toilets. About 8-10 people live in households/hutment which measures about 10ft x 10ft coupled with the existence of narrow lanes with 2-3 storied houses where often the ground floor is a house and other floors are used as factories. Hence, there were severe limitations of physical distancing with no possibility of effective Home Quarantine.” (Government of India, 2020) In all, 5,48,270 people were said to have been screened in Dharavi to contain the spread of infection. A BBC article on how Asia's biggest slum contained the coronavirus, notes a mix of draconian containment and extensive screening measures (Biswas, 2020). The success was attributed to the scale of the measures put in place:

6.1.1 The 4-Ts

BMC had adopted a model following Tracing, Tracking, Testing, and Treating, also known as “The 4-Ts”. This approach is reported to have included activities like proactive screening covering a population of 47,500 by doctors and private clinics in house-to-house screenings. 14,970 people were said to have been screened with the help of Mobile Vans, while 4,76,775 were surveyed by BMC health workers. Additionally, it is said that “fever clinics” were set up for screening high-risk categories such as elderly/senior citizens. This has helped to screen 3.6 lakh people (Government of India, 2020).

6.1.2 The Timely Separation Policy

Reportedly around 8246 Senior Citizens were surveyed and as part of the policy of ‘Timely Separation’, and were separated from the other community to effectively limit the transmission of the disease (Government of India, 2020).

6.1.3 COVID Care and Quarantine Centers

As part of the Timely Separation Policy, the suspected cases were shifted to well-organized COVID Care Centres and Quarantine Centres. All the suspected cases were reportedly shifted to well-organized COVID Care Centres and Quarantine Centres. It was noted that the option of home quarantine could not effectively produce the desired outcomes due to the space limitations in the congested area. Therefore institutional quarantine facilities were created in all available schools, marriage halls, sports complexes, etc. These were provided with facilities like a Community Kitchen, and round-the-clock access to medical services (Government of India, 2020).

7.0 Solutions and Recommendations

COVID-19 has brought out of the shadows some of the most pressing issues of urbanization and has thrown light on the fact that these issues most impact the vulnerable populations of the world. The impact of the pandemic and all that it has exposed allows the world to redefine urbanization on the principles of sustainability, resilience, and inclusion if acted on rapidly and effectively.

7.1 Addressing gaps in preparedness through urban governance and urban planning

From the examples of models like Dharavi in Mumbai, it becomes clear that good urban governance and effective urban planning particularly addressing the issues of congestion and improper distribution of resources would be the solution to handle a pandemic like the COVID-19 in the developing world.

7.1.1 Urban governance

COVID-19, like most epidemics, is identified to largely be an urban problem intensified by a lack of preparedness. Therefore, urban governance, which plays an important role in the preparedness of a city, must be strengthened. Planning and strategizing to address gaps in preparedness by governments at a local level, to avoid being taken by surprise in case of disasters like the COVID-19 pandemic and then be overwhelmed due to lack of planning, should also be given priority. Integrated urban governance strategies that involve long-term visioning, pre-event planning, adequate investment in primary healthcare systems, early warning, and coordination of activities of different sectors and stakeholders are identified as being more conducive to timely and effective response mechanisms to pandemics and disease outbreaks in cities. It is emphasized by the UN-Habitat that local strategies for disaster risk reduction must include pandemic preparedness as a priority and that it needs to be part of the process of better recovery and building resilience to future disease outbreaks. Additionally, it is said that better data collection of episodes like the COVID-19 pandemic will allow city leaders to prepare for future episodes where once unthinkable metrics become normal.

7.1.2 Urban Planning

Urban environments by aiding in dynamic interactions between society and ecosystems have a good impact on human behaviour and social ecology, and can significantly influence a pandemic. Stephen H Zinner in “The Social Ecology of Infectious Diseases” mentions that human behaviour and social ecology have a major influence on infectious diseases. The considerable decline in the death rate from tuberculosis in the USA -well in advance of any active treatments for the tubercle bacillus- as housing conditions improved, as well as the decline in the incidence of ‘Group A beta-hemolytic streptococci’ with decreased crowding in households, is proof. (Mayer et al., 2009) Thus urbanization is not only an issue, but it is also a big part of the solution, more importantly in the developing world where the challenges of rapid urbanization have created immense barriers for the vulnerable communities to experience safety from the spread of infection. By addressing the issues of congestion and improper infrastructure, urbanization will hold the ability to address health issues and the spread of infectious diseases like the COVID-19.

7.1.3 Addressing the issues of congestion and substandard infrastructure

Urban centres like cities and megacities are exceptionally intricate settlements that are territorially and internationally subject to one another and adjoining towns and other rustic regions. Owing to a high concentration of population and economic activities, these centres are often characterized by congestion often witnessed in the intact housing system of the urban slums. These urban centres regularly fill in as sub-national and global centres, with significant marks of passage like air terminals, seaports, ground intersections which act as foci for transmission of infection in situations like the COVID-19 pandemic. Given the extensive global and local interconnectivity, and the issue of congestion, these urban centres are often hotspots of infections like COVID-19.

Therefore urban planning should focus extensively on addressing congestion in slums and public spaces, like markets and streets. This would ensure minimum risk of infection transmission and also minimize the possibility of shutting down these economically and socially thriving urban nodes and ensure saving livelihoods for many migrants and non-migrant workers depending on the informal economy. In line with addressing the issue of congestion, the document ‘Strengthening Preparedness for COVID-19 in Cities and Urban Settings’ published by the World Health Organization, suggests that cities should devote more space to active transportation modes and public spaces to promote successful physical distancing in the event of pandemics. This, it is noted, will necessitate a street renovation including re-designing streets to better accommodate pedestrians and cyclists, as well as providing enough green and open spaces to meet residents' demands for outdoor exercise and recreation. The World Health Organization insists that such reorganizations can also present opportunities to further incorporate urban greenery into cities, resulting in additional health and climate adaptation benefits.

Through the COVID-19 pandemic, cities have been forced to confront the fact that several factors put the urban poor, especially those living in slums, at high risk for contracting infectious diseases (World Bank Group, n.d.). Unplanned urbanization creates conditions with crowded and substandard housing in slums where physical distancing is challenging. Many residents of such communities also lack adequate water and sanitation facilities while living in overcrowded places (*OPINION: COVID-19 Demonstrates Urgent Need for Cities to Prepare for Pandemics* | *UN-Habitat*, n.d.).

Informal settlements like the Dharavi slum that are often known for their limitations in basic amenities and other infrastructural developments, were widely seen as potential hotspots for the spread of infection at the beginning of the COVID-19 pandemic. But the story of Dharavi's survival proved that with good governance, relevant protocols, and proper implementation strategies, the spread of infection in slums can be effectively contained. This could only be achieved by acknowledging the fact that slums have a system of functioning that helps them sustain themselves within the limited infrastructural availability- contrary to popular beliefs. Therefore when they are aided in their efforts to sustain, they prove to be as successful as any non-slum area of a city.

On one hand, the presence of slums is said to have several regional and global implications, impacting areas such as accessibility to quality education and health care facilities, political and social exclusion, insecurity of tenure, location on hazardous land, unsafe building structures, etc (United Nations Human Settlements Program, 2003) (UN-Habitat, 2003). On the other hand, they are unique in their identity and land-use centres their contributions to societies in terms of the services they generate and their socio-cultural impact. Yet they are also unsafe living environments especially in times of disasters like the COVID-19 pandemic. Investing in informal settlements like slums and focusing on upgrading them will help alleviate the impact of a pandemic in urban areas. Efforts to make informal settlements like slums safer for their inhabitants should be inclusive and gradual in approach to ensure that slum dwellers aren't displaced and their lives and their livelihoods aren't affected.

8.0 Conclusion

Cities and their governance have always had an important role to play in ensuring that policies across various sectors have a positive impact on health, as well as on other factors like housing, employment, food, and transportation. Today, with about 90% to 95% of all COVID-19 cases reported in the urban areas of the world, it is very clear that policies and infrastructure related to pandemic preparedness in cities and towns are equally significant factors that can play an important role in reducing disaster-related risks.

If cities were the problems, then that is where we would also find the solutions. In line with this fact, Sameh Wahba, the Global Director for the World Bank's Urban, Disaster Risk Management, Resilience, and Land Global Practice notes that "If urban areas are where COVID-19 impacts have been the most severe, it also means that interventions in cities and towns can have the biggest impact."

In responding to the COVID-19 pandemic, cities were at the frontline shouldering the immense responsibility of monitoring the impact of the pandemic and implementing measures to effectively curtail the spread of infection. Cities around the world had also responded to the many related challenges raised by COVID-19, including mobility, food security, and safety, protecting older people and marginalized populations. Despite the widespread criticism of cities and their struggles to cope with the pandemic, these responses highlight how cities have been able to build on their existing resources to respond to the needs of their populations during the pandemic. Many of these initiatives are said to be building on resilience that will potentially shape future policies on urban health. Therefore if cities are allocated with adequate resources and infrastructure, it seems that their intrinsic resilience will help them nullify many of the factors that strengthen a pandemic.

References

20th and 21st century's major pandemics. (2020, April). Atlas Magazine.
<https://www.atlas-mag.net/en/article/20th-and-21st-century-s-major-pandemics>

A comparison between developed and developing countries in terms of urban land use change effects on nitrogen cycle: Paris and São Paulo metropolitan areas. (n.d). NASA/ADS. <https://ui.adsabs.harvard.edu/abs/2010EGUGA..12..135N/abstract>

Ali, S. H., & Keil, R. (2006, March 1). *SAGE Journals: Your gateway to world-class research journals.* SAGE Journals. <https://journals.sagepub.com/doi/10.1080/00420980500452458>

Ali, S. H., & Keil, R. (2006b, March 1). *SAGE Journals: Your gateway to world-class research journals.* SAGE Journals. <https://journals.sagepub.com/doi/10.1080/00420980500452458>

Al Jazeera. (2020, January 20). *China confirms human-to-human transmission of new coronavirus*. Health News | Al Jazeera. <https://www.aljazeera.com/news/2020/1/20/china-confirms-human-to-human-transmission-of-new-coronavirus>

Al Jazeera. (2020b, December 31). *Timeline: How the new coronavirus spread*. Coronavirus Pandemic News | Al Jazeera. <https://www.aljazeera.com/news/2020/12/31/timeline-how-the-new-coronavirus-spread>

Althouse, B. M. (2020, November 12). *Superspreading events in the transmission dynamics of SARS-CoV-2: Opportunities for interventions and control*. Plos Biology. <https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3000897>

Andrews, M. A., Areekai, B., Rajesh, K. R., Krishnan, J., Suryakala, R., Krishnan, B., Muraly, C. P., & Santhosh, P. V. (2020). *First confirmed case of COVID-19 infection in India: A case report*. Indian Journal of Medical Research. <https://www.ijmr.org.in/article.asp?issn=0971-5916;year=2020;volume=151;issue=5;spage=490;epage=492;aulast=Andrews>

Arora, D. (2020, August 7). *Has Community Transmission Of Covid-19 Started In India?* PharmEasy Blog. <https://pharmeasy.in/blog/has-community-transmission-of-covid-19-started-in-india/>

Austin, S. (2019, December 18). *The 10 Largest Cities in the World*. US News. <https://www.usnews.com/news/cities/slideshows/the-10-largest-cities-in-the-world>

Bharati, I., Kumar, P., & Selvaraj, S. (2020, July 2). *How well is India responding to COVID-19?* Brookings. <https://www.brookings.edu/blog/future-development/2020/07/02/how-well-is-india-responding-to-covid-19/>

Bhardwaj, G., Lall, S. V., & Soppelsa, M. E. (2020, April 21). *Cities, crowding, and the coronavirus: Predicting contagion risk hotspots*. World Bank. <https://openknowledge.worldbank.org/bitstream/handle/10986/33648/Cities-Crowding-and-the-Coronavirus-Predicting-Contagion-Risk-Hotspots.pdf?sequence=1&isAllowed=y>

Bhatia, S. (2020, May 3). *Corona fear in India higher than in West, lower than in other parts of Asia.* Mint.

<https://www.livemint.com/news/india/corona-fear-in-india-higher-than-in-west-lower-than-in-other-parts-of-asia-11588350337151.html>

Biswas, S. (2020, June 23). *How Asia's biggest slum contained the coronavirus.* BBC News. <https://www.bbc.com/news/world-asia-india-53133843>

Bloom, D. E., & Cadarette, D. (2019, March 28). *Infectious Disease Threats in the Twenty-First Century: Strengthening the Global Response.* PubMed Central (PMC). <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6447676/>

Business Standard. (n.d.). *WHAT IS COMMUNITY TRANSMISSION OF CORONAVIRUS?*

<https://www.business-standard.com/about/what-is-community-transmission>

Cash, R., & Patel, V. (2020, May 5). *Has COVID 19 Subverted global health.* The Lancet.

[https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(20\)31089-8/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)31089-8/fulltext)

Census 2011. (2011). *Density of India State of Population Census 2011.* Census. <https://www.census2011.co.in/density.php>

Census of India 2011 Population Projections for India and states 2011 – 2036 Report of the technical group of population projections (2019, November). Nhm.Gov.In. https://nhm.gov.in/New_Updates_2018/Report_Population_Projection_2019.pdf

City Mayors: World's largest urban areas in 2020 (1). (n.d.). City Mayors. http://www.citymayors.com/statistics/urban_2020_1.html

Coast, Esterna (2002), *Population Trends in Developing Countries* [Online] LSE Research Online <http://eprints.lse.ac.uk/268/1/Arnold.pdf>

Cockerham, W. C., Abel, T., & Luschen, G. (2005, April). *Max Weber, Formal Rationality, and Health Lifestyles.* Research Gate. https://www.researchgate.net/publication/227664827_Max_Weber_Formal_Rationality_and_Health_Lifestyles

Collyns, D., Daniels, J. P., Phillips, D., & Agren, D. (2020, July 1). "Hubs of infection": how Covid-19 spread through Latin America's markets. *The Guardian*. <https://www.theguardian.com/world/2020/may/17/coronavirus-latin-america-markets-mexico-brazil-peru>

Connolly, C., Ali, S. H., & Keil, R. (2020, May 15). *SAGE Journals: Your gateway to world-class research journals*. SAGE Journals. <https://journals.sagepub.com/doi/full/10.1177/2043820620934209#>

Coskun, H., Yildirim, N., & Gunduz, S. (2021, January 10). *The spread of COVID-19 virus through population density and wind in Turkey cities*. ScienceDirect. <https://www.sciencedirect.com/science/article/abs/pii/S0048969720351925>

COVID-19 - Government measures. (n.d.). ACAPS. <https://www.acaps.org/projects/covid19/data>

Deutsche Welle. (n.d.). *Why is India denying COVID-19 community transmission?* DW.COM. <https://www.dw.com/en/why-is-india-denying-covid-19-community-transmission/a-54352760>

Effen, D. M. A. (2020, September 24). *Covid-19 and Environment: The need for new paradigms*. Campus Virtual. https://www.campusvirtualsp.org/sites/default/files/final_eng_brief_covid_and_the_environment_.pdf

Endo, A., Centre for the Mathematical Modelling of Infectious Diseases COVID-19 Working Group, Abbott, S., Kucharski, A. J., & Funk, S. (2020, July 10). *Estimating the overdispersion in COVID-19 transmission using outbreak sizes outside China*. Wellcome Open Research. <https://wellcomeopenresearch.org/articles/5-67>

Enserink, M. K. K. (2020, October 30). *Gyms. Bars. The White House. See how superspreading events are driving the pandemic*. Science Mag. <https://vis.sciencemag.org/covid-clusters/>

Eysenbach, G., Fagherazzi, G., & Song, X. (2020). *COVID-19 in India: Statewise Analysis and Prediction*. PubMed Central (PMC). <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7431238/>

- G.M. (n.d.). *The costs and benefits of density in cities*. The Planner. <https://www.theplanner.co.uk/opinion/the-costs-and-benefits-of-density-in-cities>
- Gavi, the Vaccine Alliance. (2020, October 19). *How has our urban world made pandemics more likely?* <https://www.gavi.org/vaccineswork/how-has-our-urban-world-made-pandemics-more-likely>
- Gera, I. (2020, August 31). *Covid-19 spread in India: A million cases in just 15 days! Cases surge in tier-2 cities*. The Financial Express. <https://www.financialexpress.com/lifestyle/health/coronavirus-spread-in-india-metro-cities-add-just-a-third-to-urban-infections/2069961/>
- Ghosh, A., Nundy, S., & Mallick, T. K. (2020). *How India is dealing with COVID-19 pandemic*. PubMed Central (PMC). <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7376361/>
- Golecha, M. (2020, December 1). *COVID-19 Containment in Asia's Largest Urban Slum Dharavi-Mumbai, India: Lessons for Policymakers Globally*. PubMed Central (PMC). <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7437383/>
- Government of India. (2020, June 21). *Chasing the Virus" in Dharavi, and ensuring a steep decline of daily cases from an average 43 in May to 19 in third week of June*. Press Information Bureau. <https://pib.gov.in/PressReleaseDetail.aspx?PRID=1633177>
- Government of Maharashtra Public Health Department. (2020). *Novel Corona Virus*. Arogya Maharashtra. <https://arogyamaharashtra.gov.in/1175/Novel--Corona-Virus>
- Health Check. (2020). *Coronavirus Monitor | Health Check*. Corona Health Check. <https://corona.health-check.in/state-trends>
- Historical Context: SARS, MERS, and Ebola | ATrain Education*. (n.d.). Atrainceu. <https://www.atrainceu.com/content/8-historical-context-sars-mers-and-ebola>
- How the 4 biggest outbreaks since the start of this century shattered some long-standing myths*. (2015, September 1). World Health Organization. <https://www.who.int/news/item/01-09-2015-how-the-4-biggest-outbreaks-since-the-start-of-this-century-shattered-some-long-standing-myths>

Impact of COVID-19 on people's livelihoods, their health and our food systems. (2020, October 13). World Health Organization. <https://www.who.int/news/item/13-10-2020-impact-of-covid-19-on-people%27s-livelihoods-their-health-and-our-food-systems>

India Age structure - Demographics. (n.d.). Index Mundi. https://www.indexmundi.com/india/age_structure.html

Infogram. (n.d.). *COVID Likelihood - Infogram.* https://infogram.com/covid_likelihood-1h0r6rplgkvw12e

International Airport Review. (2017, November 22). *Tackling the spread of pathogens in airports.* <https://www.internationalairportreview.com/article/33571/tackling-spread-pathogens-airports/>

Jacobs, L. (2013, November 25). *What it's like to grow old, in different parts of the world.* TED Blog. <https://blog.ted.com/what-its-like-to-grow-old-in-different-parts-of-the-world/>

John Hopkins University. (2020). *Human Subject Research.* <https://research.jhu.edu/covid-19/hsr-international/>

Kadi, N., & Khelifaoui, M. (2020). Population density, a factor in the spread of COVID-19 in Algeria: statistic study. *Bulletin of the National Research Centre*, 44(1), 138. <https://doi.org/10.1186/s42269-020-00393-x>

Kadi, N., & Khelifaoui, M. (2020). *Population density, a factor in the spread of COVID-19 in Algeria: statistic study.* PubMed Central (PMC). <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7439635/>

Kantis, C. (2021, March 26). *UPDATED: Timeline of the Coronavirus | Think Global Health.* Council on Foreign Relations. <https://www.thinkglobalhealth.org/article/updated-timeline-coronavirus>

Kapoor, C. (2020, April 9). *India: Asia's largest slum rings alarm bells as COVID-19 cases surge.* Aa.Com. <https://www.aa.com.tr/en/asia-pacific/india-asia-s-largest-slum-rings-alarm-bells-as-covid-19-cases-surge/1798628>

Kawoosa, V. M. (2020, December 19). *The spread of India's 10 million Covid-19 cases*. Hindustan Times.

<https://www.hindustantimes.com/india-news/the-spread-of-india-s-10-million-covid-19-cases/story-HgHpG3TKozHOwIqX7DsXHP.html>

Keil, R., Connolly, C., & Ali, H. S. (2020, February 17). *Outbreaks like coronavirus start in and spread from the edges of cities*. The Conversation.

<https://theconversation.com/outbreaks-like-coronavirus-start-in-and-spread-from-the-edges-of-cities-130666>

Kennisgeving voor omleiding. (n.d.). Dutch.

<https://www.google.com/url?q=https://www.who.int/publications/i/item/strengthening-preparedness-for-covid-19-in-cities-and-urban-settings&sa=D&source=editors&ust=1619266373077000&usg=AOvVaw0a8Bn8p8jyvglKoTZV6f8h>

Khare, B. V. (2021, April 17). *India's Kumbh festival attracts big crowds amid devastating second Covid wave*. BBC News.

<https://www.bbc.com/news/world-asia-india-56770460>

Kissler, S. M., Gog, J. R., Viboud, C., Charu, V., Simosen, L., Grenfell, B. T., & O.N. (2019, March 1). *Geographic transmission hubs of the 2009 influenza pandemic in the United States*. ScienceDirect.

<https://www.sciencedirect.com/science/article/pii/S1755436517301196?via%3Dihubhttps://www.sciencedirect.com/science/article/pii/S1755436517301196?via%3Dihub>

Kobo. (2014, January 24). *Study On Globalizing Cities, A: Theoretical Frameworks And China's Modes* ebook by Zhenhua Zhou. Rakuten Kobo.

<https://www.kobo.com/us/en/ebook/study-on-globalizing-cities-a-theoretical-frameworks-and-china-s-modes>

Koop, A. (2021, April 26). *Ranked: The Most Populous Cities in the World*. Visual Capitalist. <https://www.visualcapitalist.com/most-populous-cities-in-the-world/>

Lau, H., Khosrawipour, V., Kochbach, P., Mikolajczyk, A., Khosrawipour, T., Baniya, J., Ichii, H., & Zacharski, M. (2020, June 1). *The association between international and domestic air traffic and the coronavirus (COVID-19) outbreak*. ScienceDirect.

<https://www.sciencedirect.com/science/article/pii/S1684118220300864>

Leighton, M. (n.d.). *Labour Migration And Inclusive Development Setting a Course for Success*. United Nations. <https://www.un.org/en/chronicle/article/labour-migration-and-inclusive-development-setting-course-success>

Levison, M. E. (2020, July 8). *Commentary—COVID-19 Challenges in Developing Countries*. MSD Manual Consumer Version. <https://www.msdmanuals.com/en-in/home/news/editorial/2020/07/08/20/55/covid-19-challenges-in-the-developing-world>

Malani, A., Shah, D., Kang, G., & Lobo, G. N. (2020). *Seroprevalance of SARS CoV - 2 in Slums and Non Slums of Mumbai India*. The Lancet. [https://www.thelancet.com/journals/langlo/article/PIIS2214-109X\(20\)30467-8/fulltext](https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(20)30467-8/fulltext)

Maringira, G. (2020, May 18). *Covid-19: Social Distancing and Lockdown in Black Townships in South Africa*. Kujenga Amani. <https://kujenga-amani.ssrc.org/2020/05/07/covid-19-social-distancing-and-lockdown-in-black-townships-in-south-africa/>

Maurya, L., & Pandey, K. (n.d.). *Slumming it out*. Down to Earth. <https://www.downtoearth.org.in/dte-infographics/slums/index.html#:~:text=Every%20sixth%20urban%20Indian%20lives,cen%20of%20the%20Indian%20towns.&text=Six%20out%20of%2010%20slum,do%20not%20get%20treated%20water>

Maya, C. (2020, August 1). *What went wrong in containing COVID-19 spread in Kerala*. The Hindu. <https://www.thehindu.com/news/national/kerala/what-went-wrong-in-containing-covid-19-spread-in-kerala/article32234289.ece>

Maya, C. (2020b, August 1). *What went wrong in containing COVID-19 spread in Kerala*. The Hindu. <https://www.thehindu.com/news/national/kerala/what-went-wrong-in-containing-covid-19-spread-in-kerala/article32234289.ece>

Mayer, K. H., Pizer, Kenneth, H. F., Mayer, H., & Pizer, H. F. (2009). *The Social Ecology of Infectious Diseases* by Kenneth H. Mayer; H. F. Pizer. JSTOR. <https://www.jstor.org/stable/40207228?seq=1>

Muggah, R., & Florida, R. (2020, May 27). *Why COVID-19 will hit the developing world's cities hardest.* World Economic Forum. <https://www.weforum.org/agenda/2020/05/covid-19-will-hit-the-developing-worlds-cities-hardest-heres-why/>

Murhekar, M. V. (2020, January 1). *Prevalence of SARS-CoV-2 infection in India: Findings from the national serosurvey, May-June 2020* Murhekar MV, Bhatnagar T, Selvaraju S, Rade K, Saravanakumar V, Vivian Thangaraj JW, Kumar MS, Shah N, Sabarinathan R, Turuk A, Anand PK, Asthana S, Balachandar R, Bangar SD, Bansal AK, Bhat J, Chakraborty D, Rangaraju C, Chopra V, Das D, Deb AK, Devi KR, Dwivedi GR, Salim Khan S M, Haq I, Kumar M S, Laxmaiah A, Madhuka, Mahapatra A, Mitra A, Nirmala A R, Pagdhune A, Qurieshi MA, Ramarao T, Sahay S, Sharma Y K, Shrinivasa MB, Shukla VK, Singh PK, Viramgami A, Wilson VC, Yadav R, Girish Kumar C P, Luke HE, Ranganathan UD, Babu S, Sekar K, Yadav PD, Sapkal GN, Das A, Das P, Dutta S, Hemalatha R, Kumar A, Narain K, Narasimhaiah S, Panda S, Pati S, Patil S, Sarkar K, Singh S, Kant R, Tripathy S, Toteja G S, Babu GR, Kant S, Muliyl J P, Pandey RM, Sarkar S, Singh SK, Zodpey S, Gangakhedkar RR, S. Reddy D C, Bhargava B - *Indian J Med Res.* Indian Journal of Medical Research. <https://www.ijmr.org.in/article.asp?issn=0971-5916;year=2020;volume=152;issue=1;spage=48;epage=60;aulast=Murhekar>

Nair, M. (2018, December 2). *Does Dharavi in Mumbai have a million residents?* Hindustan Times. <https://www.hindustantimes.com/mumbai-news/does-dharavi-in-mumbai-have-a-million-residents/story-rAsCWDqsU86dpW9NhoMcJP.html>

National Geographic Society. (2019, September 10). *Urbanization.* <https://www.nationalgeographic.org/encyclopedia/urbanization/>

New England Journal of Medicine. (2020, April 30). *Clinical Characteristics of Coronavirus Disease 2019 in China.* <https://www.nejm.org/doi/10.1056/NEJMoa2002032>

NITI-Aayog, Municipal Corporation of Greater Mumbai (MCGM), & Tata Institute of Fundamental Research (TIFR), and partner organizations viz. Kasturba Molecular Diagnostic Laboratory, Translational Health Science and Technology Institute (THSTI) A.T.E. Chandra Foundation and IDFC Institute. (2020). Technical details: SARS-CoV2 Serological Survey in Mumbai by NITI-BMC-TIFR. Tifr. <https://www.tifr.res.in/TSN/article/Mumbai-Serosurvey%20Technical%20report-NITI.pdf>

OPINION: COVID-19 demonstrates urgent need for cities to prepare for pandemics | UN-Habitat. (n.d.). UN Habitat. <https://unhabitat.org/opinion-covid-19-demonstrates-urgent-need-for-cities-to-prepare-for-pandemics>

Outbreak at missionary school as South Korea reports 437 new Covid-19 cases. (2021). Business Standard. https://www.business-standard.com/article/current-affairs/outbreak-at-missionary-school-as-south-korea-reports-437-new-covid-19-cases-121012500126_1.html

Phillip, K. (2018, September 7). *The World's Largest Slums: Dharavi, Kibera, Khayelitsha & Neza.* Habitat for Humanity GB. <https://www.habitatforhumanity.org.uk/blog/2017/12/the-worlds-largest-slums-dharavi-kibera-khayelitsha-neza/>

Policy Brief: COVID - 19 in an Urban World. (2020, July). United Nations. https://www.un.org/sites/un2.un.org/files/sg_policy_brief_covid_urban_world_july_2020.pdf

Population Division, Department of Economic and Social Affairs, United Nations Secretariat. (2001, September). *The Components of Urban Growth in Developing Countries.* Population United Nations. [https://population.un.org/wup/Archive/Files/studies/United%20Nations%20\(2001\)%20-%20The%20Components%20of%20Urban%20Growth%20in%20Developing%20Countries.pdf](https://population.un.org/wup/Archive/Files/studies/United%20Nations%20(2001)%20-%20The%20Components%20of%20Urban%20Growth%20in%20Developing%20Countries.pdf)

Population Facts. (2018, December). United Nations, Department of Social and Economics Affairs.

https://www.un.org/en/development/desa/population/publications/pdf/popfacts/PopFacts_2018-1.pdf

Princeton University. (2020, September 30). *Largest COVID-19 contact tracing study to date finds children key to spread, evidence of superspreaders.*

<https://www.princeton.edu/news/2020/09/30/largest-covid-19-contact-tracing-study-date-finds-children-key-spread-evidence>

Public Health Agency of Canada. (n.d.). *ARCHIVED: Chapter 2: Learning from SARS: Renewal of public health in Canada – SARS in Canada: anatomy of an outbreak - Canada.ca.* Government of Canada.

<https://www.canada.ca/en/public-health/services/reports-publications/learning-sars-renewal-public-health-canada/chapter-2-sars-canada-anatomy-outbreak.html>

Pulla, P. (2020). *'The epidemic is growing very rapidly': Indian government adviser fears coronavirus crisis will worsen.* Nature.

https://www.nature.com/articles/d41586-020-01865-w?error=cookies_not_supported&code=07e506d4-58ea-44cd-a812-bc1c37bae614

Ray, D. (2020, June 1). *India's Lockdown: An Interim Report.* NBER. <https://www.nber.org/papers/w27282>

Rollston, R. L. (2020, May 5). *The Coronavirus Does Discriminate: How Social Conditions are Shaping the COVID-19 Pandemic.* Harvard Medical School.

<http://info.primarycare.hms.harvard.edu/blog/social-conditions-shape-covid>

Rukmini S, IndiaSpend.com. (2020, November 24). *Why is coronavirus spiking in some Indian states, but not in others?* Scroll.In.

<https://scroll.in/article/979224/why-is-coronavirus-spiking-in-some-states-but-not-in-others>

Rupp, S. (2018, December 28). *Healthcare In the 21st Century: It's All About Technology.* Electronic Health Reporter.

<https://electronichealthreporter.com/healthcare-in-the-21st-century-its-all-about-technology-2/>

S, R. (2020, June 9). *Mumbai vs Delhi: Behind Covid-19 numbers in India's two worst-hit cities.* India Today.

<https://www.indiatoday.in/diu/story/mumbai-vs-delhi-behind-covid19-numbers-india-two-worst-hit-cities-1687236-2020-06-09>

Sahasranaman, A., & Jensen, H. J. (2021, January 20). *Spread of COVID-19 in urban neighbourhoods and slums of the developing world.* The Royal Society.

<https://royalsocietypublishing.org/doi/10.1098/rsif.2020.0599>

Sarkar, R., & Rai, A. (2020, June 3). *AN OVERVIEW OF URBANISATION AND ITS ROLE ON COVID 19 SPREADING.* Admas University.

<https://www.google.com/url?q=http://adamasuniversity.ac.in/an-overview-of-urbanisation-and-its-role-on-covid-19-spreading/&sa=D&source=editors&ust=1619517644839000&usg=AOvVaw0vCynECAPOcWQwYjJeLlIK>

Schellekens, P., & Sourrouille, D. (2020). *COVID-19 Mortality in Rich and Poor Countries A Tale of Two Pandemics?* World Bank.

<https://openknowledge.worldbank.org/bitstream/handle/10986/33844/COVID-19-Mortality-in-Rich-and-Poor-Countries-A-Tale-of-Two-Pandemics.pdf?sequence=5&isAllowed=y>

Sethi, V. (2021, April 27). *COVID-19: These are the most affected cities in India with the highest number of cases.* Business Insider.

<https://www.businessinsider.in/india/news/these-are-the-most-affected-cities-in-india-with-the-highest-number-of-cases-after-covid-19-second-wave/slidelist/82082660.cms#slideid=82082839>

Shen, M. (2020, January 1). *Modelling the epidemic trend of the 2019 novel coronavirus outbreak in China.* BioRxiv.

<https://www.biorxiv.org/content/10.1101/2020.01.23.916726v1.full>

Shetty, P. (2020, April 7). *Grey Matter: Ageing in different countries.* The Lancet.

[https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(12\)60541-8/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(12)60541-8/fulltext)

Sinha, S. (2018, September). *Causes of Urban Sprawl: A comparative study of Developed and Developing World Cities.* Research Gate.

https://www.researchgate.net/publication/329196389_Causes_of_Urban_Sprawl_A_comparative_study_of_Developed_and_Developing_World_Cities

Slater, J. N. M. (2020, April 2). *India confronts its first coronavirus 'super-spreader' — a Muslim missionary group with more than 400 members infected.* Washington Post.

https://www.washingtonpost.com/world/asia_pacific/india-coronavirus-tablighi-jamaat-delhi/2020/04/02/abdc5af0-7386-11ea-ad9b-254ec99993bc_story.html

Standard of Living in the Developing World. (n.d.). GiveWell.
<https://www.givewell.org/international/technical/additional/Standard-of-Living>

Statista. (2021, March 30). *World population by age and region 2020.*
<https://www.statista.com/statistics/265759/world-population-by-age-and-region/>

Success story of Dharavi against COVID-19. (2020, July 14). The BMJ.
<https://www.bmj.com/content/370/bmj.m2817/rr>

Success story of Dharavi against COVID-19. (2020, July 21). The BMJ.
<https://www.bmj.com/content/370/bmj.m2817/rr>

Tatem, A. J., Rogers, D. J., & Hay, S. I. (2006, April 27). *Global Transport Networks and Infectious Disease Spread.* PubMed Central (PMC).
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3145127/>

The Business Standard. (n.d.). *THINGS TO KNOW ABOUT MUMBAI'S DHARAVI SLUMS.* <https://www.business-standard.com/about/where-is-dharavi-slum>

The Financial Express. (2020, June 7). *COVID-19: Four metros account for half of all cases; Nationwide tally nears 2.4 lakh.*
<https://www.financialexpress.com/lifestyle/health/covid-19-four-metros-account-for-half-of-all-cases-nationwide-tally-nears-2-4-lakh/1983731/>

The Hindu. (2020, June 11). *Coronavirus | COVID-19 turns India's urban blight.*
<https://www.thehindu.com/news/national/coronavirus-covid-19-turns-indias-urban-blight/article31798984.ece>

The Print. (2020, December 31). *Why poorer nations have low Covid deaths per million as compared to richer countries.*

<https://theprint.in/opinion/why-poorer-nations-have-low-covid-deaths-per-million-as-compared-to-richer-countries/576976/>

The World Bank. (n.d.). *Population living in slums (% of urban population)* | Data. <https://data.worldbank.org/indicator/EN.POP.SLUM.UR.ZS>

The World Bank. (n.d.-b). *Population living in slums (% of urban population)* | Data.

<https://data.worldbank.org/indicator/EN.POP.SLUM.UR.ZS?end=2018&start=2018&view=bar>

The World Bank. (n.d.-c). *Population living in slums (% of urban population) - India* | Data. <https://data.worldbank.org/indicator/EN.POP.SLUM.UR.ZS?locations=IN>

The World Bank. (n.d.-c). *Urban population - India* | Data. <https://data.worldbank.org/indicator/SP.URB.TOTL?locations=IN>

United Nations. (n.d.). *THE 17 GOALS | Sustainable Development*. <https://sdgs.un.org/goals>

United Nations Human Settlements Program. (2003). *The Challenge of Slums*. Google Books. https://books.google.co.in/books?hl=en&lr=&id=q4B4YvnUS7cC&oi=fnd&pg=PR5&dq=UN-Habitat.+2003The+challenge+of+slums:+global+report+on+human+settlements+2003.+London,+UK:+Earthscan.&ots=orlcVrrCSH&sig=iQKY9BlhfKcg4g3OdiXUbE3aonA&redir_esc=y#v=onepage&q&f=false

United Nations Secretary-General. (2020, April 2). *Transcript of UN Secretary-General's virtual press encounter to*. <https://www.un.org/sg/en/content/sg/press-encounter/2020-03-31/transcript-of-un-secretary-general%E2%80%99s-virtual-press-encounter-launch-the-report-the-socio-economic-impacts-of-covid-19>

Urban Gateway. (n.d.). *30 Most Crowded Cities in the World* | Urban Gateway. <https://urbangateway.org/news/30-most-crowded-cities-world>

Urs, A. (2020, March 26). *First case of community transmission reported in Karnataka; Second death due to Covid-19*. The Hindu Business Line.

<https://www.thehindubusinessline.com/news/first-case-of-community-transmission-case-reported-in-karnataka/article31175819.ece#:~:text=The%20State%20recorded%20its%20first,with%20many%20health%20care%20professionals>

USSR. (n.d.). *Declaration of Alma-Ata International Conference on Primary Health Care, Alma-Ata, USSR, 6–12 September 1978*. Declaration. https://www.who.int/publications/almaata_declaration_en.pdf

Vachana, V. R. (2020, July 31). *The COVID-19 crisis as a metropolitan battle*. The Hindu. <https://www.thehindu.com/opinion/op-ed/the-covid-19-crisis-as-a-metropolitan-battle/article32243597.ece>

Véras, M. P. B. (2006, September 14). *URBAN SOCIETY: Social Inequality and Exclusion. Problematizing the Brazilian Cities*. Isocarp.Org. https://isocarp.org/app/uploads/2015/02/Istanbul-2006- TXT_MAURA-PARDINI-BICUDO-VERAS.pdf

Wang, J., & Geng, L. (2019, January 1). *Effects of Socioeconomic Status on Physical and Psychological Health: Lifestyle as a Mediator*. PubMed Central (PMC). <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6352250/>

Wong, D., & Li, Y. (2020, December 23). *Spreading of COVID-19: Density matters*. Plos One. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0242398>

World Bank. (2020, October 22). *Who on Earth Can Work from Home? A global comparison sheds light on the importance of ICT infrastructure*. <https://www.worldbank.org/en/news/feature/2020/10/22/who-on-earth-can-work-from-home-a-global-comparison-sheds-light-on-the-importance-of-ict-infrastructure>

World Bank Group. (n.d.). *COVID-19 and the Urban Poor Addressing those in slums*. Pub Docs, World Bank. <https://pubdocs.worldbank.org/en/304801589388481883/Addressing-COVID-19-and-the-Urban-Poor-SHORT-version-rev3-logos.pdf>

World Economic Forum. (2020, March 17). *COVID-19: How cities around the world are coping.*

<https://www.weforum.org/agenda/2020/03/how-should-cities-prepare-for-coronavirus-pandemics/>

World Economic Forum. (n.d.). *The Global Risks Report 2021 16th Edition.*
http://www3.weforum.org/docs/WEF_The_Global_Risks_Report_2021.pdf

World Health Organization. (2020, April 28). *Archived: WHO Timeline - COVID-19.* <https://www.who.int/news/item/27-04-2020-who-timeline---covid-19>

World Health Organization. (2020a, March 17). *Events as they happen.*
<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen>

World Health Organization. (2020c, July 14). *Q&A: How is COVID-19 transmitted?*

<https://www.who.int/vietnam/news/detail/14-07-2020-q-a-how-is-covid-19-transmitted>

World Health Organization. (n.d.). *Naming the coronavirus disease (COVID-19) and the virus that causes it.*
[https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-\(covid-2019\)-and-the-virus-that-causes-it](https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-(covid-2019)-and-the-virus-that-causes-it)

World Health Organization. (n.d.-a). *Covid-19.*
<https://www.who.int/teams/social-determinants-of-health/urban-health/covid-19>

World Health Organization. (n.d.-b). *Indicator Details.*
[https://www.who.int/data/gho/data/indicators/indicator-details/GHO/residential-long-term-care-beds-\(per-10-000-population\)](https://www.who.int/data/gho/data/indicators/indicator-details/GHO/residential-long-term-care-beds-(per-10-000-population))

World Health Statistics. (2009). *Demographic and socioeconomic statistics.*
https://www.who.int/whosis/whostat/EN_WHS09_Table9.pdf

World Population Review. (2021). *Delhi Population 2021.*
<https://worldpopulationreview.com/world-cities/delhi-population>

World Population Review. (2021b). *Mumbai Population 2021.*
<https://worldpopulationreview.com/world-cities/mumbai-population>

Yadav, N. (2021, April 27). *These are the 10 most-affected countries with the highest number of COVID-19 cases.* Business Insider. <https://www.businessinsider.in/politics/india/news/check-out-the-10-most-affected-countries-with-the-highest-number-of-coronavirus-cases/slidelist/76275918.cms#slideid=76276214>

You, M., Wu, Z., Yang, Y., Liu, J., & Liu, D. (2020, June 12). *Spread of Coronavirus 2019 From Wuhan to Rural Villages in the Hubei Province.* OUP Academic. <https://academic.oup.com/ofid/article/7/7/ofaa228/5856718>

Zurich. (2015, January 14). *The risks of rapid urbanization in developing countries.* <https://www.zurich.com/en/knowledge/topics/global-risks/the-risks-of-rapid-urbanization-in-developing-countries>