

**A Review of Literature: Learning from Epidemic and Pandemic Disease  
Outbreak Response in Urban Environments**

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## Executive Summary

This paper was developed as part of a study commissioned by the German Red Cross (GRC) on Response to COVID-19 in Urban Settings. The wider study aims to answer the following four questions:

- What are the lessons learned from previous and current response to epidemics and pandemics in urban settings?
- How did national societies/organisations position themselves in the response to COVID-19 in urban settings?
- What capacities did national societies/organisations deploy in response to COVID-19 in urban settings and were these effective?
- What were the gaps and opportunities that presented themselves during the response to COVID-19 in urban contexts?

This paper aims to capture lessons learned from previous and current response to epidemics and pandemics in urban settings through a document review. The paper provides a comparison of the characteristics of different epidemic diseases and their impact on key areas **(i) governance (ii) health systems (iii) social and (iv) economic**.

The history of epidemic diseases in urban areas has in part contributed to aspects of modern urban planning, and certain elements of modern architecture have partly emerged in response to disease outbreaks and measures to contain them. Modern sanitation systems, urban parks, building ventilation and light are all examples of how infectious disease outbreaks have influenced urban planning.<sup>iiiiiiiv</sup>

Currently 56% of the world's population live in urban areas<sup>v</sup>, with this set to rise to 68% by 2050<sup>vi</sup>. Approximately 24% of global urban populations live in slums and informal settlements. Urban poor and slum communities are characterised by poor and over-crowded shelter conditions, high density of population, poor sanitation (toilets, drainage) and limited access to clean water, often providing conditions for the fast spread of epidemic diseases. They face not only the challenges of chronically poor residential environments, the acute effects of an epidemic, but also the direct and indirect impacts of the preventive measures that follow.

Limitations of the study included the lack of urban specific literature. To mitigate this, wherever feasible an urban lens has been applied to more general lessons around epidemics to provide urban specific learnings. Gaps in literature also highlighted an often inconsistent approach to research on epidemic impacts, illustrated by a much greater focus on the health implications of epidemics/pandemics than the broader governance, societal and economic impacts of disease outbreaks.

The urban specific findings of the study are summarised below as they relate to governance, social economic and the health of urban populations.

### Governance

- The importance of communication during epidemics/pandemics in urban areas cannot be overemphasised. The plethora of communication channels in urban environments is both positive and negative. The presence of diverse communication channels in urban environments allows information to be disseminated on mass. However, this can also be the same route for the spread of mis-information. Ensuring that communication is targeted and appropriate to vulnerable portions of the urban population, such as migrants or those living in informal settlements is important (e.g. using languages that migrants use). In addition, identifying trusted sources to communicate with targeted urban populations can overcome mis-information.

- The greater distrust of government in urban environments and the natural fear of government authorities by certain groups such as migrants and refugees that are concentrated in urban areas coupled with the novel nature of many epidemics forcing regular changes in control measures and policies may result in disobedience and breaking of control measures put in place. This risks increasing transmission and increases in cases.
- The fact that large segments of urban populations rely on daily wages and lack diversity in income earning opportunities means that control measures imposed must be undertaken concomitantly with economic support measures. These economic measures must be undertaken with transparency and clarity on entitlements and avoiding delays or broken promises of assistance which may ultimately result in a breakdown of law and order.

### **Social**

- The mental health and psychosocial impacts of restrictions such as lockdowns, travel bans and curfews is widespread. Urban environments are more policed, due to the comparatively extensive resources available in urban centres (numbers of police stations, Officers and material resources). This in turn can increase the isolation of vulnerable people such as the elderly impacting on mental health wellbeing.
- Overcrowding associated with informal urban settlements combined with epidemic control measures that restrict movement and reduce livelihood opportunities in urban areas exacerbate existing GBV risk factors. The risk of violence against women and children can increase as a result of fear of women to seek assistance due to the risks associated with contracting the disease, closure of health facilities and social services. This emphasises the need to maintain access to support services to vulnerable groups in the population.
- School dropouts are more likely to increase in urban areas given the reliance of households on the informal sector for livelihoods and the additional needs of households to secure income. In addition, consideration should be given to gender disparity, given the heightened risks of increased pregnancies and sexual exploitation of girls associated with school closures. Programmes to incentivise school attendance should therefore be considered in tandem with programmes that reduce the economic pressures on households, such as school feeding, which often acts as a safety net for the most vulnerable households.

### **Economic**

- The predominance of informal sector workers in urban areas with increased risk of unemployment, absenteeism and costs of medical treatment; attributed to epidemic disease outbreak and control measures imposed; as well as their lack of inclusion in social protection mechanisms means that economic relief and recovery programmes should be prioritised.
- Specific focus on countries that rely heavily on remittances is needed. Declines in remittances as a result of repatriation of migrant workers predominantly employed in the informal sector in urban environments has cut-off millions of households from vital income sources.
- Ensuring that social protection mechanisms, particularly safety nets equally support rural and urban populations and address the needs of the vulnerable in society in developing countries should be a focus of future efforts to address epidemic/pandemics.
- Maintaining rural to urban links is essential. Supply chains often involve the transport of goods from rural areas to urban areas. This is particularly important for food commodities in order to maintain food security.

### **Health**

- Urban areas have conditions, particularly in informal and unplanned settlements for the spread of epidemic/pandemic diseases due to poor sanitation, reduced access to water and overcrowding. Risk awareness and mitigation measures can be communicated to urban communities alongside material support, such as hygiene and sanitation materials and improved water sources and systems to combat disease spread.

- The rural to urban migration phenomenon experienced during epidemics/pandemics often results from the greater availability of health services in urban settings as well as the stigma associated with contracting the disease (more easily identifiable in rural areas). Ensuring the health services are provided in rural areas and countering stigma should be key strategies adopted to control the spread of disease.
- Wealth and mothers education are the key determinants of vaccination coverage. While evidence remains limited and is masked by generalised immunization data for urban areas, wealth inequality between those living in informal urban settlements and slums and urban centres and suburbs is indicative of likely disparity in immunization rates. Immunisation should be designed in collaboration with all communities particularly those more marginalised urban poor and slum-dwelling communities in order to include the specificities of the local context.

## 1.0 Introduction

The history of epidemic diseases in urban areas has in part contributed to aspects of modern urban planning, and certain elements of modern architecture have partly emerged in response to disease outbreaks and measures to contain them. Modern sanitation systems, urban parks, building ventilation and light are all examples of how infectious disease outbreaks have influenced urban planning.<sup>vii</sup><sup>viii</sup><sup>ix</sup>

However, as COVID-19 has shown, the poorest and most vulnerable in society often bear the brunt of infectious disease, as well as the blame for epidemics. Geographic and urban approaches to contagious disease have gone through phases of **exclusion** (e.g. leper colonies) and **inclusion** (quarantined confinement areas), which were often rooted in class and racial discriminatory practices to contain the poor/immigrants from infecting the rich during outbreaks, for example, the burning of immigrant Mexican neighbourhood of Los Angeles during the bubonic plague in 1924<sup>xi</sup>.

Currently 56% of the world's population live in urban areas<sup>xii</sup>, with this set to rise to 68% by 2050<sup>xiii</sup>. Approximately 24% of global urban populations live in slums and informal settlements, with the highest levels in sub-Saharan Africa (56%) and Southern Asia (31%)<sup>xiv</sup>, with individual countries with almost all of their urban population living in slums e.g. Central African Republic (96%, 2009)<sup>xv</sup>.

Urban poor and slum communities are characterised by poor and over-crowded shelter conditions, high density of population, poor sanitation (toilets, drainage) and limited access to clean water, often providing conditions for the fast spread of epidemic diseases. They face not only the challenges of chronically poor residential environments, the acute effects of an epidemic, but also the direct and indirect impacts of the preventive measures that follow.

The current COVID-19 pandemic highlights the importance of ensuring that the specificities of urban contexts are recognised given that over 90% of COVID-19 cases are occurring in urban areas<sup>xvi</sup>. With over one billion people living in informal settlements and slum-like conditions, COVID-19 is exacerbating the vulnerability of these specific population groups<sup>xvii</sup>.

This paper was developed as part of a study commissioned by the German Red Cross (GRC) on Response to COVID-19 in Urban Settings and aims to capture lessons learned from previous and current response to epidemics and pandemics in urban settings through a document review. The paper provides a comparison of the characteristics of different epidemic diseases and their impact on key areas **(i) governance (ii) health systems (iii) social and (iv) economic** .

Recent calls by the Global Preparedness Monitoring Board for greater preparedness for a potential “rapidly spreading, lethal respiratory pathogen pandemic”<sup>xviii</sup>, mention the amplifier effect and vulnerability caused by urbanization, however, specific preparedness actions for urban settings were lacking in its action plan.

Where the literature lacks urban specific data, an urban lens has been applied to more general lessons around epidemics to provide urban specific learnings. Gaps in literature highlight an often inconsistent approach to research on epidemic impacts, illustrated by a much greater focus on the health implications of epidemics/pandemics than the broader governance, societal and economic impacts of disease outbreaks.

## 2.0 Characteristics of Epidemic and Pandemic Diseases and their Importance

This section describes efforts made by the scientific community to define a pandemic and applies these parameters to highlight the specific characteristics of epidemic diseases, specifically **Zika, Dengue, Ebola, SARS, MERS, H1N1 and COVID-19**. The understanding of these characteristics is important to analyse the likely impact on any population and the most vulnerable, many of which are located in poor urban areas and slums.

### 2.1 What makes a Pandemic?

Between 2011-2018, WHO tracked 1483 epidemic events in 172 countries<sup>xix</sup>. A meeting of National Institutes of Health held at the beginning of the H1N1 pandemic, was asked to develop a more detailed definition of pandemics beyond the simple definition of 'a worldwide spread of a new disease'. They proposed eight characteristics of pandemics (Table 1), which can be helpful in understanding the critical components of the disease and their relationship and impact in urban areas<sup>xx</sup>.

Table 1. Defining a Pandemic

Feature	Description
1. Novelty/New	Mostly unknown to the medical profession
2. Minimal population immunity	Frequent absence of specific IgG antibodies
3. <b>Explosiveness</b>	Determined mainly by size or density of population and factors related to type of transmission, for example vector population
4. <b>Fast disease movement</b>	Type and speed of human transmission
5. Wide geographic extension	Social interaction of populations, widespread common source
6. Infectiousness	Ability of microbes to produce disease (minimal infective dose)
7. Contagiousness	Proportion of completely asymptomatic cases, super-spreaders, and evident and pathognomonic disease markers
8. Severity	Need for hospitalization, artificial ventilation, or intensive rehydration; chronicity or death

### 2.2 Why is it important to understand the Pathogen and its Impact?

Table 2 below applies the definition of a pandemic described above to recent epidemic/pandemic diseases to determine the different characteristics of each disease.

Understanding the characteristics of the pathogen is important because a disease's characteristics, coupled with the control measures, determine the impact a disease will have on different parts of the population. Some key characteristics of a pathogen and what they can tell us include:

- **Age/sex specificity** of the pathogen tells us how the community may be impacted. For example, does the pathogen affect age and sex groups that are more family carers (e.g. women or the elderly), the income earning age group of the population, or, as in the case of Zika, particularly those of reproductive age and new-borns?
- **Long incubation periods** coupled with a high percentage of asymptomatic carriers, facilitates transmission and makes contact tracing more challenging.
- **High reproductive numbers  $R_0$**  and overcrowded conditions, as often found in urban environments, increase the potential for a *fast moving and explosive pandemic* (Table 1).

- ***High case fatality rates*** can create fear and panic within communities, whereas low case fatality rates can create doubt in the community of the need for strict control, potentially resulting in the flouting of rules and measures, heightening the risk of transmission and spread of the disease.
- ***Pathogen and disease transmission*** through close contact or air-borne require more community and individual '***behavioural compliance***', such as Ebola and COVID-19. They rely heavily on effective communication to bring about these behaviours, rather than effective physical interventions. Diseases that have the ability to be ***controlled by more physical and environmental measures*** (e.g. Zika, Dengue), have the potential to be more easily controlled, than those requiring more significant and extended behavioural change.

**Understanding the characteristics of the epidemic disease therefore enables tailoring of both policy and responses to cater for the needs of different population groups who may be more at risk or more vulnerable to the pathogen.**

The types and duration of measures put in place to control the epidemic or pandemic have an important impact and interaction with urban populations. For example:

- Those diseases which cause more ***extended lockdowns, shielding and quarantine*** go beyond the urgent need for a short-term health response to the need for a longer multi-sector ***response which supports lives and livelihoods*** more broadly.
- However, novel or emerging epidemic/pandemic disease characteristics are often little understood about their characteristics often resulting in governments scrambling to understand their characteristics and having to make policy decisions with minimal or incomplete information.

**Table 2. Characteristics of Different Epidemic/Pandemic Diseases**

Characteristic	Zika Virus	Cholera	Ebola Viral Disease (EVD)	Dengue	COVID-19 (SARS-CoV-2)	SARS	MERS	H1N1 (pdm09)
Transmission Countries	87 (2019)	34 (2018)	4 (2020)	>100 (2020) 1970=9	218 (Nov 2020)	29 (2003)	27 (2020)	214 (2011)
Median Age	32 (16 days-100)	23; 26 (all ages)	28 (all ages)	12 (primary infection) and 20 (secondary Infection)	59 (15-89)	35 (0-92)	43 (all ages)	20 (all ages) Substantial immunity in the elderly.
% Asymptomatic	80%	80%	1-19%;27%	40-80%	80-90%	13%	13-26% (could be higher in children)	5-35%
Vaccine Available	Not yet approved	Yes	Yes	yes (only for those previously infected)	Yes (new)	No	No	Yes
Main Transmission	Vector (mosquito)  Sexual contact/ blood	Food/Water/ Hands	Contact with blood, bodily fluids of an infected person	Vector (mosquito)	Airborne Respiratory droplets; Surface contact (less important)	Airborne Respiratory droplets; Surface contact	Airborne Respiratory droplets; Not well understood	Airborne Respiratory droplets; Surface contact (less important)
Incubation Period Average	3-14 days	12 hours - 5 days	8-10 days (2 -21)	4-10 days	5–6 days (up to 14)	2-7 days (up to 10)	5 days (2-14)	2-3 (1- 7 )
Case fatality rate	8-10% 16% perinatal FR	50% (no treatment) < 1% (with treatment)	Average 66% (all ages)	1%	>1.6%	3%	35%	0.05%
R <sub>0</sub> basic reproductive numbers	3-6.6	1.7-2.6	1.5-2.5	1-65 highest in sub-tropical	1.5-3.5	1-2.75	1	1.46-1.48



### 3.0 Learning from epidemic and pandemic disease outbreak impacts

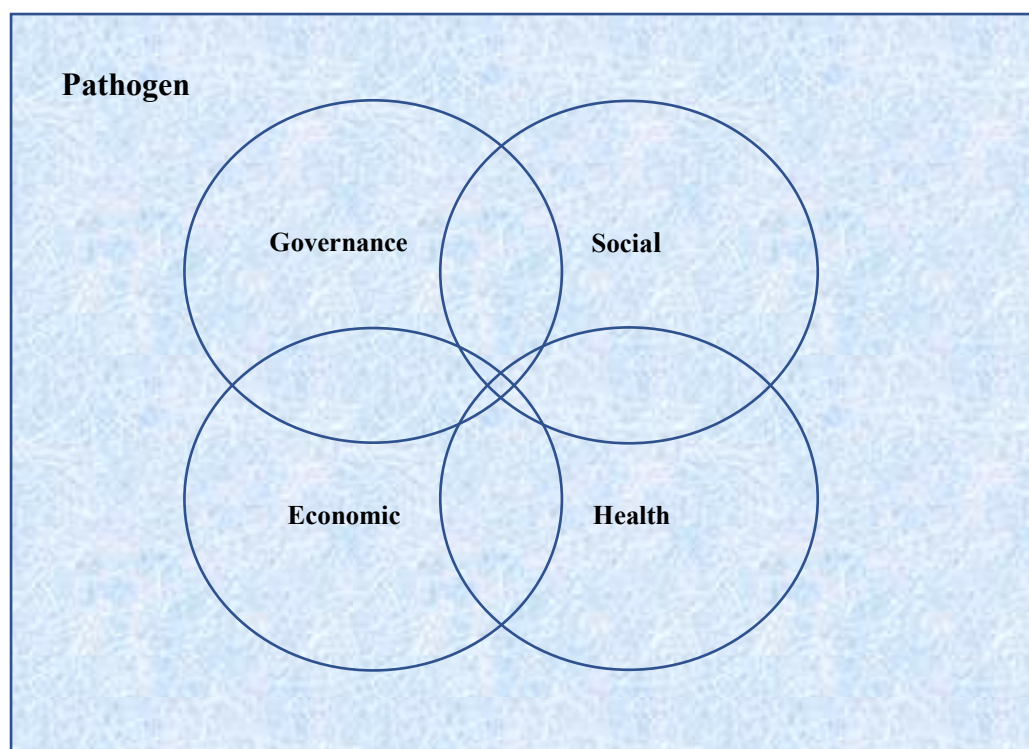
This section details how the epidemic diseases reviewed (Zika, Dengue, Ebola, SARS, MERS, H1N1, COVID-19) have impacted:

1. **Governance** – including trust and public Action, communication and misinformation, violence and security
2. **Social impacts** - including Social - Travel/Quarantines; GBV/Domestic Violence; Education
3. **Economic impacts** – macro and micro
4. **Health systems impacts** – including general systems and health workers

Where possible, we identify the specificities of these impacts as they relate to urban contexts.

Figure 1 below provides a framework for analysing the interaction of an epidemic disease with key aspects of populations living in urban areas. The framework demonstrates the inter-relationships between governance, social, economic and health system determinants that can ultimately lead to appropriate outbreak response.

**Figure 1. Interaction of a pathogen with key aspects of urban living**



In attempting to analyse the impact of the pathogen on one aspect of urban living, such as governance, it is likely there will be impacts on other aspects such as social and economic determinants. Equally, the impact of an epidemic on social and economic development of urban populations is likely to impact governance. Suggesting that a multi-sectoral analytical approach should be pursued to understand the impact of epidemic diseases on urban environments.

#### 3.1 Governance

UNDP offers a useful definition of *governance* as “the exercise of economic, political, and administrative authority to manage a country’s affairs at all levels and the means by which states promote social cohesion, integration, and ensure the well-being of their populations”<sup>xxi</sup>.

### **Communication, Information and Misinformation**

In the absence of constantly flowing information from a respected source, rumours will fill the void and take on a life of their own. If officials are not available for comment, reporters will find their own experts and launch their own investigations<sup>xxii</sup>.

While there is more than sufficient evidence that communication in an epidemic/pandemic is critical, communication has not consistently been recognised as a key strategy by governments for epidemic/pandemic control and therefore rarely prepared for. Including recent government experience to SARS, five key learnings have been highlighted, all of which require preparedness:<sup>xxiii</sup>

1. Build Trust
2. Announce Early
3. Be Transparent
4. Respect Public Concerns
5. Plan in Advance.

Myths and misinformation are easy to spread during an epidemic outbreak due to the population's concerns and anxiety, particularly without a reliable and trusted source of verified information. In the West Africa **Ebola** outbreak, misinformation and rumours filled gaps in communication left by humanitarians.<sup>xxiv</sup>

### **Public Trust and Compliance with Epidemic Control Measures**

For political and/or economic reasons, governments may hesitate to rapidly declare an epidemic, attempt to cover it up, or downplay its significance<sup>xxv</sup>. At the same time both national and local authorities often have competing interests within a finite budget; locally they may have insufficient authority to institute response measures promptly. Insufficient epidemic preparedness capacities at a subnational and local levels and difficulties in accessing national capacities, may inhibit epidemic/pandemic response<sup>xxvi</sup>. This delay or downplaying of the importance of the epidemic can have long-lasting negative consequences on trust put in authorities. *A lack of confidence in a government undermines compliance with control measures and can allow counter-productive behaviours to flourish*, as evidenced during an outbreak of **viral encephalitis** (Malaysia, 1999) and the outbreak of **hantavirus pulmonary syndrome** (Brazil 2004)<sup>xxvii</sup>.

In the early stages of the **H1N1** outbreak in the United States, there was a lack of trust in government whereas health professionals were the most trusted individuals<sup>xxviii</sup>. In Monrovia (**Ebola**, Liberia 2014), a lack of trust between the population and government hindered community mobilisation and public education<sup>xxix</sup>. In DRC, distrust in government authorities was associated with low compliance with messages of social and behavioural change and refusal to seek formal medical care or accept vaccines, which in turn increases the risk of spread of **Ebola**<sup>xxx</sup>. Similar trends were experienced in Puerto Rico and the Philippines with Dengue.<sup>xxxi</sup> A recent survey of populations in the Group of Seven wealth nations (G7) demonstrated a declining trust in government response to **COVID-19** with the United Kingdom demonstrating the largest decline.<sup>xxxii</sup>

Understanding who the public trust was critical in consulting and delivering risk communications in Nepal. A new media organisation, Sharecast, that promotes citizen participation through media and local radio and trusted by the community, was able to work with relevant national experts to launch in April 2020, an independent nationwide survey to understand citizen knowledge, attitudes, and practices regarding **COVID-19**<sup>xxxiii</sup>. The survey was able to feed into the national COVID-19 taskforce and may represent a way forward for partnership between government and bodies trusted by the community, for the benefit of a more effective epidemic response.

A recent OECD study demonstrated that while trust in governments was low, trust in public services such as health and local police was higher. The study found that *trust was very closely correlated with compliance to measures for the control of COVID-19*.<sup>xxxiv</sup>

Research in New Zealand<sup>xxxv</sup> points to the trust which political leaders and health experts were able to cultivate amongst the population as a key reason for why results there have been so strikingly different than in other developed countries; *trust built on consistent, clear communications from the government communicated with kindness and empathy, which brought together “a team of 5 million”<sup>xxxvi</sup>.*

### **Violence and Insecurity**

The potential for *violence and social disorder increases as a result of myths and misinformation*, is exacerbated by the lack of information on government restrictions, as well as perceived or unexplained inconsistencies. The threat of breakdown in law and order has in past epidemics resulted in concerns by countries for **national security** such as in the Mexico **Cholera** outbreak in 1991<sup>xxxvii</sup> and during the H1N1 outbreak<sup>xxxviii</sup>.

In 2015 as fears grew about the spread of the **Ebola** outbreak beyond West Africa global concern resulted in a resolution by UN Security Council<sup>xxxix</sup>, and governments in their preparedness planning e.g. US (2006), UK(2008) and Australia (2006), viewed **pandemic influenza** as a national security threat.<sup>xl</sup>

The **COVID-19** pandemic has exacerbated existing global challenges, further exposing the underlying causes of insecurity, social and economic inequality with overtones of racial tension and nationalism.

The Armed Conflict Location & Event Data Project (ACLED)<sup>xli</sup> identified more than *4,000 episodes of violence associated with COVID-19-related restrictions* (March-May 2020), with protests and riots by citizens and under-protected healthcare workers, a common outcome in many countries. The Africa Centres for Disease Control and Prevention (Africa CDC) has also already warned that if people lack trust in their government’s responses, there is even a greater risk of violent outbreaks in that region<sup>xlii</sup>, and violent extremist groups/organized crime gangs have exploited the pandemic in most regions<sup>xliii</sup>.

### **3.1.1 Specificities for Urban Contexts**

Epidemics/pandemics can impact on governance in urban contexts in a similar way as in rural areas. However, specificities of urban environments can exacerbate these impacts.

#### **Communication, Information and Misinformation in Urban Areas**

- The plethora of information sources available in urban areas (TV, Radio, Newspapers, Blogs, Social Media), increases the potential for rapid misinformation spread. However, their availability equally raises the potential to reach large numbers of people, if well prepared for with good government-media partnerships. The **Ebola** crisis in West Africa revealed that poor messaging resulted in the public misunderstanding, and as a result, risky behaviour, such as not seeking health care and hiding cases<sup>xliv</sup>. Without clear communication from trusted sources, the task of correcting misinformation becomes even more difficult; without a trusted source, there’s no way to verify potential fake news (Lagos, Nigeria, **COVID-19** 2020)<sup>xlv</sup>.
- Urban centres and in particular informal settlements often attract migrants, the displaced and refugees. Migrants and refugees are often missed for reasons of language differences as most risk communication is in the language(s) of the resident population, therefore missing key vulnerable groups. A fear and distrust in authorities by these groups often prevents them coming forward with symptoms for testing and therefore coupled with overcrowding and poor sanitation in informal settlements can be a source of greater transmission and sickness<sup>xlvi</sup>. *Migrants in Singapore made up 93% of the countries **COVID-19** cases<sup>xlvii</sup>.*

#### **Public Trust and Compliance with Epidemic Control Measures**

- Urban centres are often the seats of power and where there is underlying distrust of government. For example a study across seventeen African countries found that “Distant citizens were less likely than their urban peers to translate service dissatisfaction into discontent with their government; distant citizens had more trust in government and more positive evaluations of both local and national officials”.<sup>xlviii</sup>
- The novel nature of some epidemic diseases means that knowledge is nascent and governments have to act without a full understanding of the disease in its attempts to reduce risk. This process of ongoing learning about the disease, with resulting fluctuation in policy making, coupled with the difficult conditions brought about by preventative policies in dense urban areas, as well the plethora of different information sources can, if not done in completely transparency way, spread distrust as Government and policy appear inconsistent.

#### **Security and Violence in Urban Areas**

- In urban areas large segments of the most vulnerable in the population survive in the informal economic sector, eating from what they earned that day. Estimates suggest a 60% decrease in income for 1.6 billion informal workers as a result of **COVID-19** and concomitant restrictions<sup>xlix</sup>. Therefore, maintaining regular information flows is important in order to quell potential anger given the precarious livelihoods of large parts of urban populations. A lack of transparency and clarity on entitlements, delayed response to promises of assistance and insufficient assistance in densely populated poor urban areas, is an evidenced recipe for a breakdown of law and order (Lagos, Nigeria, COVID-19)<sup>l</sup>.
- *Lockdowns implemented without consideration for those who eat from their daily work*, at best result in attempts to escape from quarantined areas as was the case from the Westpoint informal settlement in Monrovia (Liberia, **Ebola**, 2014), and otherwise in violent unrest (Lagos, Nigeria, **COVID-19** 2020)<sup>li</sup>.

### **3.2 Social Impacts**

There have been some unexpectedly positive side effects of the abrupt shifts in human behaviour in response to the covid-19 pandemic. There have been fewer cars accidents, crime is falling, and some other infectious diseases are fading from hospital emergency departments, leading to some postulating that the pandemic may lead to more permanent behavioural change<sup>lii</sup>. In addition, spontaneous initiatives to support vulnerable people have been generated, such as the ‘Teens helping Seniors’ initiative in the USA which delivers food shopping to the elderly<sup>liii</sup> and the 750,000 people who signed up in a matter of days to volunteer to support the National Health Service in the UK<sup>liv</sup>.

However, where proximity and contact are important for disease transmission, typical control measures include travel bans, quarantine and local and in-country movement restrictions implemented as part of the epidemic/pandemic control measures e.g. **Ebola** crisis in West Africa<sup>lv</sup> and most recently in response to COVID-19<sup>lvi</sup>; these measures on a global scale have greatly impacted on the social wellbeing of populations.

#### **Mental Health**

Social, cultural and behavioural practices contribute to both control and spread of epidemics. Control measures put in place for pandemics and epidemic emergencies, including **SARS** and **H1N1** (Swine Flu), have been associated with difficult coping behaviours, anxiety, suicide attempts and mental health disorders, including post-traumatic stress and depressive disorders, with quarantines, social isolation and limitations on freedom as important contributing factors.<sup>lvii</sup>

#### **GBV/Domestic Violence**

Disasters exacerbate pre-existing gender and power related inequalities and vulnerabilities. Evidence from epidemics documents increased domestic, sexual and gender-based violence where lockdowns, quarantines, and sickness (i) increase economic pressures on households (ii) restrict movement from the home (and therefore ability to move away from abusers) (iii) restrict access to protection and reproductive health services and (v) increase alcohol and drug use. Epidemic diseases where lockdowns and movement restrictions are more severe and lengthier (e.g. **Ebola**, **COVID-19**) intensify and prolong this vulnerability to domestic violence<sup>lxviii</sup>. Many countries during the **COVID-19** pandemic highlight an increase in domestic violence e.g. China where police reports indicated a 300% increase<sup>lix</sup>. However, South Africa restricted the sale of alcohol during lockdown periods to reduce the potential the burden on healthcare systems - whilst other countries were experiencing increases in domestic violence, they reported decreases of domestic violence of almost 70%<sup>lx</sup>, in addition to an 87% reduction in rape and similar decreases in other violence related crimes compared to the same period in 2019<sup>lxi</sup>.

### Education

Restrictions on movement in epidemics/pandemics have often, although inconsistently, been coupled with school closures where epidemic/pandemic disease transmission is through contact or airborne.

The experiences of school closure have varied across countries<sup>lxii</sup>, particularly since its implementation and protection measures have been quite different e.g. policy on mask wearing by students and teachers. Despite previous experience in the 2009 H1N1 epidemic, many Ministries of Education were not well prepared in terms of procedures, with many decisions being last minute and not involving heads of schools e.g. **COVID-19** (UK, 2020).

Several studies indicate that there is limited impact of school closures on reduction of transmission for *airborne diseases*<sup>lxiii</sup>, whilst others suggest that early closure of schools can delay the epidemic peak, supporting the ability of health care infrastructure to cope (US, **H1N1**)<sup>lxiv</sup>. Spanish health authorities indicated that schools accounted for limited transmission, 6% (**COVID-19**, Oct 2020)<sup>lxv</sup>. Data from the **SARS** outbreak in mainland China, Hong Kong, and Singapore suggest that school closures did not contribute to the control of the epidemic<sup>lxvi</sup>. Others suggest more positive impact of school closure on the epidemiology of the disease, particularly if age-specific attack rates show children to be highly susceptible<sup>lxvii</sup>. A Swiss study reviewing micro-movements of the population (phone tracking) February-April 2020, found that closing schools (which also impacted more parents staying at home) reduced mobility of the population by 22%, which in turn greatly reduced the number of COVID-19 cases<sup>lxviii</sup>.

Non-health negative impacts of school closure on the other hand, beyond potential impacts on child education, include absenteeism of workers (due to child care), increased costs for childcare, economic impact on households due to wage loss<sup>lxix</sup> and increased vulnerability for at-risk children.<sup>lxx</sup> Schools however, also provide a good avenue for awareness and preparedness through delivery of risk messaging and can be a route to overall community engagement<sup>lxxi</sup>.

### 3.2.1 Specificities for Urban Contexts

#### Mental Health

- Given the heightened risk of spread of epidemics in urban environments, travel bans, quarantines and movement restrictions are more often implemented and have potentially greater social consequences in urban than in rural areas, and are likely to be more policed (COVID-19, 2020).
- With extended movement restrictions, particularly where older people are more vulnerable and more isolated, even in better resourced environments, depression from such isolation can lead to a desire to end life (France, COVID-19)<sup>lxxii</sup>.

#### GBV/Domestic Violence

- Overcrowding at household level (rather than overall population density), particularly in urban informal settlements coupled with greater movement control measures (and therefore also reduced livelihood opportunities) in urban environments, put more stresses on families and exacerbate existing GBV risk factors.<sup>lxxiii</sup>
- The reduced ability of women to move to reach safe spaces or reduced access to specialist health/social services due to closure or diversion of resources to fighting the outbreak, or of fear of exposure to disease through movement, can increase risk of violence against women and children (e.g. Ebola resulted in closure of health facilities in West Africa)<sup>lxxiv</sup>.
- The zika virus, like dengue, is more prevalent in urban areas due to the poor infrastructure and sanitation in crowded urban and peri-urban informal settlements. Domestic violence related to financial and psychological stresses caused by homecare demands, and stigma related to looking after children disabled by the zika virus have been reported<sup>lxxv</sup>.

### Education

- As part of social support measures, schools in some countries have remained open for children at risk and children of frontline workers, resulting in schools in many urban areas with near to 50% of children still in attendance (**COVID-19, UK**)<sup>lxxvi</sup>.
- A recent survey on the plight of children during the Covid-19 pandemic found that 12% of children in urban areas reported needing a lunch meal that right now cannot be accessed due to school closures compared to 8% of rural child respondents. Such findings suggest a greater impact on child food security and wellbeing as well as additional economic pressures on parents and carers in urban environments.<sup>lxxvii</sup>
- Economic pressures resulting from epidemics often mean it is harder for children to return to school after long closures (**COVID-19**)<sup>lxxviii</sup>. This is more likely to occur in urban areas given the reliance of vulnerable urban populations on the informal economic sector for livelihoods and the need of households to engage children in these activities when the situation is even more severe.
- As part of the impacts of extended school closure, young girls are particularly at risk of school dropout with documented increases in pregnancies and sexual exploitation resulting from concomitant population density and the greater exposure to men in urban environments, as well as vulnerability brought about by increased poverty and loss of family members<sup>lxxix</sup>, with both Sierra Leone<sup>lxxx</sup> and Liberia<sup>lxxxi</sup> reporting increases (**Ebola, 2014**).
- However, the often greater concentration of schools in urban areas, coupled with increasingly urbanised societies, also provides a good existing network through which to deliver risk messaging and preparedness.<sup>lxxxii</sup>

## 3.3 Economic Impacts

Epidemics and pandemics have direct health impacts such as death and morbidity which can be debilitating leading to long term disability. Epidemics and pandemics also have important repercussions for local, national, regional and global economies. **All epidemic (and pandemic) disease outbreaks have economic consequences at both the macro and micro (household) levels.** The interconnectedness of modern economies means that most impacts go far beyond individually affected areas and national borders.

A number of factors associated with an epidemic or pandemic will have an economic impact. These include *disease morbidity and mortality rates (perhaps more than actual numbers<sup>lxxxiii</sup>), duration of illness, hospitalisation rates, disease transmission type, ability to prevent, treat or vaccinate, type of*

*prevention actions needed, fear of disease, confidence in handling of the disease, geographic extent of the epidemic/pandemic, duration of epidemic/pandemic, disease vulnerability by age/sex/socio-economic groups.*

### **Macro-Economic Impacts**

Many studies on the economic effects of epidemics, focus on the disease-associated medical costs or foregone incomes due to morbidity and mortality, but others indicate the **most significant real costs are generated by changes in spending behaviour by households and companies** in affected countries, as was the case with **SARS**, but that would be similar for 'SARS-like' pandemics<sup>lxxxiv</sup>. The global cost of the **SARS** epidemic was estimated at US\$54 billion and US\$ 45-55 billion cost of the 2009 **H1N1** pandemic<sup>lxxxv</sup>. The increasing economic inter-dependence of such changes in behaviour, have wide reaching consequences for the global economy, although many studies focus only on individual countries and regions, with **MERS** in South Korea being cited frequently for its tourist-related losses of US\$2.6 billion<sup>lxxxvi</sup>.

The latest World Bank analysis on the economic impacts of **COVID-19** predicts a global GDP reduction of 5.2%<sup>lxxxvii</sup>, with an additional 88-115 million people pushed into extreme poverty in 2020<sup>lxxxviii</sup>; that **COVID-19** has triggered a global (economic) crisis like no other, leading to the deepest global recession since the Second World War<sup>lxxxix</sup>. Many are concerned that preventative measures for COVID-19, including lockdowns, worsen the impact on economies and that there is a trade-off between health and economic costs. However, recent research indicates that overall, **countries that have contained COVID-19 also tend to have had less severe economic impacts than those that haven't**, suggesting that there is no dichotomy between saving lives and saving the economy<sup>xc</sup>.

The economic impacts of some epidemic diseases can have both short and long term effects. The economic impacts of **Zika** in Latin America and the Caribbean were an estimated US\$7-18 billion 2015-2017, mainly from tourism<sup>xc</sup>. However, in the long term, this could reach \$US30 billion as a result of a reduction in productivity as a result of drop-out from workforce for childcare (especially women).

In a similar way, the economic impacts of **Dengue** are also due to loss of productivity and the direct costs of health care. In Latin America, this was estimated at over \$US3 billion per year, with other estimates putting it at over \$US10 billion<sup>xcii</sup>.

The West Africa **Ebola** (2014-16) outbreak was estimated to have cost between \$US2.8 and 32.6 billion in lost GDP<sup>xciii</sup> with an even greater comprehensive economic and social burden to be \$US53.19 billion. The most significant component, \$18.8 billion, was deaths from non-Ebola causes. However, economic impacts were not confined to those countries directly affected. In 2014 there was an estimated \$1.08 billion relative reduction in U.S. merchandise exports to **Ebola**-affected countries, along with the loss of 11,000 export supported US jobs in 2015<sup>xciv</sup>. The humanitarian support provided by governments to such epidemics is not only about saving lives, but protecting their own economies.

Whilst there are less documented impacts of the economic effects of **Cholera**, the evidence still clearly outlines its devastating impact. Peru documented US\$770 million losses due to reductions in tourism and food exports (1991) and in 2015, 14 Asian countries estimated US\$US8.5 million in public sector costs, \$US12.1 million in lost productivity and an additional US\$985.7 million productivity losses due to premature deaths estimated<sup>xcv</sup>.

Focusing at a smaller scale, not all cities/urban areas are affected in the same way during epidemics/pandemics. Those cities and countries that don't have a diverse economic structure are, unsurprisingly, more vulnerable and hardest hit, for example, Poland's mining and industrial cities during the **COVID-19** pandemic<sup>xcvi</sup>. Similarly, unprecedented global travel restrictions and 'stay home' measures for **COVID-19** have created unprecedented challenges for cities relying on tourism; a Kenyan Ministry of Tourism survey noted 65% of respondents reported more than 90% of bookings cancelled, where tourism contributes 10% of GDP<sup>xcvii</sup>, whilst covering a more limited number of cities.

### *Micro-Economic Impacts*

A study of the economic impact of **Ebola** in Liberia in 2015 found that the majority of sampled households reported a decrease in their income, compared to their income prior to the outbreak (whether affected or not by Ebola). This indicates that the impact of the **Ebola** epidemic is not only limited to communities directly affected by the epidemic, but also communities indirectly affected where **Ebola** was not reported, demonstrating inter-community economic linkages. The study also found that the community-level incidence of **Ebola** negatively affected crop production of farm households, which may have exacerbated the problem of food insecurity throughout the country. The study highlighted that epidemics may have long-lasting and comprehensive negative effects on the livelihoods of a society, and their effect extends beyond the communities directly affected by the epidemics, potentially impacting a country's recovery and economic impacts of the epidemic may extend well beyond the end of the health crisis<sup>xcviii</sup>.

A study on the economic impact of **COVID-19** on household income in Myanmar found similar results to those of the Ebola study. Many rural households in Myanmar have incomes from both agricultural and non-agricultural activities. The widespread closure of factories, stores, and other non-farm businesses due to a lockdown period, have affected almost all Myanmar households. Incomes fell greatly for rural and urban households that rely heavily on vulnerable non-farm income sources. This led to significant increases in poverty during the lockdown month<sup>xcix</sup>.

A study on the impact of **Dengue** in Puerto Rico found that the monetary costs of health care absorbed a significant percentage of the household weekly income<sup>c</sup>. Similarly, a study in 2015 across 14 Asian countries estimated \$20.2 million in out-of-pocket household expenditures due to losses in work and costs of treatment due to **Cholera**, which can have long term impact on the poorest households.<sup>ci</sup> It may be that the damage inflicted by epidemic disease itself e.g. loss of income due to sick leave and deaths, medical costs related to treatment, causes the greatest impact on household economic security and concomitant impact on national economies.

The stigma associated with epidemic diseases can also have impacts at the micro-economic level. For example, during the SARS outbreak fear and misinformation reportedly resulted in job losses as well as impacts on the ability of workers to find work in Hong Kong<sup>cii</sup>.

The loss of informal employment and Micro, Small and Medium Enterprises (MSME) as a result of restrictive control measures, impacts those who are already the most vulnerable. This was recognised in Kerala India (**COVID-19**, 2020), where social protection measures were deployed rapidly, as in other countries. Soon after a lockdown was announced, a relief package was launched, including the distribution of food items to all households with a national ID card (Aadhaar card) and the provision of basic services for those in need. These measures were complemented with income support, such as advance payments of old age, widow and disability pensions, and transfers to the self-employed and informal workers, as well as loans provided through women's cooperatives and the provision of jobs through rural employment guarantee programmes<sup>ciii</sup>.

However, at the same time 55% of the world's population (4 billion people) are not covered by social insurance or social assistance. Globally, only 20% of unemployed people are covered by unemployment benefits, and in some regions the coverage is much lower<sup>civ</sup>.

Preventative measures for epidemics/pandemics may also disproportionately impact the livelihoods of specific ethnic or religious groups. The culling of pigs during the **H1N1 (Swine Flu)** pandemic in Egypt, affected mainly poor and marginalised Christians living in slum areas, fanning at the same time sectarian flames<sup>cv</sup>

### *3.2.3 Specificities for Urban Contexts*



Urban economies account for approximately 80 per cent of global GDP<sup>cv</sup> and are therefore critical economic centres.

Most poor urban populations are engaged in informal or precarious employment. The economic effects of epidemics/pandemics are especially severe for households relying on the informal sector, which represents 90 per cent and 67 per cent of total employment in low and middle-income countries respectively<sup>cvii</sup>. Of the top 20 countries with the highest levels of 'vulnerable employment'<sup>cviii</sup>, 85% of these are in sub-Saharan Africa<sup>cxix</sup>.

A disproportionate percentage (63%) of workers in the informal sector are women, being the primary sector for income for women in many developing regions (95% South Asia, 89% sub-Saharan Africa, 59% Latin America/Caribbean)<sup>cx</sup>. Women are also over-represented in the hardest hit sectors of the **COVID-19** pandemic, such as tourism, hospitality, and services<sup>cx</sup>.

- Any epidemic/pandemic disease which results in quarantines at household or community level as a preventative measure, will have a disproportionate impact on those working from hand to mouth in the informal sector residing in poor urban areas and slums. Where little consideration, provision or compensation is made for those who will not eat today if they do not work, means that such residents have little option but to use all means to undertake critical livelihood activities to feed their families, risking exposure and spread of disease, as happened in the **Ebola** outbreak in Monrovia, Liberia <sup>cxii</sup>.
- Significant proportions of the most vulnerable in urban environments rely on daily wage or Micro, Small and Medium Enterprises (MSME), with little if any productive assets or social safety net access. Reduced customers and/or trading opportunities reduces income earning and raises the prospect of debt. For example, in the Liberia **Ebola** context Petty Traders raised concerns that it could take 6-12 months for vendors to recover from debts and rebuild business capital<sup>cxiii</sup>
- Movement restrictions introduced as a result of **Ebola** in West Africa impacted the supply chain of food and other agricultural commodities, breaking key rural to urban links and impacting food security in urban areas <sup>cxiv</sup>.
- Epidemic mosquito-borne diseases including **Dengue** and **Zika** are associated with poor urban and peri-urban areas<sup>cxv</sup>. Economic impacts for these households are often two-fold where those affected are unable to carry out paid work in the short and sometimes long-term, but also require often expensive and sometimes long-term medical costs<sup>cxvi</sup>. The ability of women in urban and peri-urban areas to earn a living is disproportionately affected by **Dengue and Zika** (directly and indirectly), because of their role as primary carers of those affected for considerable time by **Dengue and Zika**, and the longer-term need for caring for children born with **Zika**-related disabilities<sup>cxvii</sup>.
- In the first month of the **COVID-19** crisis, on average globally, informal workers worldwide lost as much as 60 per cent of their earnings. In Africa and Latin America this figure was nearly 80 per cent<sup>cxviii</sup>. This has therefore had particularly devastating impacts for women.
- A recent survey found that "despite the greater impact of lockdowns and social distancing on urban communities, the proportion of respondents who reported that any individual in their household received government support since COVID-19 is lower among urban households (25%) than rural households (34%). In addition to this 43% of urban respondents reported losing some sort of social security net (such as government benefits, grants, transfers or pensions) that they had before the pandemic compared to 23% of rural respondents.<sup>cxix</sup>
- **Remittances** from migrant workers play an increasingly important role in alleviating poverty and sustaining growth. Most internal economic migration is rural-urban and most international migrants reside in poor urban areas. Lockdowns, loss of employment, and social distancing prompted a chaotic and painful process of mass return for internal migrants in India and many countries in Latin America. International migrant labour is often

engaged in low paid work in urban areas with precarious contracts with little social protection, often in industries that have been greatly affected lockdown closures e.g. catering, construction, manufacturing and hospitality industries<sup>cx</sup>. In 2019 remittance flows equalled foreign direct investment and government to government development assistance. However, **COVID-19** has spurred a dramatic remittance reversal with an estimated *historic decline* of 14% by the end of 2021<sup>cx</sup>, cutting off the main source of income for many millions of households.

### 3.4 Health Impacts

#### Health Systems

In general, when health systems are put under pressure through epidemics and pandemic, how well they can be protected depends on a number of factors. These include:

1. speed of acknowledgment of the epidemic/pandemic (to start response)
2. ability to reduce or control the number of cases (so that health systems can cope)
3. immediate availability of resources and equipment to protect staff (where infection is through contact or respiratory) and the general public
4. availability of health sector human resources to divert to support treatment of cases
5. level of infectiousness and rate of hospitalisation of cases
6. availability of treatment/development of vaccines
7. duration of the epidemic/pandemic – exhaustion of Health Care Workers, fatigue of population of control measures linked to the overall impact on lives and livelihoods

Overall, the impacts on health systems and services include:

- Diversion of staff and facilities to epidemic disease treatment
- Temporary and permanent reduction in Health Care Workers (HCWs) due to - quarantine of at risk staff, exhaustion of HCWs; HCWs becoming patients of the epidemic and ultimately death
- Overall reduced health service provision e.g. 18% (Ebola, West Africa, 2014-16), 74% reduction in routine referrals from GPs (COVID-19, UK Mar-Jun 2020)
- Reduction of health seeking behaviour e.g. 70% loss to follow-up, 12% missed medication and 1.3% death (COVID-19, Ethiopia, May-Jun 2020)<sup>cxxii</sup>

Such health system effects can have a broader and longer term impact on key health indicators, often beyond the morbidity and mortality of the epidemic itself, particularly in low resource settings. Liberia, with 10,678 cases and 4810 deaths from Ebola estimated a doubling in maternal mortality (111%) and infant and child mortality increases of 20 and 28% respectively)<sup>cxxiii</sup> from HCW losses. This indirect impact on maternal mortality estimates to an additional 4022 women would die *per year* in childbirth as a result of doctors, nurses, and midwives lost to Ebola.<sup>cxxiv</sup>

Evidence also suggests that it can often be more the reduction in the demand side of health services, particularly due to fear that impacts health service utilisation, rather than a lack of health services for reductions in service utilisation, leading to increased illness severity, morbidity and mortality<sup>cxxv</sup>. Recent evidence from the USA indicates that states with the highest numbers of COVID-19 deaths also experienced large increases in deaths due to other causes<sup>cxxvi</sup>.

#### Health Care Workers

Epidemic diseases where contact and proximity are important in transmission show important risks for health workers. Evidence from **Ebola** outbreaks indicate high fatality rates in health workers with Liberia and Sierra Leone losing 8% and 7% of the entire country's health care workers<sup>cxxvii</sup>.

In airborne coronavirus, HCWs represented 23% (**SARS**), 19% (**MERS**) and 4% (**COVID-19**) of cases<sup>cxxviii</sup>. In a hospital in Spain at the beginning of the **COVID-19** outbreak (24 March 2020), it was reported that 30% of health workers had been sent home<sup>cxxix</sup>. In a survey of 37 countries<sup>cxxx</sup>, HCW case fatality rates due to **COVID-19** were highest in Europe/US (up to 0.2/100,000), with countries such as Mexico losing in absolute terms 1162 health care workers (0.9/100,000), representing almost 50% of the health worker deaths reported in the Americas<sup>cxxxi</sup>.

Evidence for the impact of **Cholera** on Health Workers was very limited. A small study in Nigeria<sup>cxxxii</sup> suggested that 32% of Health Care Workers (HCWs) knew of HCWs that developed symptoms, most of which were found to be acquired in a hospital setting; 77% of HCWs also indicated no access to the required emergency response supplies. Given that most **Cholera** cases are found in low resource

(particularly humanitarian) settings<sup>cxxxiii</sup>, this would suggest that this is likely the case in other contexts, and may include fatalities.

### **Immunisation**

Novel virus' with important morbidity and mortality usually now result in attempts to develop vaccines. The **Ebola** virus, first identified in 1976 had the first vaccines worked on in the late 1970s. Since **Ebola** outbreaks were rare, had been controlled quickly and were largely experienced in more rural locations, commercial vaccine manufacturers demonstrated little urgency in advancing vaccines through clinical trials<sup>cxxxiv</sup>. That changed in 2014 when the virus moved to urban areas of West Africa and threatened outbreaks beyond regional borders. Several vaccines previously tested only on animals were fast-tracked, resulting in clinical trials in 2015, with final vaccine approval by the European Commission in November 2019<sup>cxxxv</sup>.

Similarly for the **Zika** virus, first isolated in 1947, with more recent outbreaks in 2007 and 2013, vaccines were quickly worked on after an epidemic in the Americas in 2017. However, with the 2017 epidemic waning and with reduced spotlight, reduced interest and reduced funding has meant that a vaccine is not yet ready to be deployed in the next epidemic<sup>cxxxvi</sup>. The pandemic of **COVID-19** has illustrated how the public and private sector can work together with (likely almost unlimited) resources to produce a vaccine for use in less than a year.

### **3.4.1 Specificities for Urban Contexts**

Not only can different cities have completely diverse standards of infrastructure and social security, but the same city can provide very varying conditions for their residents. Living in the slums compared to more wealthy neighbourhoods, will expose the inhabitants to different risks<sup>cxxxvii</sup>.

Growing urbanization around the world has also shifted some infectious diseases, which have traditionally been perceived as rural, to urban settings, through adaptations of their vectors (Dengue, West Nile Fever, Leishmaniasis, Lymphatic Filariasis<sup>cxxxviii</sup>) and through failure to identify and control in rural environments quickly enough (e.g. **Ebola**<sup>cxxxix</sup>), as well as the expanding poor sanitary conditions in poor urban and peri-urban settings (**Cholera**<sup>cxli</sup>).

A large proportion of the limited financial and human resources in developing societies are allocated to health care in *urban* areas<sup>cxli</sup>. Health care and other public services are therefore often more accessible in urban areas and a pull-factor for health workers and the population as a whole. Whilst some epidemics may start in rural areas, frequent rural-urban movement means that urban areas are often where cases in epidemics diseases have the potential for exponential growth.

Informal settlements and slums closely associated with rapid urbanization, are often overcrowded with inadequate water, sanitation and basic services. As per WHO estimates, these factors contribute to a higher risk of epidemic communicable diseases, such as **Cholera**<sup>cxlii</sup>.

#### **Health Systems**

- Poor urban areas are not always where epidemics start, but it is here where the conditions are ripe for an explosion of cases – with over 95% of COVID-19 cases globally being reported in urban areas<sup>cxliii</sup>.
- Whilst urban areas are where more health services are generally available, it is also often where the greatest number of cases exist. These more available health services draw people from rural to urban areas to seek treatment, which can also support transmission of epidemic disease.<sup>cxliv</sup>
- Those stigmatised by epidemic disease (patients more easily identifiable in rural areas), have also participated in rural to urban migration.<sup>cxlv</sup>

- Evidence indicates that the risk for **Cholera** of household contacts of cases are 100 times more than the general population<sup>cxlvi</sup>. Those within 50m of a confirmed case had a 36 times higher risk than those living further away. The risk remains significant up to 450m from the case during 3 days and remains significant for 23 days with 150m<sup>cxlvii</sup>. Given overcrowding and close proximity of households in poor urban and peri-urban households, this indicates that cases in urban areas could potentially over-run health services very quickly.
- Poor urban and peri-urban areas are also associated with higher incidences of **Dengue**<sup>cxlviii</sup>. The combination of increasingly crowded living conditions, growing population density, precarious homes (shacks), and poor water storage associated with poor and unreliable water supplies, are the most likely factors determining permanent dengue transmission<sup>cxlix</sup>, becoming a permanent drain on health systems.

### Health Care Workers (HCWs)

- The literature identified does not discriminate between rural and urban areas in describing the impacts on HCWs. However, given the focus of health care services and resources in urban areas and the conditions in poor urban areas that make urban areas high risk for many epidemic and pandemic diseases, HCWs in urban areas may be disproportionately affected.

### Immunisation

- Disparities can exist in immunisation coverage in rural and urban areas but these differences are very country and context specific and therefore cannot be generalised.
- Wealth and mother's education were significant predictors of vaccination rates in both urban and rural settings in Tanzania<sup>cl</sup>. Children living in urban areas in Haryana State, India were found to be significantly more likely to be only partially immunized compared to children in rural areas<sup>cli</sup>. However, urban areas are not homogeneous and wealth inequalities (and the greatest inequalities are often found within urban areas) can often indicate great differences; generalised immunisation data for urban areas can often mask huge differences.
- In comparing the % of children with the 3rd dose of diphtheria, tetanus and pertussis (DTP3) vaccine disparities between the 1<sup>st</sup> (poorest) and 5<sup>th</sup> (wealthiest) quintiles, great differences were found across countries<sup>clii</sup>:

	% DTP3 coverage – 1 <sup>st</sup> quintile (poorest)	% DTP3 coverage – 5 <sup>th</sup> quintile (wealthiest)
Nigeria (2008)	21	79
India (2005)	44	83
Bangladesh (2007)	84	89

- Whilst Bangladesh has reached almost parity, Nigeria falls very short. Both illustrate that significant disparities can exist in immunization coverage between and within countries. Some of Bangladesh's success factors may be related to its overall improvement in country-wide immunisation rates - from 2% (1985) to 65% (1992) to 84% (2014)<sup>cliii</sup>, including: portable cold chain and vaccination kits, community outreach strategy backed by intensive media campaigns, household visits and requiring communities to provide a space for vaccination<sup>cliv</sup>.
- Different factors affect immunization coverage in different urban poor and slum contexts and therefore, *immunization needs to be designed in collaboration with all communities, particularly those more marginalised urban poor and slum-dwelling communities, considering the specificities of the local context*<sup>clv</sup>.

## 4.0 Key Lessons from Previous Epidemics and Pandemics

This section summarizes the key lessons that can be drawn from this review of previous epidemics and pandemics. Some lessons are broad in nature encompassing general considerations for epidemic/pandemic response while others are focussed on lessons for urban epidemic response. As noted previously, the study found a limited literature that distinguishes between rural and urban epidemic response but was able to interpret findings to urban context whenever possible.

Each epidemic disease has specific characteristics such as means of transmission, age or sex specificity, and reproductive number etc.. Understanding these characteristics is vital to be able to tailor policy and response to meet the needs of the most vulnerable or at risk.

In many instances epidemic diseases are often considered as health emergencies, particularly early on in the response. Evidence suggests a need to have a broader contextual and multi-sectoral analysis that considers the implications of control measures on the most vulnerable in society.

Governments have often lead the response to epidemic or pandemic diseases. Understanding both national and local government policies, capacities and response is important to be able to undertake appropriate humanitarian response to epidemic and pandemic diseases.

Well designed communication, implemented regularly and targeted to include the most vulnerable and marginalised in society delivered through trusted sources coupled with assistance can:

- Overcome mis-information and trust issues
- Enhance compliance with epidemic/pandemic control measures
- Reduce the incidence of violence

Despite examples of solidarity within communities the social impacts of epidemic diseases are significant. Both Mental Health illnesses and GBV have been shown to increase. Ensuring that vulnerable individuals are identified and supported can be the difference between life and death for many of the most vulnerable in society.

The implications of school closures go beyond the education of children. There can be severe consequences to child mental health and dropout rates (significantly higher for girls) can have long-lasting effects on child development, national economies as well as raise protection concerns.

The economic impacts of epidemic diseases are considerable. The impact on households of control measures, the inability to work as a result of illness and the additional costs incurred for medical treatment compound existing employment fragility. This coupled with the lack of access to social protection mechanisms places great strain on households. In addition the predicted drop in remittance places many households in precarious financial situations.

Control measures, such as lockdowns, quarantines and curfews, are put in place to prevent the transmission of the disease and protect health services from becoming overwhelmed. Evidence from epidemic/pandemic studies suggests that frontline health workers suffer from increased morbidity and mortality as a result of greater exposure to such diseases placing pressures on health systems and services.

While many of these factors are common to both rural and urban environments the study found a number of key lessons for response to epidemics/pandemics in urban settings.

## 4.1 Specific Lessons for Epidemic/Pandemic Response in Urban areas

Currently 56% of the world's population live in urban areas<sup>clvi</sup>, with this set to rise to 68% by 2050<sup>clvii</sup>. Approximately 24% of global urban populations live in slums and informal settlements, with the highest levels in sub-Saharan Africa (56%) and Southern Asia (31%).<sup>clviii</sup>

Urban poor and slum communities are characterised by poor and over-crowded shelter conditions, high density of heterogenous population, poor sanitation (toilets, drainage) and limited access to clean water, often providing conditions for the fast spread of epidemic diseases. They face not only the challenges of chronically poor residential environments, a reliance on daily and informal sector employment, and the acute effects of an epidemic but also the direct and indirect impacts of the preventive measures that follow.

### **Governance**

- The importance of communication during epidemics/pandemics in urban areas cannot be overemphasised. The plethora of communication channels in urban environments is both positive and negative. The presence of diverse communication channels in urban environments allows information to be disseminated on mass. However, this can also be the same route for the spread of mis-information. Ensuring that communication is targeted and appropriate to vulnerable portions of the urban population, such as migrants or those living in informal settlements is important (e.g. using languages that migrants use). In addition, identifying trusted sources to communicate with targeted urban populations can overcome mis-information.
- The greater distrust of government in urban environments and the natural fear of government authorities by certain groups such as migrants and refugees that are concentrated in urban areas coupled with the novel nature of many epidemics forcing regular changes in control measures and policies may result in disobedience and breaking of control measures put in place. This risks increasing transmission and increases in cases.
- The fact that large segments of urban populations rely on daily wages and lack diversity in income earning opportunities means that control measures imposed must be undertaken concomitantly with economic support measures. These economic measures must be undertaken with transparency and clarity on entitlements and avoiding delays or broken promises of assistance which may ultimately result in a breakdown of law and order.

### **Social**

- The mental health and psychosocial impacts of restrictions such as lockdowns, travel bans and curfews is widespread. Urban environments are more policed, due to the comparatively extensive resources available in urban centres (numbers of police stations, Officers and material resources). This in turn can increase the isolation of vulnerable people such as the elderly impacting on mental health wellbeing.
- Overcrowding associated with informal urban settlements combined with epidemic control measures that restrict movement and reduce livelihood opportunities in urban areas exacerbate existing GBV risk factors. The risk of violence against women and children can increase as a result of fear of women to seek assistance due to the risks associated with contracting the disease, closure of health facilities and social services. This emphasises the need to maintain access to support services to vulnerable groups in the population.
- School dropouts are more likely to increase in urban areas given the reliance of households on the informal sector for livelihoods and the additional needs of households to secure income. In addition, consideration should be given to gender disparity, given the heightened risks of increased pregnancies and sexual exploitation of girls associated with school closures. Programmes to incentivise school attendance should therefore be considered in tandem with programmes that reduce the economic pressures on

households, such as school feeding, which often acts as a safety net for the most vulnerable households.

### **Economic**

- The predominance of informal sector workers in urban areas with increased risk of unemployment, absenteeism and costs of medical treatment; attributed to epidemic disease outbreak and control measures imposed; as well as their lack of inclusion in social protection mechanisms means that economic relief and recovery programmes should be prioritised.
- Specific focus on countries that rely heavily on remittances is needed. Declines in remittances as a result of repatriation of migrant workers predominantly employed in the informal sector in urban environments has cut-off millions of households from vital income sources.
- Ensuring that social protection mechanisms, particularly safety nets equally support rural and urban populations and address the needs of the vulnerable in society in developing countries should be a focus of future efforts to address epidemic/pandemics.
- Maintaining rural to urban links is essential. Supply chains often involve the transport of goods from rural areas to urban areas. This is particularly important for food commodities in order to maintain food security.

### **Health**

- Urban areas have conditions, particularly in informal and unplanned settlements for the spread of epidemic/pandemic diseases due to poor sanitation, reduced access to water and overcrowding. Risk awareness and mitigation measures can be communicated to urban communities alongside material support, such as hygiene and sanitation materials and improved water sources and systems to combat disease spread.
- The rural to urban migration phenomenon experienced during epidemics/pandemics often results from the greater availability of health services in urban settings as well as the stigma associated with contracting the disease (more easily identifiable in rural areas). Ensuring the health services are provided in rural areas and countering stigma should be key strategies adopted to control the spread of disease.
- Wealth and mothers education are the key determinants of vaccination coverage. While evidence remains limited and is masked by generalised immunization data for urban areas, wealth inequality between those living in informal urban settlements and slums and urban centres and suburbs is indicative of likely disparity in immunization rates. Immunisation should be designed in collaboration with all communities particularly those more marginalised urban poor and slum-dwelling communities in order to include the specificities of the local context.

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<sup>i</sup> Gandy, Matthew. "[The Bacteriological City and Its Discontents](#)." *Historical Geography* 34, no. 0 (2006): 14–25

<sup>ii</sup> Rogers, Heather. *Rubbish Past*. In [Gone Tomorrow: The Hidden Life of Garbage](#), p. 29-58. New York; York: The New Press, 2006

<sup>iii</sup> Riis, Jacob A. *How the Other Half Lives: Studies Among the Tenements of New York*, 2014



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- iv Meir Rinde, How Philly's neighborhoods can help us understand pandemics, March 26, 2020
- v World Bank Data 2019. <https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS>
- vi UNDP Dept of Economic and Social Affairs, News 16 May 2018
- vii Gandy, Matthew. "[The Bacteriological City and Its Discontents.](#)" *Historical Geography* 34, no. 0 (2006): 14–25
- viii Rogers, Heather. *Rubbish Past*. In [Gone Tomorrow: The Hidden Life of Garbage](#), p. 29-58. New York; York: The New Press, 2006
- ix Riis, Jacob A. *How the Other Half Lives: Studies Among the Tenements of New York*, 2014
- x Meir Rinde, How Philly's neighborhoods can help us understand pandemics, March 26, 2020
- xi Deverell, William Francis. "Ethnic Quarantine." In [Whitewashed Adobe: The Rise of Los Angeles and the Remaking of Its Mexican Past](#), 172–206. Berkeley: University of California Press, c2004.
- xii World Bank Data 2019. <https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS>
- xiii UNDP Dept of Economic and Social Affairs, News 16 May 2018
- xiv UNHABITAT 2020, COVID-19 Key Facts and Data
- xv UNHABITAT, 2013. *State of the world's cities 2012/2013*
- xvi UNDP, 2020, Brief #2 Putting the UN Framework for Socio-Economic Response into Action: Insights
- xvii Ibid.
- xviii Global Preparedness Monitoring Board, 2019. *A world at risk: annual report on global preparedness for health emergencies*
- xix WHO Health Emergencies Programme, unpublished data, July 2019, cited in a world at risk: Annual report on Global preparedness monitoring for health emergencies. Geneva: World Health Organisation.
- xx Pitlik SD. COVID-19 Compared to Other Pandemic Diseases. *Rambam Maimonides Med J.* 2020;11(3):e0027. July, 2020. doi:10.5041/RMMJ.10418
- xxi Vymětal, Petr. (2007). *Governance: defining the concept*. Working Papers Faculty of International Relations
- xxii *Outbreak communication: Best practices for communicating with the public during an outbreak*. Report of the WHO Expert Consultation on Outbreak Communications, Singapore, 21–23 September 2004
- xxiii Ibid
- xxiv Campbell, L. and Miranda Morel, L., (2017) *Learning from the Ebola Response in cities: Communication and engagement*. ALNAP Working Paper. London: ALNAP/ODI.
- xxv *Outbreak communication: Best practices for communicating with the public during an outbreak*. Report of the WHO Expert Consultation on Outbreak Communications, Singapore, 21–23 September 2004
- xxvi Vernon J. Lee et al., 2020, *The Lancet, Infectious Diseases: Epidemic preparedness in urban settings: new challenges and opportunities*
- xxvii *Outbreak communication: Best practices for communicating with the public during an outbreak*. Report of the WHO Expert Consultation on Outbreak Communications, Singapore, 21–23 September 2004
- xxviii Vicki S Freimuth et al., 2013, *Journal of Health Communication, Trust During the Early Stages of the 2009 H1N1 Pandemic*
- xxix Campbell, L. (2017) *Ebola Response in cities: Learning for future public health crises*. ALNAP Working Paper. London: ALNAP/ODI
- xxx Vinck et al., 2019, *Institutional trust and misinformation in the response to the 2018–19 Ebola outbreak in North Kivu, DR Congo: a population-based survey*
- xxxi Akanda A.S, Johnson K., *Growing water insecurity and burden of Dengue in the Americas*, *The Lancet, Planetary Health* Volume 2, Issue 5
- xxxii <https://www.kantar.com/inspiration/politics/public-approval-and-trust-in-government-falls-in-g7-and-plummets-in-uk>
- xxxiii Sharecast Initiative Nepal, *COVID-19 Citizens' Pulse*, April 2020
- xxxiv OECD, 2020, *All you need is trust. Informing the role of government in the COVID-19 context*.
- xxxv Cited in [theguardian.com](#), 23 July, 2020; *New Zealand beat COVID-19 by trusting leaders and following advice – study*
- xxxvi Smith, A Team of Five Million. *How New Zealand Beat Coronavirus*,
- xxxvii Jaime Sepulveda et al., 2006 *International Journal of infectious Disease, Cholera in Mexico: The paradoxical benefits of the last pandemic*
- xxxviii Christian Enemark, 2009, *Survival, Is Pandemic Flu a Security Threat?*
- xxxix Suerie Moon et al., 2015, *Lancet, Will Ebola change the game? Ten essential reforms before the next pandemic. The report of the Harvard-LSHTM Independent Panel on the Global Response to Ebola*
- xl Cited in Christian Enemark (2009) *Is Pandemic Flu a Security Threat?*, *Survival*, 51:1, 191-214, DOI: [10.1080/00396330902749798](https://doi.org/10.1080/00396330902749798)

- 
- <sup>xli</sup> Resnick, D, Trust in science and in government plays a crucial role in COVID-19 response, June 2020; Cited in International Food Policy Research Institute; [ifpri.org](http://ifpri.org)
- <sup>xlii</sup> Partnership for Evidence- Based Response to COVID-19 (PERC) Responding To COVID-19 In Africa: Using Data to Find A Balance
- <sup>xliii</sup> United Nations Press, COVID-19 Impacting Global Security with Heightened Volatility, Increased Threats to United Nations Personnel, Secretary-General Says in New Report
- <sup>xliiv</sup> Campbell, L. and Miranda Morel, L., (2017) Learning from the Ebola Response in cities: Communication and engagement. ALNAP Working Paper. London: ALNAP/ODI.
- <sup>xli v</sup> Justice Empowerment Initiative, Corona Diaries, We are sitting on a keg of gunpowder, June 2020
- <sup>xli vi</sup> Informal communication, German Red Cross, Lebanon and Kuala Lumpur
- <sup>xli vii</sup> New York Times, 17 December, 2020. *As Singapore Ventures Back Out, Migrant Workers Are Kept In*
- <sup>xli viii</sup> D.W.Brinkerhoff et al., 2017, Distance, Services and perceptions of the state in rural Africa, Governance, An International Journal of Policy, Administration and Institutions
- <sup>xli x</sup> UNDP, 2020, Brief #2 Putting the UN Framework for Socio-Economic Response into Action: Insights
- <sup>l</sup> Justice Empowerment Initiative, Corona Diaries, We are sitting on a keg of gunpowder, June 2020
- <sup>li</sup> *ibid*
- <sup>lii</sup> BMJ 2020; The Positive effects of Covid-1369:m1785
- <sup>liii</sup> <https://en.unesco.org/news/covid-19-pandemic-youth-engaged-nextnormal>
- <sup>li v</sup> The Guardian, 3 May 2020. NHS coronavirus crisis volunteers frustrated at lack of tasks
- <sup>li v</sup> Campbell, L. (2017) Learning from the Ebola Response in cities: Population Movement. ALNAP Working Paper. London: ALNAP/ODI.
- <sup>li vi</sup> UNWTO, 2020, COVID-19 related Travel Restrictions – A Global Review for Tourism
- <sup>li vii</sup> Amber Peterman et al., 2020, Pandemics and Violence against women. Working Paper 528. Centre for Global Development.
- <sup>li viii</sup> Peterman et al., 2020, Pandemics and Violence against women. Working Paper 528. Centre for Global Development.
- <sup>li x</sup> VAWG Helpdesk Research Report No 284, March 2020
- <sup>li x</sup> Institute for Security Studies, June 2020. Domestic violence during COVID-19: are we asking the right questions?
- <sup>li xi</sup> MOVENDI International, April 2020. South Africa: Alcohol sales ban leads to violence reduction
- <sup>li xii</sup> Cauchemez et al, 2014. School closures during the 2009 influenza pandemic: national and local experiences
- <sup>li xiii</sup> Viner, R. et al., 2020, School closure and management practices during coronavirus outbreaks including COVID-19: a rapid systematic review, *Lancet Child Adolescent Health* 2020; 4: 397–404
- <sup>li xiv</sup> Germann et al, 2019 School dismissal as a pandemic influenza response: When, where and for how long?
- <sup>li xv</sup> El Pais, October 2020. A room, a bar and a classroom: how the coronavirus is spread through the air
- <sup>li xvi</sup> Viner et al April 2020. School closure and management practices during coronavirus outbreaks including COVID-19: a rapid systematic review
- <sup>li xvii</sup> Harpa and Moghadas, Effectiveness of School Closure for the control of influenza, A review of recent evidence, National Collaborating Centre for Infectious Diseases 2014
- <sup>li xviii</sup> EPFZ 2021, cited in the Tribune de Genève January 2021
- <sup>li xix</sup> Wan-Chin Chen et al., 2011, Social and economic impact of school closure resulting from pandemic influenza A/H1N, *The Journal of infection* 62(3):200-3
- <sup>li xx</sup> Peterman et al., 2020, Pandemics and Violence against women. Working Paper 528. Centre for Global Development.
- <sup>li xxi</sup> UNICEF,WHO, IFRC, 2020, Interim Guidance for Covid19 Prevention and Control in Schools
- <sup>li xxii</sup> TV report interviews with residents of care homes in Lyon, F3, December 9, 2020
- <sup>li xxiii</sup> Peterman et al., 2020, Pandemics and Violence against women. Working Paper 528. Centre for Global Development.
- <sup>li xxiv</sup> Campbell, L. (2017) Learning from the Ebola Response in cities: Population Movement. ALNAP Working Paper. London: ALNAP/ODI.
- <sup>li xxv</sup> Peterman, A et al, April 2020. Pandemics and Violence Against Women and Children. *Gender and COVID-19 Working Group*, Centre for Global Development
- <sup>li xxvi</sup> Informal communication with Headmistress of school in urban area, UK
- <sup>li xxvii</sup> Sabry, Sarah and Clacherty, James (2021). The Hidden Impact of COVID-19 on Children in Urban Contexts. London, Save the Children International.
- <sup>li xxviii</sup> UNESCO, 2020. Adverse consequences of school closure

- 
- <sup>lxxxix</sup> Amber Peterman et al., 2020, Pandemics and Violence against women. Working Paper 528. Centre for Global Development.
- <sup>lxxx</sup> Save the Children, 2015. Children Report Increased Exploitation, Teenage Pregnancies in Ebola-Affected Sierra Leone
- <sup>lxxxix</sup> Plan International, 2014. Teenage pregnancy rates rise in Ebola-stricken West Africa
- <sup>lxxxixii</sup> <https://www.cdc.gov/coronavirus/2019-ncov/global-covid-19/schools.html>
- <sup>lxxxixiii</sup> *Brahmbhatt M, Dutta A, 2008. On SARS Type Economic Effects during Infectious Disease Outbreaks World Bank East Asia and Pacific Region*
- <sup>lxxxixiv</sup> Lee JW, 2004, Estimating the Global Economic Costs of SARS
- <sup>lxxxixv</sup> Global Preparedness Monitoring Board, 2019. A World at Risk. Annual report on global preparedness for health emergencies
- <sup>lxxxixvi</sup> Joo, H, 2019. Economic Impact of the 2015 MERS Outbreak on the Republic of Korea's Tourism-Related Industries
- <sup>lxxxixvii</sup> World Bank, June 2020. The Global Economic Outlook During the COVID-19 Pandemic: A Changed World
- <sup>lxxxixviii</sup> Blake, P, Wadhwa, D, Dec 2020 World Bank, Year in Review: The impact of COVID-19 in 12 charts
- <sup>lxxxixix</sup> World Bank, June 2020. Global Economic Prospects
- <sup>xc</sup> Smithson, M, Australia National University in The Conversation, 25 Nov 2020, "Data from 45 countries show containing COVID vs saving the economy is a false dichotomy"
- <sup>xc</sup> UNDP, IFRC, April 2017. A Socio-economic Impact Assessment of the Zika Virus in Latin America and the Caribbean
- <sup>xcii</sup> Laserna A et al, 2018. Economic impact of dengue fever in Latin America and the Caribbean: a systematic review. *Rev Panam Salud Publica*
- <sup>xciii</sup> Huber, C et al, 2018. The Economic and Social Burden of the 2014 Ebola Outbreak in West Africa. *J Infect Dis* 2018 Nov 22;218(suppl\_5)
- <sup>xciv</sup> Kostova et al, 2019. Long-distance effects of epidemics: Assessing the link between the 2014 West Africa Ebola outbreak and U.S. exports and employment
- <sup>xcv</sup> Mogasale Vittal et al 2020, Amber Hsiao, Economic burden of cholera in Asia; *Vaccine*, Vol 38, Sup 1
- <sup>xcvi</sup> Sharifi A, Dec, 2020. The COVID-19 pandemic: Impacts on cities and major lessons for urban planning, design, and management
- <sup>xcvii</sup> Invest in Group, 2015. Kenya Tourism - Total Contribution to GDP
- <sup>xcviii</sup> Gatiso. T. et al, 2018, The impact of the Ebola virus disease (EVD) epidemic on agricultural production and livelihoods in Liberia, *Journal of Neglected tropical Diseases*
- <sup>xcix</sup> IFPRI, 2020, Assessing the Impacts of COVID-19 on Household Incomes and Poverty in Myanmar A microsimulation approach MYANMAR STRATEGY SUPPORT PROGRAM | WORKING PAPER 02 JULY 2020
- <sup>c</sup> M.Torres, 1997 Impact of an Outbreak of Dengue Fever: A Case Study from Rural Puerto Rico
- <sup>ci</sup> Mogasale Vittal et al 2020, Amber Hsiao, Economic burden of cholera in Asia; *Vaccine*, Vol 38, Sup 1
- <sup>cii</sup> SARS Expert Committee Report, 2003. SARS in Hong Kong: from Experience to Action. The Impact and After-Effects of SARS on the Community
- <sup>ciii</sup> ILO, 2020, Social Protection Spotlight
- <sup>civ</sup> UNDP, 2020, Putting the UN Framework For Socio-Economic Response into Action: Insights
- <sup>cv</sup> Johnson, C, 2009. Reuters - ANALYSIS - Egypt's pig cull fans sectarian tension
- <sup>cvi</sup> World Bank, 20 April 2020. Urban Development
- <sup>cvi</sup> ILO, 2020. COVID-19 crisis and the informal economy: Immediate responses and policy challenges
- <sup>cvi</sup> ILO define workers in *vulnerable employment* as the sum of own-account workers and contributing family workers. They are less likely to have formal work arrangements, and therefore more likely to lack decent working conditions, adequate social security and 'voice' through effective representation by trade unions and similar organizations. Vulnerable employment is often characterized by inadequate earnings, low productivity and difficult conditions of work that undermine workers' fundamental rights
- <sup>cix</sup> *ibid*
- <sup>cx</sup> UN Women, Commission on the Status of Women 61, Mar 2017
- <sup>cx</sup> *ibid*
- <sup>cxii</sup> Campbell et al, 2017 Learning from the Ebola Response in Cities: Responding in the context of urban quarantine
- <sup>cxiii</sup> <https://www.alnap.org/help-library/learning-from-the-ebola-response-in-cities-population-movement>
- <sup>cxiv</sup> FAO, 2016. Impact of the Ebola Virus Disease outbreak on Market Chains and Trade of Agricultural Products in West Africa

- 
- <sup>cxv</sup> Zellweger et al, 2017 Socioeconomic and environmental determinants of dengue transmission in an urban setting: An ecological study in Nouméa, New Caledonia
- <sup>cxvi</sup> Idali Torres, M 1997 Impact of an Outbreak of Dengue Fever: A Case Study from Rural Puerto Rico. *Human Organization* Vol. 56, No. 1
- <sup>cxvii</sup> UNDP, IFRC, 2017. A Socio-economic Impact Assessment of the Zika Virus in Latin America and the Caribbean
- <sup>cxviii</sup> United Nations, June 2020. Policy Brief: The World of Work and COVID-19
- <sup>cxix</sup> Sabry, Sarah and Clacherty, James (2021). The Hidden Impact of COVID-19 on Children in Urban Contexts. London, Save the Children International.
- <sup>cxx</sup> IOM, May 2020. COVID-19 Analytical Snapshot #32: Socioeconomic impacts
- <sup>cxixi</sup> Global Knowledge Program on Migration and Development (KNOMAD), October 2020. Phase II: COVID-19 Crisis Migration and Development Brief 33
- <sup>cxixii</sup> Tamirat M Aklilu et al, Nov 202. The Impact of COVID-19 on Care Seeking Behavior of Patients at Tertiary Care Follow-up Clinics: A Cross-Sectional Telephone Survey. Addis Ababa, Ethiopia.
- <sup>cxixiii</sup> David K Evans et al, 2015. Health-care worker mortality and the legacy of the Ebola epidemic. *Lancet Global Health*, Vol 3, Issue 8
- <sup>cxixiv</sup> idem
- <sup>cxixv</sup> Chen J, McGeorge R, October 2020 Spillover Effects of the COVID-19 Pandemic Could Drive Long-Term Health Consequences for Non-COVID-19 Patients
- <sup>cxixvi</sup> Woolf S et al March-April 2020, Excess Deaths From COVID-19 and Other Causes, *JAMA* 324(5)
- <sup>cxixvii</sup> idem
- <sup>cxixviii</sup> Hu, Tingting et al, Aug 2020. A comparison of COVID-19, SARS and MERS.”*PeerJ* vol. 8 e9725
- <sup>cxixix</sup> *New York Times*, 24 March, Virus Knocks Thousands of Health Workers Out of Action in Europe
- <sup>cxixxx</sup> Erdem H, Lucey DR. Healthcare worker infections and deaths due to COVID-19: A survey from 37 nations and a call for WHO to post national data on their website. *Int J Infect Dis.* 2021;102:239-241
- <sup>cxixxxi</sup> Pan American Health Organization (PAHO)/World Health Organization (WHO) Sept 2020. COVID-19 has Infected Some 570.000 Health Workers and Killed 2,500 in the Americas
- <sup>cxixxxii</sup> David A. Oladele et al, 2012. An assessment of the emergency response among health workers involved in the 2010 cholera outbreak in northern Nigeria. *Journal of Infection and Public Health*, Vol 5, Issue 5
- <sup>cxixxxiii</sup> McCluskey J, 2018, Whose responsibility? Improving the coordinated and integrated response to cholera outbreaks within humanitarian crises. Report for Global WASH and Health Clusters
- <sup>cxixxxiv</sup> History of Vaccines, College of Physicians of Philadelphia, 2018. Ebola virus disease and Ebola vaccines
- <sup>cxixxxv</sup> European Medicines Agency, leaflet. Ebola timeline, Fighting the outbreaks
- <sup>cxixxxvi</sup> Pattnaik, Aryamav et al. “Current Status of Zika Virus Vaccines: Successes and Challenges.” *Vaccines* vol. 8, 266. 31 May. 2020, doi:10.3390/vaccines8020266
- <sup>cxixxxvii</sup> Neiderud, CJ, 2015. How urbanization affects the epidemiology of emerging infectious diseases: urban population – a heterogeneous group with different living conditions *Infection ecology & epidemiology*, 5
- <sup>cxixxxviii</sup> *ibid*
- <sup>cxixxxix</sup> WHO Newsroom, Jan 2015. Factors that contributed to undetected spread of the Ebola virus and impeded rapid containment
- <sup>cxli</sup> Zerbo A et al, 2020. A review of the risk of cholera outbreaks and urbanization in sub-Saharan Africa, *Journal of Biosafety and Biosecurity*, Volume 2, Issue 2
- <sup>cxli</sup> Fosu GB, 1989 *J Health Soc Behav* 30 (4): 398-411
- <sup>cxlii</sup> Zerbo A et al, 2020. A review of the risk of cholera outbreaks and urbanization in sub-Saharan Africa, *Journal of Biosafety and Biosecurity*, Volume 2, Issue 2
- <sup>cxliiii</sup> UNHABITAT 2020, COVID-19 Key Facts and Data
- <sup>cxliv</sup> Campbell, L. (2017) Ebola Response in cities: Learning for future public health crises. ALNAP Working Paper. London: ALNAP/ODI
- <sup>cxlv</sup> Campbell, L. (2017) *Learning from the Ebola Response in cities: Population movement*. ALNAP Working Paper. London: ALNAP/ODI.
- <sup>cxlvi</sup> George et al, 2016. Cited in Randomized Controlled Trial of Hospital-Based Hygiene and Water Treatment Intervention (CHoBI7) to Reduce Cholera
- <sup>cxlvii</sup> Debes et al 2016. Cholera cases cluster in time and space in Matlab, Bangladesh: implications for targeted preventative interventions

- 
- <sup>cxlviii</sup> Zellweger et al, 2017 Socioeconomic and environmental determinants of dengue transmission in an urban setting: An ecological study in Nouméa, New Caledonia
- <sup>cxlix</sup> Velasco-Salas et al, 2014. Dengue Seroprevalence and Risk Factors for Past and Recent Viral Transmission in Venezuela: A Comprehensive Community-Based Study
- <sup>cl</sup> Nadella, P., Smith, E.R., Muhihi, A., et al. 2019. Determinants of delayed or incomplete diphtheria-tetanus-pertussis vaccination in parallel urban and rural birth cohorts of 30,956 infants in Tanzania. *BMC Infectious Diseases*. 19(188).
- <sup>cli</sup> Prinja, S., Monga, D., Rana, S.K., et al. 2018. District level analysis of routine immunization in Haryana State: implications for Mission Indradhanush under Universal Immunization Programme. *Indian Journal of Community Medicine*. 43(3).
- <sup>clii</sup> WHO. Global Health Observatory Data: Urban health. 2016. [http://www.who.int/gho/urban\\_health/en/](http://www.who.int/gho/urban_health/en/)
- <sup>cliii</sup> . Bangladesh Demographic and Health Survey 2014: Key Indicators. Dhaka: National Institute of Population Research and Training (NIPORT), Mitra and Associates, and ICF International; 2015.
- <sup>cliv</sup> Jamil K, Bhuiya A, Streatfield K, Chakrabarty N. The immunization programme in Bangladesh: impressive gains in coverage but gaps remain. *Health Policy and Planning*. 1999;14:49-58
- <sup>clv</sup> Crocker-Buque, Tim & Mindra, Godwin & Duncan, Richard & Mounier-Jack, Sandra. (2017). Immunization, urbanization and slums - A systematic review of factors and interventions. *BMC Public Health*. 17. 10.1186/s12889-017-4473-7
- <sup>clvi</sup> World Bank Data 2019. <https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS>
- <sup>clvii</sup> UNDP Dept of Economic and Social Affairs, News 16 May 2018
- <sup>clviii</sup> UNHABITAT 2020, COVID-19 Key Facts and Data