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**Health and Population:
Perspectives and Issues**



आरोग्यम् सुखसम्पदा

राष्ट्रीय स्वास्थ्य एवं परिवार कल्याण संस्थान

स्वास्थ्य एवं परिवार कल्याण मंत्रालय, भारत सरकार के अंतर्गत एक स्वायत्तशासी निकाय

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Editorial

State of Neonatal Health in India: Where are We and How Do We Improve It?

***Arti Maria**

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Background: Neonatal Mortality

The urgent need for an accelerated action to achieve the single digit neonatal mortality rate translates to extending the right of life to every baby. Newborn Mortality, also known as the Neonatal Mortality Rate (NMR) refers to the number of deaths of children during the period of 0-28 days per thousand live births. As per the Registrar General of India- Sample Registration System (SRS) 2018, the NMR was 23 per 1000 live births. Neonatal mortality contributes to around 60 per cent of all deaths during the childhood i.e. up to the age 5 years; and 70 per cent of total infant deaths¹. Rural-urban differentials exist to such an extent that the rural NMR at 27 is almost twice of the urban figure of 14, among whom the urban poor are the most disadvantaged². Notably, half of all the maternal deaths also take place during the first week after birth³. Aply, the country has laid for herself ambitious targets for arresting neonatal mortality to 16 by the year 2025 under National Health Policy⁴ and to single digit (<10) by 2030 under the India National Action Plan (INAP)⁵. With the inception of National Health Mission, decline in neonatal mortality gained pace and recorded 14 point decline during 2005-2018 as shown in Figure 1. In the last decade, the average annual rate of reduction of NMR has improved to 4.2 per cent during 2010-2018⁶ from 3.4 per cent during 2000-2012⁷. The rate of decline in mortality would require average annual rate of reduction by 5.8 per cent to achieve the envisioned targets by 2030⁵.

Why do Babies Die?

Maximum neonatal deaths happen around the birth. Most vulnerable are the low birth weight and pre-term neonates who constitute 80 per cent of the total neonatal deaths⁵. Three-fourth of neonatal deaths in the country are due to three main causes namely- those related to complications from pre-term births (44%), followed by intra-partum related causes /perinatal asphyxia (19.1%) and infections (13.7%)¹. Congenital malformations are becoming an important cause of death.

The trend of neonatal survival shows maximum progress due to reductions in deaths due to perinatal asphyxia and infections. However, deaths due to prematurity still remain a bottleneck to overcome⁸. Still-birth is the most invisible and uncounted aspect of perinatal mortality. India accounts for the highest number of still-births in the world, owing to a large birth cohort and a high Still-Birth Rate (SBR) of 22 per 1000 live births (2009) and of these 40 per cent occurs during labour and day of birth⁵. The causes are preventable conditions such as maternal infections (syphilis, malaria), non-communicable diseases, and pregnancy related complications and only few are non preventable congenital causes.

It is estimated that high coverage of interventions can result in the prevention of around one-third still-births as these deaths mostly happen in facility births which is an addressable concern. Key evidence-based interventions have the greatest impact namely- syphilis treatment (7.7% contribution to still-births), foetal heart rate monitoring and labour surveillance, need to be monitored for higher coverages⁸.

Interventions for Newborn Health

We now know that maximum gains occur if we focus on care during labour and birth (41% newborn deaths averted) and care of small and sick babies (30% newborn deaths averted)⁹. Two-third of neonatal deaths can be prevented by treading this two-pronged approach by ensuring quality standards of care and high coverage rate. Building upon the foundations of essential newborn care (10% benefit in NMR) and care for healthy newborn (12%) through community-based programme, we now need to focus in direction of providing care for the small and sick newborn who are most likely to die⁹.

In order to achieve the goals of Every Newborn Action Plan (ENAP) and achieve single-digit neonatal mortality, newborn programmes will have to go beyond the public health approach of essential newborn care to individualized care of sick babies. Hence, we are now moving in a new direction, building on the foundation of essential newborn care to strengthen the wholesome care of the most vulnerable newborns- the small and sick newborns, who are the most likely to die.

The lancet newborn series 2014 advocates for larger investments in facility-based care, despite being cost intensive due to its potential to provide maximum dividends in saving newborns. With a tiered approach of facility-based care at the secondary and tertiary levels (with provision for respiratory, feeding and thermal care management of infection, hyperbilirunemia surfactant and continuous positive airway pressure (CPAP)/intermittent positive air pressure) can avert 70 per cent and 90 per cent preterm deaths respectively⁹. Facility-Based Newborn Care (FBNC) is one of the key components under the National Rural Health Mission to improve the status of newborn health in the country. Special Newborn Care Units (SNCU) at District and tertiary hospitals with more than 16,000 beds and Newborn Stabilization Unit (NBSU) at Community Health Centers/ First Referral Units are established for the provision of comprehensive care to sick and small newborns¹⁰. New Born Care Corners (NBCCs) have been operationalized within the labour rooms and operation theatres of all public health facilities to provide resuscitation if required. A continuum of newborn care has been established with the launch of home-based newborn care (HBNC). Together they ensure that every newborn receives essential care right from the time of birth and first 48 hours at the health facility and then at home during the first 42 days of life.

Newborn care services gained momentum especially after 2010 when there were just 100 SNCUs (Special Newborn Care Units) in government set up and they were scaled up at rapid pace every year along with the launch of community outreach (Home-Based Newborn Care programme in 2011). This period onwards shows a rapid decline in NMR.⁴ As of now, there are more than 850 SNCUs admitting around a million babies, apart from the secondary level care at NBSUs (New-Born Stabilization Units) and a million outreach Accredited Social Health Activists (ASHAs) visiting around 1.4 crore newborns to promote newborn care practices, apart from *Rashtriya Bal Swasthya Karyakram* (RBSK) programme for detection, management of development delays and defects¹⁰.

Towards improving newborn survival, political and leadership commitment became further evident when India Newborn Action Plan (INAP) was launched in 2014 to make concerted efforts towards the attainment of the goals of “Single Digit Neonatal Mortality Rate” and “Single Digit Stillbirth Rate” by 2030.India

Newborn Action Plan (INAP) contains clearly defined targets, sub-national plans, dedicated administration for newborn health, set of technical guidelines and quality improvement guidelines, training and mentoring packages, dedicated financial provisions, online monitoring and supportive supervision to support facility based care. It includes six pillars of intervention packages across various stages with specific actions to impact still-births and newborn health. For the first time, under the INAP, 'still-births' has been targeted as a goal and is likely to show higher rates of reduction under the Under National Health Mission (NHM), capacity building of the service providers in the skills required in FBNC units is supported by an online data reporting system with requisite budget lines for regular reporting and monitoring the service utilization and quality of care.

Relatively newer interventions to reduce newborn mortality have also been implemented, including - Vitamin K injection at birth, Antenatal corticosteroids in preterm labour, Kangaroo Mother Care and empowering ANMs to provide Injection Gentamicin to young infants for possible serious bacterial infections. The states are encouraged to use data and prepare a dashboard which can be monitored on regular basis to improve the quality of care. Mother's Absolute Affection (MAA) programme was launched in 2016 to promote Breast feeding and infant feeding practices by building the capacity of frontline health workers and a comprehensive IEC campaign.

Immediate Challenges

In spite of 80 per cent institutional deliveries, only half (42%) of them initiate early-breastfeeding¹¹. A large portion of deaths due to asphyxia in SNCUs and sepsis in pre-terms in tertiary care facilities are consequences of low quality of healthcare delivery across the Country. A comprehensive bottleneck analysis undertaken by TAG (Technical Advisory Group) of INAP⁵ highlighted the key constraints such as insufficient human resource, quantity and quality of trainings along with multi-skilling and task-shifting by the trained staff, need for strengthening of infrastructure of existing facilities, inadequate referral services, as key challenges surrounding care at birth/labour. Poor supply chain management in ensuring equipment, supplies and corticosteroids, demand side issues apart from quality of care are key challenges for the care of sick and small newborn besides quality of mentoring needs improvement in outreach HBNC programme.

Strategy and Initiatives to Improve Quality of Care

Quality holds the key. Reaching high rates of institutional births would now require emphasis on quality of care. Low hanging fruits for saving newborns are improving coverage of high impact cost-effective interventions. Low coverage of key interventions such as use of Antenatal corticosteroids which mediates via reduction in respiratory distress in preterm (up to 53% preterm specific reduction in Low Middle income countries)¹², provision of expressed breast-milk (27% preterm mortality reduction), kangaroo mother care (51% reduction in neonatal mortality in <2000 g babies), resuscitation training (30% intra-partum and 38% early neonatal mortality rate reduction) must be targeted by programme implementers as priority monitoring interventions⁹. The above interventions work over and above the gains derived from the proven intervention such as skin to skin contact¹³, delayed cord clamping¹⁴, early initiation of breastfeeding (22% neonatal mortality reduction)¹⁵, case-based management of sepsis and pneumonia (25-27% all cause NMR reduction)⁹ with rational use of antibiotics, hand hygiene with infection control measures, continue to remain as critical components of essential newborn care.

Progress of Family-Centred Care (FCC) and Developmentally Supportive Care (DSC)

Family-centred care has led to gain extensive mileage in terms of humanizing care and meeting developmental needs of the small or sick newborn. FCC creates opportunities for lifetime bonding with the parents, improves quality of care and various health outcomes while providing a linkage for continuum of care from facility to home; especially for the most vulnerable pre-terms or low-birth weight babies who are mostly at risk to die after discharge. FCC leads to empower communities through acquired skills and competencies essential for their own sick newborn's care. Through transparency of care, FCC establishes trustful relationships between providers and receivers of care. Overall, FCC improves health care experience by families while creating a sense of fulfillment and accomplished delivery of quality care on the part of the provider^{16,17}. The MoHFW launched the Family Participatory Care (FPC) in 2018 that provides support for a setting in which the family is empowered, encouraged and supported as the constant care-provider in addition to the available nursing staff⁵.

Interventions to Strengthen Health Systems in Improving Access to Maternal and Newborn Services

The Health of the mother has an important bearing on the health of the child. Thus, interventions for improvement of maternal health are critical for improving the survival of the newborn; and are deemed to be intervention for both maternal and child health. Basic provisions such as skilled birth attendant leads to reduction of intra-partum related neonatal deaths by 25 per cent. So, there is a need to ensure planned labour for each mother with provision of basic and comprehensive emergency obstetric care through which intra-partum deaths could be averted by 40 per cent, for cases requiring them, apart from preterm labour management, clean birth practices (averts 27% neonatal deaths due to sepsis and 38% tetanus related mortality at facilities)⁹. A number of recently introduced initiatives address this concern. Laqshya, a labour room quality improvement initiative launched by the MoHFW in 2017 is an effort specially in this direction, targeting the preventable 41 per cent newborn deaths on the day of birth. Implemented in force, it can be a game changer public health programme. With the objective to provide quality ANC to every pregnant woman, the Government of India in 2016 had launched the *Pradhan Mantri Surakshit Matritva Abhiyan* (PMSMA), ANC is given on a fixed day in every month across the country. This is given in addition to the routine ANC at the health facilities. The programme aims at providing free of cost assured, comprehensive and quality antenatal care universally to all pregnant women on the 9th of every month. The *Surakshit Matritva Aashwasan Scheme* (SUMAN) was launched on 10 October 2019 as an initiative by the Central Government for Zero preventable maternal and newborn death. This initiative focuses on assured delivery of maternal and newborn healthcare services encompassing wider access to free, and quality services, zero tolerance for denial of services, assured management of complications along with respect for women's autonomy and dignity.

The launch of *Ayushman Bharat* by the government in 2018 in order to achieve the goal of providing universal health coverage (UHC) is a big leap towards achieving the vision of "Health for All". Also in 2018, several additions and modifications were made to the Mother and Child Protection (MCP) Card to ensure motivation of communities and encourage responsive care by parents.

Way Forward

What works for reducing deaths has been clearly proven and widely disseminated. Making these available for every birth in the country would translate into huge benefits. Increasing trend of institutional deliveries

provides a unique opportunity and pays quadruple dividends on the reduction of neonatal mortality, still births, maternal mortality and developmental outcomes which must be harnessed. Preterm and small babies are most vulnerable and thus, require focussed approach. Overall strengthening of the health systems catering to newborns especially in terms of human resource management, infrastructure strengthening, continuous mentoring (trainings) and monitoring (perinatal audits) would be required. Scale up of impactful interventions, improving quality of care and providing equitable newborn care services along with demand generation would ensure every baby survives and thrives⁹. Larger variation in mortality rates among various states and further among districts calls for district-level planning and addressing specific bottlenecks, deriving unique innovative solutions to address supply-side issues due to scarce resources. Nevertheless, a large set of determinants ranging from socio-cultural barriers, regional inequity, caste and gender-based inequity, care seeking behaviour, scope of convergence with departments other than the health sector makes newborn survival a daunting task. However, with commitment, this is an achievable forte to give every newborn life a bright chance to survive, thrive and transform.

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View Point

COVID-19: A Novel Teacher of Public Health

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To be vaccinated, or not to be? That's the question. With India rolling out with two 'Made in India' vaccines countrywide for Health Care Workers (HCWs) and Frontline Workers (FLWs) and rapidly reaching to high coverage, the vaccine hesitancy is palpable not only among the general population but also among the health professionals.

A picture published in Atlas of Clinical Medicine, Surgery and Pathology in 1901 had become very famous in those days, showing two fifteen year old boys exposed to the same source of Smallpox source, one had been vaccinated and other hadn't.

Figure 1

THE STARK REALITY BETWEEN THE VACCINATED AND NOT-VACCINATED



This photograph was taken in early 1900 by Dr. Allen Warner of the Isolation Hospital at Leicester in the UK. Dr. Warner believed that the most way to challenge fears and misinformation about vaccination was to show people the horrors of the disease and clear evidence of how the vaccination is effective, through photography. Needless to say, that in a dwindling situation, people need to remind about the havoc this virus can cause to the individual, family and nation especially with three new variants viz. South African, Brazilian and British on the horizon. Definitely yes, there is need of strong efforts to deal with this vaccine hesitancy and improve the acceptance of COVID-19 vaccination among the population using appropriate

behaviour change communication. The high vaccination coverage levels will help the administration to deal with the situation more effectively.

Globally, the COVID-19 pandemic affected all strata of the population. It started in December 2019 in Wuhan province of China with a suspicion of new infection of unknown aetiology and then spread all over the globe rapidly. By February 2021, more than 10 crore people reported globally to have been affected by the novel Corona Virus causing more than 20 lakh deaths. The USA, a developed country with advanced medical amenities in abundance, is topping in the number of cases, followed by India, a developing country with the second largest population in the world.

Recorded human history is rich in descriptions of infectious disease outbreaks and occasional pandemics. During the European Middle Ages, episodes of *Yersinia pestis* (plague) were recorded with the infectious agent transmitted by shipping from the far Eastern world to Europe by flea infested rats that had managed to board the vessels. Many historians believe there is evidence to show that the H1N1 Influenza pandemic of 1918 which originated in the United States was subsequently spread to other parts of the world, by World War I military troop transport to Europe and western Asia. The unintentional spread of the virus across active battle lines in Europe likely had an important impact on the outcome of the War. In more modern times, the HIV virus is thought to have initially spread from Africa by human travellers to other locations throughout the world.¹ Each of these epidemics/pandemics teach Public Health lessons but the fact we realized when COVID-19 was on the doorsteps, there was no preparedness across the globe irrespective of economic status of the countries.

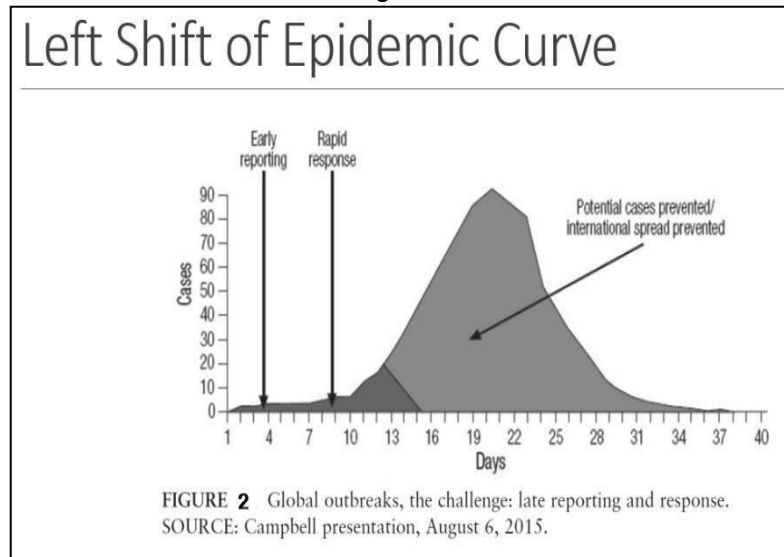
Initially, there was fear even among the health care workers (HCWs). Majority of these usually do not have adequate public health orientation and lacking exact etiology, evolving case definitions and treatment protocols and lack of faith in surveillance system created hesitancy and even reluctance to work. Government had to take special efforts through '*Thali Naad*' to prepare the population for eventual lockdown and recognizing the dedication of functional health workers to boost the morale. The burnout of the HCWs while working in constrained environments is a burning ethical issue which came to the forefront once again. The importance of preserving the physical and mental health and availability of health workers in an epidemic situation is very important. The quality of health care depends almost entirely on them having a professional service ethic that motivates them to provide the highest quality care to all with the resources available to them.²

Transmissibility and severity are the two most critical factors that determine the public health impact of an epidemic. Control strategies are driven by this combination. R_0 , the basic reproduction number, is a commonly used measure of transmissibility and is defined as the number of additional persons one case infects over the course of their illness. An R_0 of less than 1 indicates the infection will die out "eventually." An R_0 of greater than 1 indicates the infection has the potential for sustained transmission.³

COVID-19 had a high transmission rate, and the fatality rate appeared to be high in initial stages. The period of infectivity possibly commences before symptoms appear, and also the existence of asymptomatic cases making it far more difficult to control the spread. In such a situation, reducing the peak of new cases by slowing down the spread of new cases is very useful as it⁴

- reduces the load on diagnostic and treatment services,
- reduces the number of health workers who contract the disease and who can continue working, and
- if the epidemic curve can be smoothed, it will result in a lower overall disease burden.

Figure 2



The preventive measures like handwash, use of mask and physical/social distancing at personal level complimented by the Government-clamped lockdown regulations did achieve exactly the same in India. The global experience shows that the countries those either did not follow the public health principles depended only on herd immunity, had to pay the price in terms of huge morbidity and mortality.

Apart from the victims of COVID-19, the women in the reproductive age group are the greatest sufferers. The lockdown imposed by the administrative authorities, though necessary to control the outbreak, has also led to restriction on movements of pregnant women; thus, reducing their access to antenatal care. During the peak period, there has been a 35.5 per cent increase in emergency admissions; as well as an increase in maternal mortality, intrauterine foetal death, and neonatal mortality. The cause of increased mortality could be delayed treatment due to the closure of primary and secondary health-care services.⁵

The existing data also suggest that the world today may be facing bigger public health challenges than COVID-19. The impact of pandemic prevention measures is a matter of concern, particularly on the mental health and livelihood of the poor and the most vulnerable populations. There are reports that persons with non-communicable diseases are failing to seek timely care due to fear of breaking lockdown rules, the threat of acquiring COVID-19 during visits to healthcare facilities, and the choice made by hospitals to treat emergencies only. The risk of adverse health effects due to the postponement of routine and elective care along with the severe mental stress and depression caused by this largely unprecedented situation is of grave concern. Isolation, unemployment and loss of income may further compound the misery.⁶

The next steps by the Governments worldwide will determine the real impact of this pandemic. Now vaccine is available and cases are declining globally, we should not abandon the public health measures immediately but take the steps cautiously keeping the watch on situation through the surveillance mechanisms and educating people for getting vaccinated and maintain COVID-19 preventive appropriate behaviour. Obviously bringing back health services to normalcy is another challenge.

As WHO Director General Dr. Tedros Ghebreyesus recently said⁷, “We should all be encouraged, but complacency is as dangerous as the virus itself. Now is not the time for any country to relax measures, or for any individual to let down their guard.”

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COVID-19 Pandemic: A Progressive Complex Emergency in India

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Abstract

In December 2019, the first case of COVID-19 was identified in Wuhan city of China which had spread to more than 200 countries by 7 April 2020. It was declared a pandemic on 11 March 2020. By 19 April 2020, a total of 16,116 COVID-19 cases were reported from 32 states/union territories of India. COVID-19 pandemic has created havoc across the globe. According to the figures of worldmeters.info, as on 5 March 2021; there are 116,356,456 Corona virus cases have been reported worldwide out of which 91,980,954 have been recovered while 25,83,349 deaths have been reported. Out of 21,772,153 currently infected patients, 89,634 (0.4%) are critical while the rest are in mild condition. With a total case of 11,175,768 and total 157,591 deaths; India stands at number-2 after the USA As on 5 March 2021. The pandemic has affected the food security, public health, GDP, education and employment sector to a great extent across the globe.

On 8 April 2020, the central government initiated a four-day exercise to create a database of migrant workers across the country for the disbursement of relief materials. The Government of India activated the National Executive Committee (NEC) for quick actions and advisories to manage the emergency. It constituted an inter-ministerial committee represented by the ministers of the Ministry of Health and Family Welfare, External Affairs, Home, Civil Aviation as well as the National Disaster Management Authority. The Joint Monitoring Group (JMG) under the Chairmanship of DGHS started reviewing the preparedness and response mechanisms.

Key words: COVID-19, Emergency, Disaster, Relief, Online, Containment, Vaccination.

Introduction

World Health Day this year occurred against the backdrop of the pandemic of coronavirus disease 2019 (COVID-19), with widespread closure of interstate and international borders that had brought the world to a virtual standstill. By 7 April 2020, COVID-19 had affected more than 200 countries, territories and areas; more than four out of five people in the global workforce of 3.3 billion were affected by full or partial workplace closures; and almost 90 per cent of the schools were closed world over affecting 1.5 billion students.¹

The incidence of emerging infectious diseases in humans has increased in the recent past, and will continue to do so in the near future as well. The emergence of COVID-19 was first identified in Wuhan city of China in December 2019. On 30 January 2020, the World Health Organization (WHO) declared the CoV epidemic or COVID-19 centred in Wuhan, Hubei province, 'a public health emergency of international concern (PHEIC)' and later on, on 11 March 2020, characterized it as a pandemic.²

Complex emergencies (CEs) combine internal conflict with large-scale displacements of people, food shortage and fragile or failing economic, political, and social institutions.³ Emergencies are challenging by

nature but become especially complicated when there is little response system in place; and people often can't access the help they need to recover from the existing or the new ailment.⁴Reasons that CEs put populations at risk are because of large-scale displacement and crowding, lack of clean water, poor sanitation, malnutrition, and low health care and vaccine coverage. Additionally, they may last for years leading to long term deprivation of basic and health services. Finally, large-scale displacement may expose populations to diseases to which they have no immunity or conversely, they may introduce diseases, like malaria, into non-endemic areas.⁵

With the changing global environment, human migration, international trade and travel, population growth and urban development, the prevention of emergence of communicable diseases becoming tough. Moreover, diseases tend to evolve along with scientific advances making them difficult to handle since they spread quickly and have no readily available management modality. In particular, lack of knowledge about the epidemiological determinants and natural history of disease making its spread unpredictable in the community. Globally, more than 200 countries affected with more than 23 lakh confirmed cases and 1,57,847 deaths as on 20 April 2020 which shows the quick spread in a span of around 90 days from the first case reported⁶. As on 19 April 2020, a total of 16,116 COVID-19 cases were reported from 32 states/union territories. The WHO classified cluster of cases from 32 states/UTs.⁷ India witnessed a surge in confirmed coronavirus cases after a religious congregation held at Delhi in March which was attended by more than 5,000 members including foreigners but the system was able to trace approximately 95% of the members and contact tracing is going on.⁸

Factors Affecting Disaster Response

The factors that influence disaster response can be broadly classified into resources i.e. man, money, material; communication, education and training, leadership, inter-sectoral coordination, onsite response preparedness, environment and involved legalities.

Mass Population Displacement

The National Sample Survey Office (NSSO) indicates that the percentage of casual and self-employed workers in urban areas is over 60 per cent of the workforce. These sections have had the immediate loss of earnings due to the COVID-19-related lockdown measures. Amidst the closure of workplaces and avenues of employment, the lack of clear and positive assurances exacerbated these workers' anxieties, and compelled them to make the long walk to home, from the cities to the hinterland. Furthermore, the absence of transport on account of the sealing of borders of states/provinces forced the workers with their belongings and family members to traverse long journeys on foot without food or proper drinking water. Some states set up centres for providing food and shelter but these measures were woefully inadequate. To stem the massive migration from urban to rural India, providing food and shelter to such jobless families in towns and cities became a national priority. The possible solutions were shelter homes utilizing schools, community halls, railway platforms, religious places, guest houses and lodges. In order to come up with a relief package, on 8 April 2020, the central government initiated a four-day exercise to create a database of migrant workers across the country.⁹

Food Security

Prolonged crisis-laden insecurity can have a significant adverse impact on national and local economies including the agricultural industry. Lockdown-related restrictions on movement can hinder food-related

logistic services, disrupt the entire food supply chains and affect the availability of food especially in remote areas. Moreover, agricultural labour will soon pose critical challenges to food production; thus, jeopardizing food security. In addition, economic impacts of this pandemic will reinforce the need for investments to prevent future outbreaks by strengthening the One Health approach. Cumulatively, these factors can lead to food scarcity and/or compromise a population's reliable access to food, and during complex emergencies, the prevalence of acute malnutrition and micronutrient deficiencies can be extremely high.¹⁰ Insulating the rural food production during this period of COVID-19 protected the Indian food market to a great extent. Online food grocery platforms were affected due to the unclear police restrictions and stoppage of vehicles.¹¹

Public Health

The usual health concerns, in complex emergencies, are outbreak of multiple endemic communicable diseases. This was further exacerbated by interruptions in routine vaccination. Later on, mental health and psychological distress become a priority for the population in general and medical responders in particular.¹⁰ In the areas hardest hit to date, neither the hospitals nor the health workforces have been sufficient in number or level of equipment to manage the scale of the COVID-19 caseload is adequate. Shortages of personal protective equipment for health-care workers, ventilators for critical-care patients and even disinfectant for large-scale public health measures have been widespread, and efforts to replenish supplies have been thwarted by the closure of entry points. The COVID-19 pandemic has also revealed that rapid response and/or emergency medical teams at the national level are not adequately resourced or ready for mobilization. In the areas most affected to date, the number of deaths occurring per day has overwhelmed the capacities of mortuary and funeral services¹¹.

These were further complicated by an increasing number of individuals seeking care for chronic, pre-existing medical problems such as hypertension, cancer, cardiac disease, and diabetes, especially in more developed countries with advanced health systems¹⁰. Routine immunisation programmes were disrupted due to interplay of multiple factors like human resources were diverted for other priorities, prolonged lockdown and sealed borders led to disruption of logistics supply chain; and lastly, because of social distancing, parents were not taking their children to the health centres. This led to compromise the immunity of the children to communicable diseases.

Economic Impacts

India's real GDP decelerated to its lowest in over six years in 3Q 2019-2020, and the outbreak of the COVID-19 posed fresh challenges. Steps taken to contain its spread, such as nationwide restrictions and a complete lockdown of states, have brought economic activity to a standstill and impacted both consumption and investment. While Indian businesses, barring a few sectors, can possibly insulate themselves from the global supply chain disruption caused by the outbreak due to relatively lower reliance on intermediate imports, their exports to COVID-19 infected nations took a hit. In sum, the three major contributors to GDP-private consumption, investment and external trade were highly affected¹¹.

Education Sector

Schools around the country have been impacted by COVID-19. Schools have been closed across the land till January 2021 while physical classes for secondary and senior secondary classes have been started with restrictions and various COVID-19 measures. Public schools and low-fee private schools have been

affected significantly which in turn, impacted the teaching and learning in these schools. The parents from the economically weaker section have been facing additional economic burden in the absence of mid-day meals. On the other hand, private schools armed with the means and resources, have been affected minimally; and online teaching-learning has been continuing. Yet, they are facing cash flow issues due to delayed fee payments, in some cases. In higher education, most Higher Education Institutions (HEIs) are not fully geared to implement the online teaching-learning, with constraints around availability of digital content, technology and delivery capabilities¹¹.

Preparedness and Response to Complex Emergencies

As a part of public health emergency preparedness effort, the Government of India activated National Executive Committee (NEC) for quick actions and advisories. Following actions were taken place:

Inter-ministerial Committee: Intensified preparedness for the unprecedented threat posed by COVID-19, the Government of India (GOI) has constituted an inter-ministerial committee represented by the ministers of the Ministry of Health and Family Welfare, External Affairs, Home, Civil Aviation as well as the National Disaster Management Authority. The Joint Monitoring Group (JMG) under the Chairmanship of DGHS started reviewing the preparedness and response mechanisms.

Emergency Medical Relief (EMR): Emergency Medical Relief (EMR) division of Ministry of Health and Family Welfare is the nodal agency for coordinating, implementing and monitoring of preparedness and response. The hazard crisis management plan with defined roles and responsibilities was shared with all the states. Organised series of JMGs with WHO as member were held to maintain situational awareness on potential PHEICs and various technical issues. It also initiated bulk procurement of personal protective equipment, ventilators and drugs.

National Centre for Disease Control (NCDC): National Centre for Disease Control (NCDC) frame up national guidelines on surveillance, case investigation, laboratory detection and quarantine guidelines. A 24x7 call centre has been operational at the NCDC from an early stage of COVID-19 outbreak which provides information and guidance about testing facilities and their location, sample collection facilities, as well as other aspects of the pandemic. Simultaneously, many measures were undertaken to curb the spread ranging from thermal screening at point of entries to lockdown for more than a month with hold on all flights.²

Cluster Containment Strategy: The cluster containment strategy geographically divides the outbreak area into 'containment zone' and a surrounding 'buffer zone'. The containment zone would constitute epicentre with perimeter control, where widespread active search for cases and testing as per sampling guidelines. While in the Buffer Zone there will be no perimeter, no active search but testing of all ill suspects reported to the health centre. In both the areas, isolation of all COVID positive cases in the defined COVID hospitals, home quarantine of contacts and social distancing of more than six feet were followed. The hotspots (>15 cases) and clusters (<15 cases) were differentiated on the basis of number of cases. The red zones were categorised on the basis of high contribution in the state/country (more than 80% of cases) and high growth rate (doubling rate less than 4 days) followed by orange zones which are without hotspots but with clusters while the green zones are without new case in last 28 days. Series of detailed measures taken by the states/district administrations for cluster containment in hotspots, wider testing, and ensuring protective gear for health and security personnel, complete lockdown measures such as school closures and

cancellation of mass gatherings, other measures to minimize person density, and communitywide practice of hand and respiratory hygiene were maintained.¹³

Emergency Response and Health System Preparedness Package: Government of India (GoI) has announced significant investments to the tune of Rs.15,000/- crores for 'India COVID-19 Emergency Response and Health System Preparedness Package'. The key objectives of the package include mounting emergency response to slow and limit COVID-19 in India through the development of diagnostics and COVID-19 dedicated treatment facilities, centralized procurement of essential medical equipment and drugs required for treatment of infected patients, strengthen and build resilient National and State health systems to support prevention and preparedness for future disease outbreaks, setting up of laboratories and bolster surveillance activities, bio-security preparedness, pandemic research and proactively engage communities and conduct risk communication activities. These interventions and initiatives are being implemented under the overall umbrella of the Ministry of Health and Family Welfare.¹⁴

Capacity Building: As a part of disaster preparedness, EMR-DGHS collaborated with National Institute of Health and Family Welfare (NIHFW) for capacity building on public health emergency management. Under this project, NIHFW provided two trainings- one for senior medical officers serving in public healthcare delivery system posted as chief medical officer or district health officer and hospital administrators posted as medical superintendents in tertiary care hospitals. The objective was to train at-least two professionals from each district for each type of training so that through cascading approach at their places, every medical professional may be trained. The content covers all the aspects of present significance like incident response system, surge capacity, infection control, pre hospital care and triage. The trained workforce shall be utilised for harnessing this emergency situation as these trained professionals will be easily operationalize the incident response plan, triage, media management and pre-hospital care. In this pandemic period, the capacity building of the healthcare workers were ensured through online webinars by premier institutes like AIIMS through IGOT- DIKSHA portal. The portal has customized training material for all the level of workforce like medical officers, ANMs and ASHAs.

Food and Agriculture: While the government machinery is providing good information on dealing with COVID-19, at the same time, we need to help our farmers and small producers on how to deal with the threat of pest and disease in their farming systems too. For instance, close to 100 farmers joined a 'plant clinic' run by MSSRF, online, for the first time¹⁵. Inter-state movement of labour needs to be allowed for both primary agriculture and food processing sectors. Seasonal agri-industries like mango, seafood, etc. need labour availability. While the Ministry of Agriculture has released clear guidelines, percolation to state and district officials, clear briefing to police departments is missing.¹¹ The pandemic will emphasize for localisation of supply chains especially for essential services and for the sectors that are strategically important.

Digitalisation: Most companies have opted to work remotely and their employees have been working from home 'online'. These trends were already 'in-motion', they have now hit the fast-forward button. Even the most brick and mortar organisations have been forced to experiment with digital channels like government schools. This presents a real and immediate opportunity to drive efficiencies through digital. At the same time, this crisis has highlighted the importance of investment in enabling technologies like cloud, data and cyber security. This will change the way we 'work' with far reaching implications on B2B, B2C, B2G services, commercial real estate, e-commerce, e-governance, cyber security, process automation, data analytics, self-service capabilities, etc.¹¹

Local Measures for Containment: Nevertheless, extremely robust containment measures have been used for the first time in history in desperate attempts to break the transmission chain of the virus. These attempts to protect public safety through sealing borders and locking down cities, provinces and even countries have taken precedence over the pursuit of development goals.¹ The routine functioning of Medical colleges and hospitals including OPD, teaching and IPD was reduced except emergency departments. The states were asked to identify separate hospitals for COVID-positive cases care and non-COVID case emergency care. Complex emergencies often lead to high mortality rates, generally due to the collapse of the local medical and public health systems which is largely tried to take care by allowing emergency services. But hospitals are not following these directives considering the threat of asymptomatic COVID cases.

Since the vaccine has been made available just recently; therefore, the current prevention strategies shall continue to work like social distancing, face mask, frequent hand sensitization and lockdown measures in high caseload areas. With the downfall in COVID cases and increase in vaccination drive; the lockdown measures have been eased out in phased manners. Some reports also say that most of the populace might have developed antibodies (herd immunity) to resist the virus.

Conclusion

Frequent pandemics and public health emergencies may be mitigated by prompt emergency care only through prior preparedness to prevent overload on the already burdened health system in India. This can be handled by creating a panacea for biological disasters in collaboration with DGHS, Indian council of Medical Research, institutes of national importance, NITI aayog, NIHFW and NDMA.

Urban health system facing multiple problems because of unorganised civil systems and the growth of private for-profit and non-profit care make it more complex. The government has to continue to play the lead role with the support and collaboration of the multiple stakeholders involved in facilitation of access, financing, development of standards and capacity building for emergency care. The concerned areas include linkage to development plans, effective communication system with the use of latest technology, extensive public awareness and education campaign for disaster preparedness, legal and legislative support with involvement of non-governmental organizations and private sectors.

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COVID-19 महामारी: भारत में एक प्रगतिशील जटिल आपातकाल

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सारांश

दिसंबर 2019 में, COVID-19 का पहला मामला चीन के वुहान शहर में पहचाना गया था जो 7 अप्रैल 2020 तक 200 से अधिक देशों में फैल गया था। इसे 11 मार्च 2020 को महामारी घोषित किया गया। 19 अप्रैल 2020 तक भारत के 32 राज्यों /केंद्र शासित प्रदेशों से COVID-19 के कुल 16,116 मामले सामने आए। COVID-19 महामारी ने दुनिया भर में कहर मचा रखा है। 5 मार्च 2021 तक worldmeters.info के आंकड़ों के अनुसार; दुनिया भर में 116,356,456 कोरोना वायरस के मामले सामने आए हैं, जिनमें से 91,980,954 लोग इस महामारी से ठीक हुए हैं, जबकि 25,83,349 लोगों की मौत हुई है। वर्तमान में 21,772,153 संक्रमित रोगियों में से 89,634 (0.4%) गंभीर हैं, जबकि बाकी हल्के स्थिति में हैं। कुल मामले 11,175,768 तथा कुल मौतें 157,591 हैं; भारत 5 मार्च 2021 तक संयुक्त राज्य अमेरिका के बाद नंबर -2 पर खड़ा है। महामारी ने दुनिया भर में सार्वजनिक स्वास्थ्य, जीडीपी, शिक्षा और रोजगार क्षेत्र को काफी हद तक प्रभावित किया है।

8 अप्रैल 2020 को, केंद्र सरकार ने राहत सामग्री के वितरण के लिए देश भर में प्रवासी श्रमिकों का एक डेटाबेस बनाने के लिए चार दिवसीय अभ्यास शुरू किया। भारत सरकार ने आपातकाल के प्रबंधन के लिए त्वरित कार्य और सलाह के लिए राष्ट्रीय कार्यकारी समिति (एनईसी) को सक्रिय किया। इसने स्वास्थ्य और परिवार कल्याण मंत्रालय, विदेश मंत्रालय, गृह मंत्रालय, नागरिक उड्डयन और राष्ट्रीय आपदा प्रबंधन प्राधिकरण के मंत्रियों द्वारा प्रतिनिधित्व की गई एक अंतर-मंत्रालयी समिति का गठन किया। सामान्य स्वास्थ्य सेवा निदेशालय (DGHS) की अध्यक्षता में संयुक्त निगरानी समूह (JMG) ने तैयारियों और प्रतिक्रिया तंत्र की समीक्षा शुरू की।

मुख्य शब्द: COVID-19, आपातकाल, आपदा, राहत, ऑनलाइन, नियंत्रण क्षेत्र, टीकाकरण।

Sustainable Development of Health in India: An Inter-Ministerial Contribution towards Health and Wellbeing for Optimum Quality of Life

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Abstract

The significant achievement within public health in India during the past few decades is visualized by a decrease in demographic indicators for health like IMR, MMR, TFR and doubling of life expectancy. But, grading people's health and the health care system across the states visages a kind of disagreement of an emerging disconnect between the complexity and iniquitous nature of problems as well as the competence to address it meaningfully. The health outcomes still remain depleted when the country is compared with others with similar economic stage of development. Our past efforts to improve the health status showed that optimum health cannot be achieved without the development of other sectors like economy, education and information, social and environment. Hence, there should be an intense collaboration with other departments for achieving the quality of life; and it is desirable that each sector should consider health dimension in their public policy and programme strategies with utmost priority of "leaving no one behind". Thus, the objective of this paper is to explore the level of inter-ministerial contribution and collaboration within and between for health; based on the content analysis of various recent annual reports and publications of each ministry. The intent is for a deeper understanding of inter-sectoral and multi-sectoral collaboration and contribution at all stages for health; identifying the strength, weakness and disparity which need to be tackled for improving and suggesting strategies for the sustainable development of health in India. The study found that majority of the ministries has incorporated health dimension in their policy and programme. But for the country to attain sustainable development for health, requires strong actions with well-defined strategies for mutual cooperation and collaboration between all the ministries and departments at all stages from resources allocation to programme implementation for the desired outcome with the set time period.

Key words: Sustainable development, Health, Quality of life, Centrally-sponsored schemes, NHM, AYUSH.

Introduction

India's development agenda is a reflection of Sustainable Development Goals (SDGs). The adorable phrase enunciated by the Prime Minister "Sabka Saath Sabka Vikas" translated as "Collective Effort, Inclusive Development" forms the foundation of the new national development agenda. Our past efforts to improve the health status showed that optimum health cannot be achieved without the development of other sectors like economy, education and information, social and environment. Hence, there should be an intense collaboration with other departments for achieving the quality of life; and it is desirable that each sector should consider health dimension in their public policy and programme strategies with utmost priority of "leaving no one behind". Further, the way India with its diversity of problems and issues develops sustainable development strategies for achieving the optimum quality of health will be the best model for replication by other countries with similar socio-economy, demography and environmental status. Research on the intersectoral and multisectoral cooperation for health showed that collaboration was enabled by authorising directives and support from the top. The experiences and lessons from the past struggles to find a way

forward on how to achieve collaborative action within the local health systems to address an unmet need for health transformation.

The United Nation Development Sustainable Development Goals 2030 include 17 goals with 169 targets. Out of these SDGs, the goal SDG-3 focuses on health comprising 13 targets with 4 listed as means of implementation targets and a total of 26 indicators. Each target has one or two proposed indicators and these health Goals have the largest number of proposed indicators among the all the SDGs. Further, the SDG-3 lays emphasis on ensuring healthy lives and promoting well-being for all at all ages and to make it attainable by linkage with other 8 SDGs i.e. SDGs 1- End poverty in all its forms everywhere; SDG-2- End hunger, achieve food security and improved nutrition and promote sustainable agriculture; SDG-5- Achieve gender equality and empower all women and girls; SDG-6- Ensure availability and sustainable management of water and sanitation for all; SDG-7- Ensure access to affordable, reliable, sustainable and modern energy for all; SDG-8- Promote sustained, inclusive and sustainable Economic growth, full and productive employment and decent work for all; SDG-11- Make cities and human settlements inclusive, safe, resilient and sustainable;SDG-13- Take urgent action to combat climate change and its impacts. Thus, attainment of optimum health of the population is not the isolated responsibility of the ministry of health rather it requires collective action by other ministries considering health dimension in the policy and programmes.

The objective of the paper is to explore the level of inter-ministerial contribution and collaboration within and between for health; based on the content analysis of various recent annual reports and publications of each ministry for a deeper understanding of inter-sectoral and multisectoral collaboration and contribution at all stages for health. It also attempts to identify the strength, weakness and disparity which need to be tackled between the concerned ministries for improving and suggesting strategies for the sustainable development of health in country.

Findings

India's Target, Ministries and Schemes for SDGs of Health

In line with the global attempt to achieve the sustainable development goals, India is set to achieve the 13 targets of various health indicators by linking the Ministry of Health and Family welfare with 19 other Ministries/Departments through centrally-sponsored schemes/central sector schemes. Target-1:Reduce the global maternal mortality ratio to less than 70 per 100,000 live births by 2030. Target-2: End preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births by 2030. The ministries involved for target1 and 2 are Health and Family Welfare, AYUSH, WCD, and Tribal Affairs. The Centrally-Sponsored scheme/Central Sector Schemes (CSS) approved are National Health Mission (NRHM/NHM) RCH Flexible Pool including Health System Strengthening, Routine Immunisation programme, Pulse Polio Immunisation Programme, National Iodine Deficiency Disorders Control Programme, National Urban Health Mission– Flexible Pool, Human Resources for Health and Medical Education, National AYUSH Mission, Umbrella ICDS, Pradhan Mantri Matru Vandana Yojana (PMMVY), Mission Indradhanush.

Target-3 focuses on ending the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases, combat hepatitis, water-borne diseases and other communicable diseases by 2030. The ministries involved in this are Health and Family Welfare, AYUSH, Drinking Water and Sanitation, Housing and Urban Affairs, RD, Petroleum and Natural Gas, Food Processing Industries, Tribal Affairs. 12 Centrally-Sponsored

Schemes/Central Sector Schemes (CSS) are approved i.e. NHM- Flexible Pool for Communicable Diseases, National AIDS Control Programme, National AYUSH Mission, Swachh Bharat Mission (SBM)-Rural, National Rural Drinking Water programme, Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Shyama Prasad Mukherjee RURBAN Mission, Pradhan Mantri Ujjwala Yojana, Pradhan Mantri Kisan SAMPADA Yojana, Special Central Assistance to Tribal Sub Scheme, Umbrella Programme for Development of Scheduled Tribes.

Target-4 aims at reducing premature mortality from non-communicable diseases through prevention and treatment to one-third by promoting mental health and wellbeing by 2030. To achieve the targets, six Centrally-Sponsored Schemes/Central Sector Schemes (CSS) are approved. These are NHM- Flexible Pool for Non-Communicable Diseases, Injury and Trauma, NHM-Human Resources for Health and Medical Education, NHM-Strengthening of State Drug Regulatory System, National AYUSH Mission, Special Central Assistance to Tribal Sub Scheme, Umbrella Programme for Development of Scheduled Tribes. Further, all these schemes are to be implemented by Health & FW, AYUSH, WCD and Tribal Affairs.

Target-5 focuses on strengthening the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol. The ministries involved are Social Justice and Empowerment, AYUSH, Home Affairs and Health and FW. Three Centrally-Sponsored Schemes/Central Sector Schemes (CSS) have been approved. These are Scheme for Prevention of Alcoholism and Substance (Drugs) Abuse, National AYUSH Mission, Police Infrastructure (Narcotics Control Bureau, etc.)

Target-6 aims to halve the number of global deaths and injuries from road traffic accidents by 2030. The ministries identified and involved are Road Transport and Highways, Health and FW and AYUSH. To achieve the targets, three Centrally-Sponsored Schemes/Central Sector Schemes (CSS) are approved like Road Safety Schemes for publicity and awareness generation, NHARSS-National Highways Accident Relief Service Project, Institute of Driving Training and Research, etc. linking with the National Health Mission and National AYUSH Mission.

Target-7 focusses on ensuring universal access to sexual and reproductive healthcare services, including family planning, information and education, and the integration of reproductive health into national strategies and programmes by 2030. The ministries involved are Health and FW, Ayush, WCD. The Centrally-Sponsored Schemes/Central Sector Schemes (CSS) approved are National Health Mission (RCH Flexible Pool), National AYUSH Mission and Umbrella ICDS.

Target-8 aims at achieving universal health coverage including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines. All these will be taken care through the Centrally-Sponsored Schemes/Central Sector Schemes (CSS) like National Health Protection Scheme (Ayushman Bharat), National Health Mission (RCH Flexible Pool, Flexible Pool for communicable diseases and Flexible Pool for non-communicable diseases), National AIDS Control Programme, medical treatment of CGHS pensioners (PORB), NHM-Human Resources for Health and Medical Education, National AYUSH Mission, Umbrella ICDS, Umbrella Programme for Development of STs and Minorities, Umbrella Programme for Development of Minorities including Development of Minorities- Multi Sectoral Development Programme for Minorities (MSDP), Jan Aushadhi Scheme. The ministries identified are Health & FW, AYUSH, WCD, Tribal Affairs, Minority Affairs, Chemicals and Fertilizers

Target-9 focusses on substantially reducing the number of deaths and illnesses from hazardous chemicals, air, water and soil pollution and contamination by 2030. The ministries identified are MoEF&CC, Housing and Urban Affairs, Water Resources, River Development and Ganga Rejuvenation, Shipping, Health and FW, AYUSH. The Centrally-Sponsored Schemes/Central Sector Schemes (CSS) listed to manage are Environment Protection, Management and Sustainable Development (Pollution Abatement), Decision Support conservation skills and System for Environmental Policy, Planning and Outcome Evaluation, Urban Transport including Metro Projects, UT Planning Scheme and Capacity Building, National River Conservation Programme, Research and Development and Implementation of National Water Mission, Development of Major and Minor Ports.

Target-10 aims at strengthening the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries, as appropriate. The Centrally-Sponsored Schemes/Central Sector Schemes (CSS) is the National Tobacco Control Programme. The ministries identified are Health and FW, AYUSH.

Target-11 focusses on supporting the research and development of vaccines and medicines for the communicable and non-communicable diseases that primarily affect developing countries, providing access to affordable essential medicines and vaccines, in accordance with the Doha Declaration. The TRIPS Agreement and Public Health affirms the right of developing countries to use the provisions in the Agreement on Trade-Related aspects of Intellectual Property Rights and flexibilities to protect public health, and providing access to medicines for all. The ministries identified are Health and FW, AYUSH, Science and Technology, Chemicals and Fertilizers and Commerce. The Centrally-Sponsored Schemes/Central Sector Schemes (CSS) listed are National Health Mission, setting up of a network of laboratories for managing epidemics and national calamities, development of infrastructure for promotion of health research, National AYUSH Mission and allied schemes related to pharmaceuticals innovation, Technology Development and Deployment, Biotechnology Research and Development, National Institutes of Pharmaceutical Education and Research (NIPERs).

Target-12 aims at substantially increasing the health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in the least developed countries and small island developing States. The Centrally-Sponsored Schemes/Central Sector Schemes (CSS) identified are NHM, Human Resources for Health and Medical Education, Human Resource and Capacity Development, Umbrella ICDS. The ministries involved are Health and FW, WCD and AYUSH.

Target-13 focusses on strengthening the capacity of all the countries, particularly developing countries, for early warning, risk reduction and management of national and global health risks. The ministries involved are Health and FW and AYUSH.

Thus, in tune with the SDGs for health, it was realized and considered that achievement of optimum health is the responsibility of all the Government departments. Hitherto, there is a need for a '*sub-department of health*' in all the Ministries for health impact assessment of the policies and other initiatives of all the Ministries right from the conceptual stages. This was also stated by the Union Minister of Health and Family Welfare (2019) over the MoU signing ceremony between National AIDS Control Organisation (NACO) under the Ministry of Health and Family Welfare and Department of Social Justice and Empowerment (DoSJE) under the Ministry of Social Justice and Empowerment (MoSJE).

Role of Various Ministries for Health

Ministry of Social Justice and Empowerment (MoSJ&E): The MOU with MoSJ&E entrusts in developing specific strategies and action plan for HIV and AIDS prevention, mechanism for drug addiction treatment and extending social protection schemes to the vulnerable population. It emphasizes developing human resources and capacity building for strengthening the service delivery mechanism for HIV and AIDS prevention, drug addiction treatment and reference services by the National AIDS Control programme and department of Social Justice and Empowerment.

Through this MoU, the services of various institutes under the DoSJE such as the National Centre for Drug Abuse Prevention (NCDAP), National Institute of Social Defence (NISD), Integration Rehabilitation Centres for Addicts (IRCA) will be leveraged for execution of activities laid out in the MoU. As per the MoU, the MoSJ&E also observes *Swachta Pakhwara* in which a free health and eye medical checkup camp and distribution of reading glasses for the benefit of Bagri Lohar DNT Community was done. Further, the NSKFDC organized Health Camps for the manual scavengers and sanitation workers and their family members, conducted Recognition of Prior Learning (RPL) training programmes and provided One Time Cash Assistance (OTCA) to the identified Manual Scavengers. It also observes Composite Awareness Programme including free medical health checkup camps. During the programme, the schemes of MoSJ&E as well as Apex Corporations were publicized and scheme pamphlets were distributed. These camps were organized on a pan India basis. Further, under the Dr. Ambedkar Medical Aid Scheme, cent per cent financial aid is provided to the poor SC and ST patients, whose annual family income is less than three lakh rupees and who are required to undergo surgery of kidney, heart, liver, cancer, brain or any other life-threatening diseases which require surgery including organ transplant and spinal surgery. The estimated cost of the treatment is released directly (crossed cheque/DD) to the concerned hospital, with a maximum ceiling limit set in each case. The MoSJ&E is also involved in promoting preventive health care, sanitation and education by organizing activities like: (i) Intervention in Aspiration District of Mewat (state Haryana): by sanctioning a CSR Project towards improving the access to Health Care Services through Mobile Van for vulnerable children, youth and community from the backward district; (ii) Provision of Sanitary Napkin Vending Machine and Incinerator Machines in educational institutions in Madhya Pradesh and West; (iii) Counselling programme for maintaining menstrual hygiene; (iv) Promoting Health Care and Sanitation to persons affected by floods in Kerala; (v) Provision of Toilets in a school in Haryana; and (vi) Free Medical and Eye Check-up Camps and School-focussed camps providing treatment of dental filling, anaemia and distance spectacles to school children.

Further, in line with the National Policy on Older Persons as proposed under the Finance Act (2015), Senior Citizens Welfare Fund for the promotion of the welfare of senior citizens including schemes for promoting financial security, healthcare and nutrition of senior citizens, welfare of elderly widows, schemes relating to Old Age Homes, Short Stay Homes and Day Care of senior citizens, etc. are being developed. A National Action Plan for Drug Demand Reduction (NAPDDR) for 2018-2025 is being prepared also. Under the IT Initiatives, during the year 2018-19, a Web Portal for Pradhan Mantri Adarsh Gram Yojana MIS (PMAGY-MIS) was developed for the integrated development of SC-majority villages. It aims at improving 50 monitorable indicators in 10 domains such as water and sanitation; education; health and family welfare, etc. Introduced Pre-Matric Scholarship to the Children of those engaged in occupations involving cleaning and prone to health hazards.

Ministry of Minority Affairs: This Ministry is looking after the health component of the minorities. Under the National Health Mission, the Ministry of Minority Affairs in coordination with the Department of Health

and Family Welfare, created more than 83,445 health facilities. Each health facility caters to a lakh population in 235 minority-concentration districts. It developed a comprehensive programme of Skill Development amongst the Muslims through an inter-ministerial group including Health and Family Welfare. It recommended State Governments and UTs to consider posting of Muslim health personnel for providing services in Muslim-concentrated areas. The Ministry of Health and Family Welfare delegated to issue appropriate guidelines and Department of Personnel & Training (DoPT) will be the nodal department for monitoring. Further, it stressed on the dissemination of information on Health and Family Welfare schemes in Urdu and regional languages in districts, blocks and towns having a substantial minority population. A basket of choices in contraception will also be made available along with ensuring easy access to such services by the MoHFW. As per the Haj Committee Act (2002), a separate Division in the Ministry headed by the Joint Secretary (Haj) has been set up to look after the Haj affairs. The Ministry manages the Haj work in coordination with the Ministry of External Affairs, Ministry of Civil Aviation, Ministry of Health, Haj Committee of India (HCoI) and the Consulate General of India (CGI), Jeddah, Kingdom of Saudi Arabia.

This ministry introduced the *Jiyo Parsi* scheme for addressing the population decline of Parsis in India and released funds to Parzor Foundation for medical assistance, advocacy and addressing the health issues of the community. It initiated the *Nai Roshni* scheme for leadership development amongst the minority women. Through a six-day (five-day for residential) sensitization programme followed by handholding for a period of one year. The ministry has developed specific training modules covering issues on Leadership of Women through participation in decision making, Educational Programmes for women, Health and Hygiene, Legal rights of women, Financial Literacy, Digital Literacy, Swachh Bharat, Life Skills, and Advocacy for Social and Behavioural change. Further, it introduced the *Pradhan Mantri Jan Vikas Karyakram* (PMJVK) for carrying out projects like construction and up-gradation of Primary Health Centres (PHCs), Health Sub-Centres, drinking water supply projects, and other social development work, etc.

Ministry of Women and Child Development (MWCD): The nodal responsibility of this ministry is to advance the rights and concerns of the women and children who together constitute 67.7 per cent of the country's population (Census 2011). The prime intention of this ministry is to address the gaps in State action for women and children, promoting inter-ministerial and inter-sectoral convergence to create gender equitable and child-centric legislation, policies and programmes. This ministry has linkages with the health department either directly or indirectly with different health schemes like Anganwadi Services Scheme, *Pradhan Mantri Matru Vandana Yojana*, National Creche Scheme, *POSHAN Abhiyaan*, Scheme for Adolescent Girls, Child Protection Scheme, *Mahila E-Haat*, Family Counselling Centre Scheme, Grant-in-Aid for Research, Publication and Monitoring, Gender Budgeting Scheme, Nutrition Education and Training through Community Food & Nutrition Extension Units (CFNEUS). The National Institute of Public Cooperation and Child Development (NIPCCD) under the *Beti Bachao Beti Padhao* scheme (BBBP), provides information and training for better inter-sectoral and inter-institutional convergence at district/block/grass-root level. It orients the trainers about planning process of preparation of district action plan and advocacy campaign for social and behavioural change. The Food and Nutrition Board (FNB) is engaged in inter-sectoral coordination and follow up action on the National Nutrition Policy, National Plan of Action on Nutrition and policy matters related to nutrition.

Ministry of Home Affairs (MHA): The MHA in collaboration with Ministry of Environment and Forest involved in diversification of the forest land for creating dispensary/hospital. The Government has approved a centrally-sponsored scheme for road connectivity project for left wing extremist affected areas. The Department of Telecommunication is setting up mobile towers in these areas. Under the Border Area Development Programme, it provides funds to the states develop infrastructure for health. It has launched

the M-Aarogya App of Medical and Health Department; and IT Policy for Information and Technology Department. It has introduced *Annaprashan* under *POSHAN Maah* and *Annaprashan* Kit was provided to the Post-Natal Care (PNC) women and 6-month-old babies. In the UT of Dadra & Nagar Haveli, it has introduced “*Swabhimaan* Scheme”, which aims at improving the nutritional status of pregnant women, lactating mothers and out of school adolescent girls in the age group of 11—14 years who find it difficult to attend the Anganwadi Centres for obtaining supplementary nutrition. Under the *Aarogyam Sarvadha*, 15 acre of land in Sayli area has been acquired for setting up of a Medical College with a capacity of 150-medical seats. Under the Empowerment of Women Scheme, the rural women/girls are trained in the matters like family health, child care, nutrition, domestic and environmental sanitation, small saving, etc. at the Home Science College, Chandigarh. Further, free lab diagnostic and free radiological services to the patients through empanelled radiological centres are made available if they are referred by the Delhi Government Health Centres. The scheme of free treatment/surgery/diagnostic for general public, which cannot be provided at Delhi Government hospitals, are being provided through identified private hospitals for which payment is released through Delhi Arogya Kosh. Further, financial assistance is provided through Delhi Arogya Kosh for free treatment of Medico-legal victims of road accident, acid attack and thermal burn injury in identified private hospitals/nursing homes. To reduce the response time in congested areas and J.J clusters, it has initiated a pilot project for induction of First Responder Vehicles (FRVs).

The MHA has launched the “*Ayushman Bharat* Scheme” in the UT of Daman & Diu and celebrated the “*Ayushman Bharat Day*” during the *Gram Swaraj Abhiyan*. *Ayushman Bharat* helps the poor people in getting treatment in various hospitals by providing a health insurance up to rupees 5.00 lakh per family. The public health services are being provided through the network in the UT of Dadra and Nagar Haveli. Free of cost curative, preventive, rehabilitative and supportive health care services are provided across the islands through a well-developed Government health infrastructure. Under the MOU with Puducherry Cancer Trust Hospital, radiotherapy and chemotherapy medical treatment are made available to cancer patients. During the National Breast-Feeding Week, emphasis was laid on donating breast milk. Periodical audit of still birth and caesarean has been initiated on a monthly basis.

Further, the UT of Lakshadweep (UTL) has been declared Open Defecation Free (ODF). Cloth bags have been distributed to all the households in the islands to replace the use of plastic bags for behavioural change. It has ensured accessibility to toilets in all households in Lakshadweep. All the public places like the Mosques, Madaras and Temples are provided toilet facilities under the CSR funds of Shipping Corporation of India; and Mumbai and Cochin Shipyard, Kochi. The UTL administration transports non-biodegradable resource materials for recycling to the Swachh Recovery Center, Kochi. The UTL conducted massive sanitation campaign “*Swachhata Hi Seva*- (SHS-2018); and Lakshadweep *Swachh Surveksan Grameen*-2018 (LSSG- 2018) was observed. One of the main components of the SHS-2018 was the mass *Shramadan* Programme in which entire UTL was cleaned by involving people from all walks of life.

The UTL administration has signed an MoU with the National Health Agency, GoI, to implement the *Ayushman Bharat* (Health Insurance Scheme) as part of the National Health Insurance Mission. The UTL administration has extended the existing health Insurance Scheme to incorporate *Antyodaya Anna Yojana* (AAY)/Priority House Hold (PHH) beneficiaries. A 20-bedded Deen Dayal Upadhyaya AYUSH Hospital has been established in the capital island Kavaratti. Under the “*Rashtriya Vayoshri Yojana* (RVY),” the administration conducted a camp for distribution of Assisted Living Devices to senior citizens of BPL category. Under the Health and Sanitation programme, Chandigarh has been conferred with *Kayakalp* Award by the Union Health Minister for implementing the *Kayakalp* module. SKOCH Order of Merit Award (top 50 *Swasth Bharat* Projects in India) has been introduced for the innovations and best practices in 2018

in Night Vigil, Mobile Food, Testing Lab, *Pradhan Mantri Surakshit Matritv Abhiyan* (PMSMA), etc. Further, under the e-Governance initiative in NHM, e-Hospital Module has been implemented in four City Hospitals. 'TARRE ZAMEEN PAR'- A NIGHT VIGIL: a first of its kind initiative in the country to improve immunization has been implemented. In this, the teams shall be sent to the areas to vaccinate the children of homeless/nomads/rag pickers/beggars, etc.) during the National Immunization Day. For strengthening medical facilities for the personnel of CAPFs; it is visualized to have a Unit hospital at each CAPF with indoor facilities with the required number of health care personnel and equipment.

Ministry of Road Transport and Highways: This ministry contributed towards health by focusing on road traffic injuries which is the leading killer of people aged 5-29 years. The SDG 3.6 targets to decrease the number of road deaths and injuries by half by 2020 which can't be achieved without drastic action. In India, accidental injury is one of the leading causes of disability, mortality and morbidity; and road traffic crashes are one of the major causes. The Committee on Road Safety was of the view that the programmes to promote road safety should be developed and implemented using the public health approach, identifying the problem and the risks, identifying the appropriate interventions based on cost effectiveness, sustainability and culture specificity, and finally evaluating these interventions by the actual reduction in injuries and deaths.

The ministry considers that road safety is a multi-sectoral and multi-dimensional issue which includes health and hospital services for trauma cases (in post-crash scenario). Health departments are responsible for medical care of accident victims; insurance companies provide insurance cover and compensation. Ministry of Road Transport & Highways would provide 140 advanced life support ambulances to 140 identified State Government hospitals to be upgraded under the Ministry of Health and Family Welfare's Scheme 'establishment of an integrated network of Trauma Centers' along the Golden Quadrilateral, North-South and East-West Corridors of the National Highways.

Ministry of Water Resources, River Development and Ganga Rejuvenation: There is no direct link with health activities in this ministry.

Ministry of Jal Shakti: The ministry launched a special campaign "*Jal Shakti Abhiyan* (JSA)" so that citizens of the country become aware of water conservation. The '*Jal Shakti Abhiyan*' focuses on five aspects i.e., water conservation and rainwater harvesting, renovation of traditional and other water bodies, reuse of water and recharging of structures, watershed development, and intensive forestation. The conservation efforts will be supplemented by initiatives like developing block and district water conservation plans and '*krishi vigyan kendra melas*' to promote efficient water use for irrigation and better crop choices. In urban areas, plans with time-bound targets will be developed for waste water reuse for industrial and agricultural purposes. Plans will be developed for at least one urban water body for groundwater recharge in the block or the city. Scientists and IITs will also be mobilised at the national level to support the teams.

Ministry of AYUSH has developed various schemes like grant-in-aid for promotion of AYUSH intervention in public health initiatives, scheme for assistance to organisations (government / non-government non-profit) engaged in AYUSH education / drug development and research / clinical research, etc. For enhancing the health security of the rural community, grant-in-aid to non-profit/non-governmental AYUSH organisations/institutions are provided. Revitalization of local health traditions, midwifery practices, etc. are encouraged through extra mural research (EMR) in ayurveda, yoga and naturopathy, unani, siddha and homoeopathy. Acquisition, cataloging, digitization and publication of text books, promotion of information, education, and communication (IEC) in AYUSH, and development of AYUSH clusters have been

envisaged. Further, various activities were initiated by the ministry under SDGs-03 to ensure healthy lives and promote wellbeing for all by 2030. Some of the initiatives are like research projects on Reproductive and Child Health (RCH), protocol on Anti-Natal Care, pilot project in Tamil Nadu for delivering AYUSH services as part of the nutrition scheme for reduction in the infant and maternal mortality rates as well as anaemia among girls have been implemented. Yoga has been introduced in schools and celebration of International Yoga Day on 21 June every year to promote wellness and prevents psychosomatic disorders. Further, the AYUSH practitioners have been empowered through its research councils and National Institutes. A detailed strategy paper has been prepared on strengthening AYUSH on Nutrition and Diet Schedule, development of AYUSH clusters for an effective and sustainable strategy for competitiveness enhancement of MSMEs. Promotion of Information, Education, and Communication (IEC) in AYUSH for awareness among the members of the community about the efficacy of the AYUSH Systems, cost-effectiveness and the availability of herbs used for prevention and treatment of common ailments at their door steps have been given priority.

Ministry of Tribal Affairs (MTAs) introduced the scheme for the Development of Particularly Vulnerable Tribal Groups (PVTGs) for who have stagnant or diminishing population with low literacy level, still use pre-agricultural technology, and economically backward. It aims at protecting and improving their social indicators like livelihood, health, nutrition and education in order to lessen their vulnerability. For addressing the health service delivery gap; it has introduced programmes beyond the NHM such as provision of safe drinking water, land distribution, land development, social security, housing and habitat, connectivity (road and telecommunication), electricity supply, solar power with provision of maintenance, irrigation, urban development, culture, sports including traditional and tribal games and sports, other innovative activities for the comprehensive socio-economic development of PVTGs.

For improving their health status, emphasis has been given on the creation of special health centers for PVTGs beyond the National Health Mission (NHM) norms. Support to the existing institutions for manpower, medicines, equipment, buildings, the need to undertake health surveys of PVTGs including issuing health cards to them indicating their health status especially with respect to sickle-cell anaemia (100% screening), keeping aside the untied funds for emergency and specific needs, training for paramedics amongst the tribal people; promoting the use of treated mosquito nets to prevent malaria, composite fish culture to control mosquito growth and also to supplement protein for nutrition. Cent per cent health facility coverage of pregnant mothers and immunisation of children are taken care of in these programmes. The schemes/projects will be monitored by the Ministry in a continuous basis through various monitoring mechanisms like field visits by the State Government officials and Ministry officials by considering specific outcomes with respect to literacy, drop out, immunization, nutrition, income levels, employments, etc.

The Ministry is also responsible to draw up plans for the PVTGs involving reputed national level bodies, including industry associations, the concerned State Governments and other agencies. The MTAs' Conservation-cum-Development (CCD) Plan is a cent per cent Central-Sector Scheme. Under the Special Central Assistance (SCA) to tribal sub plan, 10-15 per cent of the money has been released to States/UT in one/two installment(s) to further the health of the tribal populace. Few expected outcomes under the CCD Plan are like enrolment rates in schools, reduction of dropout rates, increase in immunisation rates of infants, increase in health coverage of pregnant mothers, etc.

Ministry of Housing and Urban Affairs is involved in the health activities directly or indirectly under the Swachh Bharat Mission (Urban). Under this mission, it has identified two primary components- achieving

cent per cent open-defecation free status and scientific processing of solid waste in all the statutory towns in the country. The *Swachh Survekshan* has given rise to healthy competition between cities to become the 'cleanest' city. Under this, citizen feedback sort on cleanliness status and is an integral input for cities' rankings. Ministry also launched a 'Star Rating Protocol for garbage free cities' to motivate cities to achieve garbage free status and launched the ODF+ and ODF++ protocols, with a focus on sustaining ODF outcomes and achieving holistic sanitation. While ODF+ protocol focuses on O&M of community/public toilets by ensuring functionality and proper maintenance of CT/PTs for their continued usage, ODF++ focuses on addressing safe management of fecal sludge from toilets, and ensuring that no untreated sludge is discharged into open drains, water bodies or in the open. MoHUA has a Central Public Health and Environmental Engineering Organisation (CPHEEO). Water supply and sanitation including Solid Waste Management being a State subject, the State Governments/Union Territories and Urban Local Bodies are responsible for planning, designing, implementing, operating and maintaining these. The Ministry of Housing and Urban Affairs is responsible for formulation of policies and programmes and assisting the States for technical guidelines/financial support. Further, the ministry developed National Urban Sanitation Policy for Urban Sanitation in India. According to the Annual Report 2018-'19, the MoHUA does not show any inter-sectoral co-ordination with MoHFW and no committee formation is also reported.

Discussion

To bridge equality with development initiatives, each ministry has incorporated various health associated programmes and schemes with allocated funds. According to the National Health Policy, each ministry has to consider health in all policies. Thus, the assessment of recent activities of each ministry revealed that all the ministries have tried to incorporate health dimension in their policies and programmes; and introduced various schemes. But, more coordinated efforts between the ministries are required for optimum quality of health and wellbeing within the stipulated time frame. Thus, for the country to attain sustainable development for health, requires strong actions with well-defined strategies for mutual cooperation and collaboration between all the ministries and departments at all stages of resources allocation and programme implementation. Kim et. al. reported that convergence of sectoral programmes is important for scaling up essential maternal and child health, and nutrition interventions. These interventions are implemented by two government programmes designed to work together- Integrated Child Development Services (ICDS) and National Rural Health Mission (NRHM). But, it was found that there is limited understanding of the nature and extent of coordination in place, and needed at the various administrative levels. How inter-sectoral convergence and the factors influencing convergence in policy in nutrition programming are operationalized between ICDS and NRHM from the state to village levels in Odisha has been examined. It was observed that there was a close collaboration at the state level in developing guidelines, planning, and reviewing programmes, facilitated by a shared motivation and recognized leadership for coordination. However, the health department was perceived to drive the agenda but different priorities and little data sharing presented challenges. At the district level, it was seen that there were joint planning and review meetings, trainings, and data sharing but poor participation in the inter-sectoral meetings and limited supervision. While the block level is the hub for planning and supervision, cooperation is limited by the lack of guidelines for coordination, heavy workload, inadequate resources, and poor communication. Strong collaboration among flaws was facilitated by close interpersonal communication and mutual understanding of roles and responsibilities. The study suggested that congruent or shared priorities and regularity of actions between sectors across all levels will likely to improve the quality of coordination. Clear roles, leadership and accountability are also imperative. As convergence is a means to achieve effective coverage and delivery of services for improved maternal and child health; and nutrition, focus should be on delivering all the essential services to the mother-child dyads through

mechanisms that facilitate a continuum of care approach rather than sectorally-driven, service-specific delivery processes.

Further, idealistic SD for health can be linked to Strategies and Global Action Plan adopted by the World Health Assembly. It involves covering the national health concerns and also majority of the international programmes. Any approach to national health development focussing on individual programme initiated by different ministries in isolation will be counterproductive leading to fragmentation and competition that has been observed previously. It fails to address many cross-cutting issues that do not fit into the programme areas. The emphasis on Universal Health Coverage (UHC) making it central to the overall health goals under the SDGs is crucial for the health sector to overcome all these challenges.

The SDGs are based on the principle of “integration and indivisibility” - that is progress in one area depends upon the progress in many other areas. Translating this idea into a practical action is one of the challenges of this new agenda. To address health issues, a purposeful action is required to influence governance in many policy areas leading to achieve health sector goals. The health of the people is not only dependant on the health sector but also impacted by other issues such as transportation, housing, agriculture, safe drinking water and sanitation, clean environment, housing, trade and foreign policies, information and communication, etc. To address the multi-sectoral nature of the health determinants, the health sector should strongly promote 'health in all policy'- an approach to public policy sector that it automatically takes into account the health implications decisions, making synergies, and avoid harmful health impact. In order to improve population and health equity, and address the social determinants of health; the target in other ministries/sectors goals should be given special attention in designing and implementing policies. Further, there is a need to monitor the individual targets to address the cross-cutting approaches to the health challenges. Robust and reliable monitoring of progress and performance are important for all the major health programmes with the set of indicator proposed for the set targets by each ministry for maximization of health with pooled minimum resources.

Under the MDGs, India was able to make remarkable progress. Hundred million people have been lifted out of poverty, under-five child mortality rate has been dropped by 61 per cent from 125 death per 1000 live births in 1990 to 49 in 2013; maternal mortality ratio dropped by 70 per cent from 560 to 167 during 2011-'13. The country has been successful in combating HIV, tuberculosis and malaria. The HIV prevalence among the pregnant women aged 15—24 years have declined, and malaria incidents have also come down. Deaths due to TB have been nearly halved. The SD for health provides new opportunity to strengthen the inter-sectoral governance for health based. Much of the attention on governance for health has been focussed on global issues but the SDG declaration underlines the importance of governance for health at the national and regional levels. The integrated nature of the SDGs agenda presents opportunities for new approach to the earlier problem but also present challenges to address regional disparities covering different ministries/sectors. Consecutively, to achieve the universal health coverage goal, the health system needs to be strengthened and made adaptive to the emerging health priorities associated with demographic and epidemiology transition, technologies development and meeting the changing public expectations.

The country had initiated certain specific programmes for the achievement of the SDGs focusing on health and some of them in a mission mode by different ministries. There has been a general improvement in the provision of Healthcare infrastructure, human resource development but more was needed as could be seen from India's failure to reach many of the MDG targets and the status of peoples' health in the country

is still way below the world average. This raises questions about implementation strategies of these programmes.

The MDGs agenda and the country's National Health Programmes have contributed to the expansion of health system capacities but each state and union territory is at a different state of economic, social, democratic, political and health system achievement. The Gol and the states should deliberate and consider several essential but critical aspects like- how to integrate the SD for health agenda into the existing policies, programmes and plans, what additional strategies would be required within and outside the health sector for coordination, cooperation for collective impact, how could the needed additional resources be mobilized for collaboration for health, how to implement and monitor progress of different ministries on different targets made under collaboration, how to establish centre-state and inter-ministrial/inter-sectoral coordination and cooperation mechanism for this process of transition and managing the change for sustainability.

The country has to achieve the SDGs by 2030. It has to be tackled by coordinating and cooperating with other sectors like education and women empowerment, availability of clean drinking water, sanitation and hygiene, environmental protection, transportation and communication, etc. for collective impact. The SDGs have to be achieved if the country is to ensure quality health for all. Therefore, the India government has identified 19 ministries/departments which need to be collaborated and integrated leading to collective impact for human welfare. Studies have shown that under the inter-sectoral coordination for health, the major challenges identified included lack of clear directives and institutional support for collaboration, obstacles to monitoring, interdepartmental administrative challenges, differing perspectives on strategy among district and local leaders, community resistance and inaction, and intervention over-commitment. In spite of strongly addressing difference between different ministries for inter-sectoral coordination, Governments at the centre and state-level continue to implement more sectoral actions and inter-sectoral coordination to address health issues and challenges but coordinated broader efforts for radical changes need to be made to transform policy and programme into resulted-oriented achievable action.

Conclusion

The experience and achievements of MDGs highlighted that health cannot be achieved in isolation. Considering the above scenario, there is a need to review and assess the current inter-ministerial collaboration of governance to address health and its associated dimensions of development. This will also suggest strategies to overcome the problems faced by various ministries for inter-sectoral/multi-sectoral agreements. For making such inter-setoral/multi-sectoral collaboration meaningful and coherent; there is a need to explore and comprehend the current status of inter-ministerial collaboration. For Sustainable Development of Health and issues for future course of action; the multi-sectoral understanding of various health-linked developmental initiatives needs to be relooked. The target in other sectors' goals can be considered to be health-related and should be given special attention in designing policies, planning and implementing the strategies to achieve the health goals and monitor its progress. Assessing and understanding all these dimensions will lead to scientific designing of more sectoral collaboration for health addressing the local and regional disparities.

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भारत में स्वास्थ्य का सतत विकास: जीवन की सर्वोच्च गुणवत्ता के लिए स्वास्थ्य एवं कल्याण हेतु एक अंतर-मंत्रालयीय योगदान

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सारांश

भारत में सार्वजनिक स्वास्थ्य में महत्वपूर्ण उपलब्धि के सन्दर्भ में पिछले कुछ दशकों के दौरान आईएमआर, एमएमआर, टीएफआर जैसे स्वास्थ्य जनसांख्यिकीय संकेतकों में कमी और जीवन प्रत्याशा में दुगुनी वृद्धि दर्ज की गई है। लेकिन राज्यों में लोगों के स्वास्थ्य और स्वास्थ्य देसभाल प्रणाली का वर्गीकरण करते हुए समस्याओं की जटिलता और अन्यायपूर्ण प्रकृति के बीच उभरते विरोधाभास तथा उसे सार्थक ढंग से हल करने में परेशानी का सामना करना पड़ता है। जब भारत की तुलना समान आर्थिक स्तर वाले अन्य देशों से की जाती है, तब यहाँ के स्वास्थ्य परिणाम शून्य प्रतीत होते हैं। स्वास्थ्य की स्थिति में सुधार हेतु हमारे पिछले प्रयासों से पता चला है कि अर्थव्यवस्था, शिक्षा और सूचना, सामाजिक और पर्यावरण जैसे अन्य क्षेत्रों के विकास के बिना इष्टतम स्वास्थ्य के उद्देश्य को प्राप्त नहीं किया जा सकता है। अतः जीवन की गुणवत्ता के उद्देश्य को प्राप्त करने के लिए इसका अन्य विभागों के साथ गहन सहयोग होना आवश्यक है; और यह वांछनीय है कि प्रत्येक क्षेत्र को अपनी सार्वजनिक नीति और कार्यक्रम रणनीतियों में स्वास्थ्य-आयाम पर विचार करना चाहिए, जिसमें “कोई भी पीछे न छोटे”। इस प्रकार, इस पत्र का उद्देश्य स्वास्थ्य और इसके बीच अंतर-मंत्रालयीय योगदान और सहयोग के स्तर का पता लगाना है; यह शोध पत्र विभिन्न मंत्रालयों की वर्तमान वार्षिक रिपोर्ट और प्रकाशनों की सामग्री विश्लेषण के आधार पर लिखा गया है। इस पत्र का आशय स्वास्थ्य के लिए सभी चरणों में अंतर-क्षेत्रीय और बहु-क्षेत्रीय सहयोग और योगदान को गूढ़ता से समझना है; भारत में स्वास्थ्य के सतत विकास के लिए अपनी शक्तियों, कमियों तथा विषमताओं को पहचानकर सुधार एवं उचित रणनीति बनाने हेतु सुझाव की आवश्यकता है। अध्ययन में पाया गया कि अधिकांश मंत्रालयों ने अपनी नीति और कार्यक्रम में स्वास्थ्य आयामों को शामिल किया है। लेकिन देश को स्वास्थ्य के सतत विकास हेतु सभी मंत्रालयों और विभागों के बीच आपसी सहयोग एवं सहभागिता तथा निर्धारित समय अवधि में वांछित परिणाम हेतु संसाधनों के आवंटन से लेकर कार्यक्रम के आवंटन तक उचित रणनीतियों की आवश्यकता होगी।

मुख्य शब्द: सतत विकास, स्वास्थ्य, जीवन की गुणवत्ता, केंद्र प्रायोजित योजनाएं, एनएचएम, आयुष

Understanding Emotional Intelligence in a Health Care Setting

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Abstract

Emotional intelligence (EI) is about the perception, comprehension, and regulation of emotions. However, there are differences of opinion as to what "emotional intelligence" actually is. It is the ability to perceive, use, understand, and manage emotions. Health care workers work closely with patients who are anxious, angry, confused, and vulnerable, and their colleagues who have emotional turmoil in dealing with patients, themselves, the family, and working under pressure. Enhancing emotional intelligence is the need of the hour in a health care setting. Understanding and managing emotions are very important for health care workers. To manage other's emotions, the emotion must be identified correctly. Many control emotions themselves, and if not controlled, sometimes it leads to disastrous results. A positive outlook gives positive health outcomes. People with positive attitudes always find ways to improve even more and do better. They have the potential to enhance those around, and influence others' thought and action processes significantly. To learn how to reduce negative feelings towards others as well as towards self, one can seek the help of a therapist or counselor who can guide on how to get rid of this negativity.

Key words: Emotional intelligence, Health care, Empathy, Feelings, Frustration, Motivation.

Introduction

Emotional intelligence concerns the perception, comprehension, and regulation of emotions. Still, differing views as to what "emotional intelligence" actually is. Emotional intelligence is the ability, incorporating skills in perceiving, using, understanding, and managing emotions which can be measured. Emotional intelligence is, although not a new concept, but has received much attention in the recent times. EI has two dimensions which include intra-personal and inter-personal. Intrapersonal means awareness of one's own expressions, and Interpersonal or social intelligence means awareness and responsiveness of others. This can be summarized as "being aware of one's abilities, needs, feelings, recognizing needs and feelings, those of others, displaying trust, and responding to others in appropriate ways through well-developed interpersonal skills."

Mayer and Salovey described EI as a set of abilities and acquiring the following Skills-Identification of one's own emotions and others, using emotions to facilitate reasoning and understanding feelings, and managing emotions.¹ Daniel Goleman in the year 1995 described EI in his book, "Working with Emotional Intelligence" as a matter which is more important than IQ and has described EI into five parts.²

- i. Self-awareness-recognise self-moods, emotions and their effects on others,
- ii. Self-regulation- regulating own emotions to prevent impulsive behaviour,

- iii. Internal motivation- inner drive based on optimism, ambitions, curiosity to take action and decisions,
- iv. Empathy- understanding other's emotions,
- v. Social skills-using EI to establish a relationship with peers.

Health care workers closely manage patients who are anxious, angry, confused, and vulnerable as well as their colleagues who carry emotional turmoil in dealing with patients, themselves, family, and working under pressure. Now the question arises as to how a health care worker enhances his/her EI, for which there are some suggestions-

- Understanding your own emotions
- Understanding other's emotions
- Managing your own emotions
- Being responsive and empathic
- Showing optimism

Understanding Your Own Emotions

Health care workers encounter many emotions ranging from happy vs. sad, calm vs. angry, relaxed vs. anxious depending on situations on a day-to-day basis. It is required that they reflect on various conditions and explore what resulted in those emotions. We may ask questions like *how do I feel, who or what was involved for any emotion, what were the circumstances, what impact did my feeling have on others in that situation, what were the common factors or triggers involved, how did I come back to my usual emotional state*. Reflect on your emotions in an Emotion Diary to record your feelings. Emotionally healthy people alert to their emotional wellbeing at all times. Also, they are conscious of how they engage with the people around them. These assumptions give the team a better understanding of how to deal with a situation as it develops.

Understanding Other Emotions

Conflict situations often arise because we take our position on an issue and cannot "see" the problem from other's perspective. Think back to when this has occurred. Take note of how you were feeling. Now consider the feelings of other(s) involved: What did you observe? or What have you missed? Sometimes it is helpful to "walk through a difficult situation as a re-enactment: take the physical positions of the others involved and think deeply about what they were facing and what might have been going through their heads. This is a way of putting yourself in their position and understanding the same situation from their perspective. Think about the impression you formed of the problem, and then think about alternative beliefs and explanations. To manage other's emotions, the emotion must be identified correctly. When a health care worker is caring for a patient who is showing anger reaction, it is crucial to determine whether the patient is angry or is experiencing other emotions such as frustration/ fear/ grief, which is wrongly mistaken as anger.

Managing Your Own Emotions

Working in healthcare brings demands and pressures, and you may be performing at the edge of your tolerance at times. Patients need and demand your time, energy, and attention while colleagues will need your time, support, and guidance from time to time. It is no wonder that emotions can run high. Reflect on times when you have experienced anger and frustration: what triggers this, how is it expressed, and how do

you manage it? Similarly, be mindful of when you sense pressure and demand, creating a stress response in you- what are the triggers, and how you manage it. With these and other strong emotions, notice any impulsiveness and before you react, try taking deep breaths and engage more thoughtfully rather than reactively and think through alternatives for a more productive response. The second trait is self-control. One should be able to regulate his/her emotions and stay in control. Many people feel such strong emotions that sooner or later, their own emotions control them, and if not controlled, sometimes it leads to disastrous results. Individuals who practice self-regulation can be calmer and more purposeful in their decisions.

Being Responsive and Empathic

In a hospice setting, one should think carefully if you or your relative were at that place, *how were you like to be treated. What would you want people to appreciate about your situation*, and how can they get the best out of you? Now turn this around and consider the positions of others? Consider how you respond - do you have a default response, or does your answer vary with the situation? *Reflect on how you tolerate uncertainty or emotionally sensitive conditions - are you steadfast and calm, or does it unnerve you?* Think about your "emotional repertory" and your ability to offer appropriate responses for different situations.

Showing Optimism

A positive mindset is outward-looking and opportunity-seeking. In healthcare environments, where physical wellbeing is related to psychological wellbeing, a positive outlook can support positive health outcomes - for both patients and colleagues. Try to reach out and offer a "listening ear." Intrinsic goals and motivation accompany high EQ. Such people excel in different fields. They always find ways to improve even more and do better. They strive to improve at everything they do. Emotional intelligence should also include the ability to feel empathy with one another and express compassion during hard times. They don't just empathize with the situation. They empathize by being capable of putting themselves in someone else's shoes and understand how they feel. Their ability to interact with other people is exemplary. When in group activities, they work very well with their colleagues. They have the potential to enhance those around, and influence others' thought and action processes significantly.

Being a medical professional, has a multidimensional position involving many complex emotional exposures. Health care workers are hesitant to speak about emotional feelings of their own. Emotional intelligence (EI) is people's ability to comprehend their own feelings; and the emotions of other people, distinguish and properly mark different feelings, and use emotional knowledge to guide actions and behavior of self as well as others'. EI includes the ability to understand your own feelings and those of others'. The ability to channelise thoughts and applying them to reasoning and problem-solving; ability to regulate emotions such as the desire to handle own feelings, and the ability to motivate and calm another person down is a craft by itself. In addition to positive administrative impacts, emotional intelligence is correlated with positive authorization processes. Emotionally mature leader is characterized by awareness and supervisory skills and constructive methods of empowerment, creating a favorable working atmosphere. It is characterized by versatility, advancement and change. Emotional intelligence cannot be assessed as a general approach. It may, however, bring new ways of thinking as it takes the intelligence of emotions more seriously by also reflecting, evaluating and enhancing leadership and supervisory skills.

There are some insights to help improve one's emotional intelligence. It is reasonable to conclude that some of these skills can be learned through working with a professional, and that others can learn

independently through readings, training courses, videos and publications. To learn how to reduce your negative feelings towards others, use a therapist or counselor to learn about strategies that reduce the amount of stress you feel about others, how to reduce the pressure you feel about others, and how to expect less rejection from others. One should assess oneself for the skills and techniques of assertive communication by imbibing good listening skills and enhance one's emotional stability.

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सारांश

भावनात्मक बुद्धिमत्ता भावनाओं की धारणा, समझ तथा विनियमन से संबंधित है। हालांकि, इस बात पर मतभेद हैं कि वास्तव में “भावनात्मक बुद्धिमत्ता” क्या है। यह भावनाओं का बोध करने, उपयोग करने, समझने एवं प्रबंधित करने की क्षमता है। स्वास्थ्य देखभाल कार्यकर्ता उन रोगियों के लिए कार्य करते हैं जो चिंतित हैं, क्रोधित हैं, भ्रमित हैं तथा संवेदनशील हैं; तथा वे अपने उन सहयोगियों हेतु कार्य करते हैं जिन्हें रोगी की, स्वयं की तथा परिवार की भावनात्मक समस्याओं को सुलझाने में परेशानी होती है। स्वास्थ्य देखभाल के क्षेत्र में भावनात्मक बुद्धिमत्ता को बढ़ाना समय की आवश्यकता है। स्वास्थ्य देखभाल श्रमिकों हेतु भावनाओं को समझना और प्रबंधित करना बहुत महत्वपूर्ण है। अन्य की भावनाओं को प्रबंधित करने के लिए, भावना को सही ढंग से पहचाना जाना चाहिए। कई लोग भावनाओं को स्वयं नियंत्रित करते हैं, और यदि नियंत्रित कर पाते, तो कभी-कभी इसके विनाशकारी परिणाम होते हैं। सकारात्मक दृष्टिकोण से बेहतर स्वास्थ्य की प्राप्ति होती है। सकारात्मक दृष्टिकोण वाले लोग हमेशा और भी बेहतर करने के तरीके ढूंढते हैं। इनके पास अपने आस पास के लोगों का जीवन बेहतर करने की क्षमता होती है तथा इनमें दूसरों की सोच और कार्रवाई प्रक्रियाओं को महत्वपूर्ण रूप से प्रभावित करने की क्षमता होती है। दूसरों के साथ-साथ स्वयं के प्रति नकारात्मक भावनाओं को कैसे कम करें, यह जानने के लिए, एक चिकित्सक या परामर्शदाता की मदद ले सकते हैं जो इस नकारात्मकता से छुटकारा पाने के लिए मार्गदर्शन प्रदान कर सकते हैं।

प्रमुख शब्द: भावनात्मक बुद्धिमत्ता, स्वास्थ्य देखभाल, सहानुभूति, भावनाएं, निराशा, प्रेरणा

Changes in Air Quality during Lockdown in New Delhi amid the SARS-Cov-2

Pandemic

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Abstract

Lockdown measures came into force in India from 24 March 2020, two weeks after WHO declared it a pandemic of the SARS-CoV-2, to reduce the epidemic curve. After two weeks of lockdown, urban air pollution markedly decreased. This paper aims at describing changes in air pollution levels during the lockdown period in the city of New Delhi (India) by studying the time evolution of atmospheric pollutants recorded at the urban background and air quality monitoring stations. Secondary data were collected from 1 February to 13 April 2020 on the particulate matter with a diameter of less than 2.5 (PM_{2.5}), 10 (PM₁₀), Nitrogen dioxide (NO₂), Sulphur dioxide (SO₂), Carbon monoxide (CO) and Ozone (O₃) for the city of New Delhi, provided by the openaq.org, Government of India. Air pollutants markedly decreased but with significant differences among pollutants. The most significant reduction was observed for Particulate Matter (PM_{2.5}) and Nitrogen dioxide (NO₂), two pollutants mainly related to traffic emissions. A lower reduction was observed for PM₁₀. In contrast, Ozone (O₃) levels increased, probably due to lower levels of NO and the decrease of NO_x in a Volatile Organic Compound (VOC) limited environment. There was no defined trend for the low Sulphur dioxide (SO₂) levels, probably due to the preferential reduction in emissions from the least polluting power plants. Cleaner pandemic skies showed how fast we can bring down pollution when we reduce anthropogenic activities. In Delhi, where air is normally choking, levels of both PM_{2.5} and the harmful gas NO₂ fell more than 70 percent and met the national standards during the initial lockdown period.

Key words: COVID-19, Lockdown, Air quality, NO₂, PM_{2.5}, PM₁₀, O₃, VOC.

Introduction

The planet earth was locked down with its 7.8 billion people practically brought down on their knees by one of the smallest living creatures. The virus which probably originated in bats, but passed to people via an yet unrecognized intermediary animal species, is believed to have started infecting people in Wuhan, China, in late November or early 1 December 2019. On 31 December 2019, the World Health Organization (WHO), China Country Office was informed cases of pneumonia of unknown etiology were detected in Wuhan city, in Hubei province of China. On 7 January 2020, Chinese authorities identified a new strain of Corona virus as the causative agent for the disease.¹ Coronaviruses (CoV) are zoonotic i.e.; they transmit disease between animals and humans and, in the past, have caused outbreaks of Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV)². Several known coronaviruses are circulating in animals that have, fortunately, not yet infected humans. The WHO named the disease as COVID-19, and based on its similarity to SARS-CoV (2002-2003), the CoV Study Group of the International Committee on Taxonomy of Viruses (ICTV) has named the virus as SARS-CoV-2³. On 30 January 2020, the WHO declared the outbreak as a public health emergency of international concern (PHEIC) as the disease spread in different countries⁴. Later, based on the speed and scale of transmission

reported from several countries worldwide, WHO titled this outbreak a pandemic on 11 March 2020^{5,6}. Since its emergence, the virus raced around the globe.

As a preventive step to contain the COVID-19 disease, an unprecedented lockdown was imposed on the 25 March 2020 in India, and then it was extended phase-wise until the 31 May 2020. All non-essential sectors were closed, such as schools, colleges, and industries, including transportation (both within a city and across cities) in the entire country, making it the most extended lockdown in the world. People had to stay indoors, factories were shut, and daily-wage labourers had to reverse-migrate to rural areas. For the first time in history, the Indian railways stopped operations around the country. While the costs of enforcing these preventive measures are undoubtedly enormous, these measures could unintentionally bring about substantial social benefits. One of them was unforeseen environmental benefits, including improvement in air quality since the start of the lockdown. For example, satellite images caught a sharp drop in air pollution in several countries compared to the daily averages for the same period in the year 2019. For a country whose cities are so dense and always beaming with activity, lockdown presented sights both eerie and beautiful. In Jalandhar, for example, people could see the Dhauladhar mountain range of Himachal Pradesh, 250 km away, for the first time in 30 years. Thanks to the lockdown, the skies were blue, and the air quality index (AQI) was in code green in most parts of the country.

In this paper, a systematic investigation is done on how locking down cities affected air quality at a national scale in India. The focus of the paper is on New Delhi for two reasons. First, New Delhi was hit hard by the COVID-19 outbreak, and the Indian government launched draconian counter measures to prevent the escalation of infections. Second, New Delhi also suffers significantly from severe air pollution, with some estimates suggesting that air pollution is associated with an annual loss of nearly 38.7 million in India's healthy life years. In the past, several short and long-term measures to improve air quality were taken in Delhi. Some of these steps include the 2016 odd-even policy in New Delhi, to reduce vehicular air pollution⁷. The odd-even policy in New Delhi showed a marginal change in air quality improvement⁸. Most of the above interventions were short-term and having limited restrictions, e.g. closure of a road or some industries. Lockdown provided unprecedented opportunity to take a closer look at how air pollution levels have responded to this situation to ascertain the baseline air pollution levels and what we can learn for the future.

Methodology

Secondary data were collected from 1 February to 13 April 2020 on the particulate matter with a diameter of less than 2.5 (PM_{2.5}), 10 (PM₁₀), Nitrogen dioxide (NO₂), Sulphur dioxide (SO₂), Carbon monoxide (CO) and Ozone (O₃) for the city of New Delhi, provided by the openaq.org, Government of India. In this study, all the traffic stations selected, were far from emission sources, and represent the levels of contamination of the urban background. Daily averages (24 hours) was calculated for the periods before and during the lockdown (1 February to 13 April 2020), assessing the variation in the mean concentration ($\mu\text{g}/\text{m}^3$) between both periods, and their relative change (%). A box plot was plotted to study the variation in concentration before the lockdown and during the lockdown.

Findings

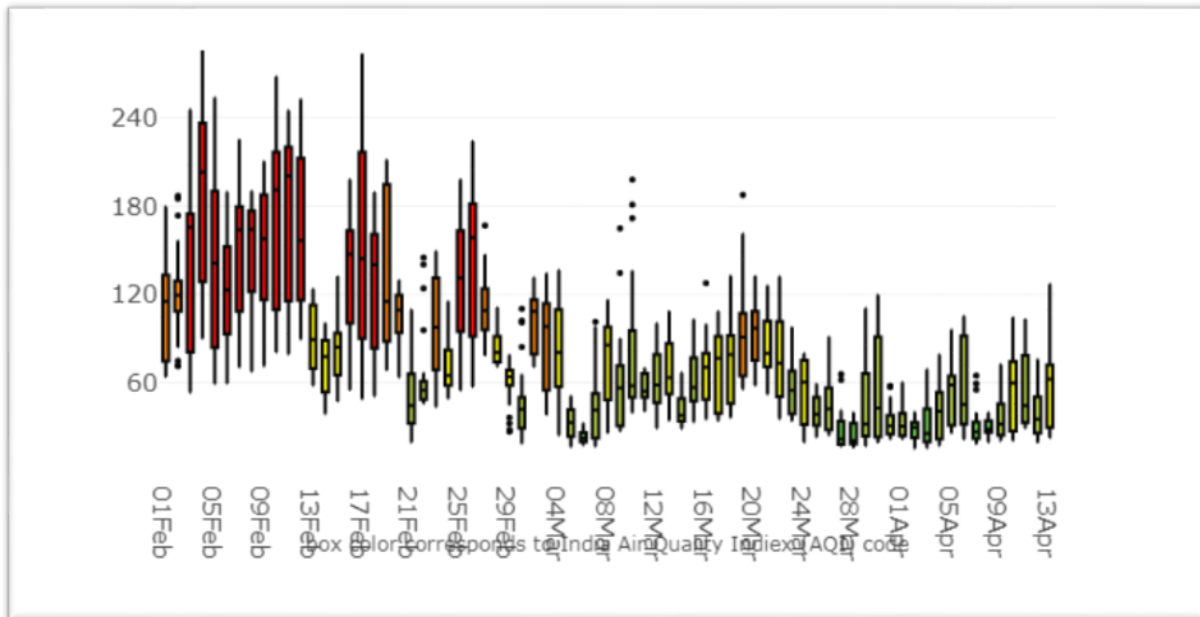
The lockdown gave an opportunity to understand the extent of air quality changes in various sectors. Cities had very little traffic or commercial and industrial movement. Cooking energy use had also dropped a bit due to interstate mass migrations of workers. The National Capital Region of Delhi, with a sizeable number

of operational air quality monitors to analyze some data, has six criteria pollutants. Each of the pollutants has a different origin. Each of these is discussed in details:

PM_{2.5}

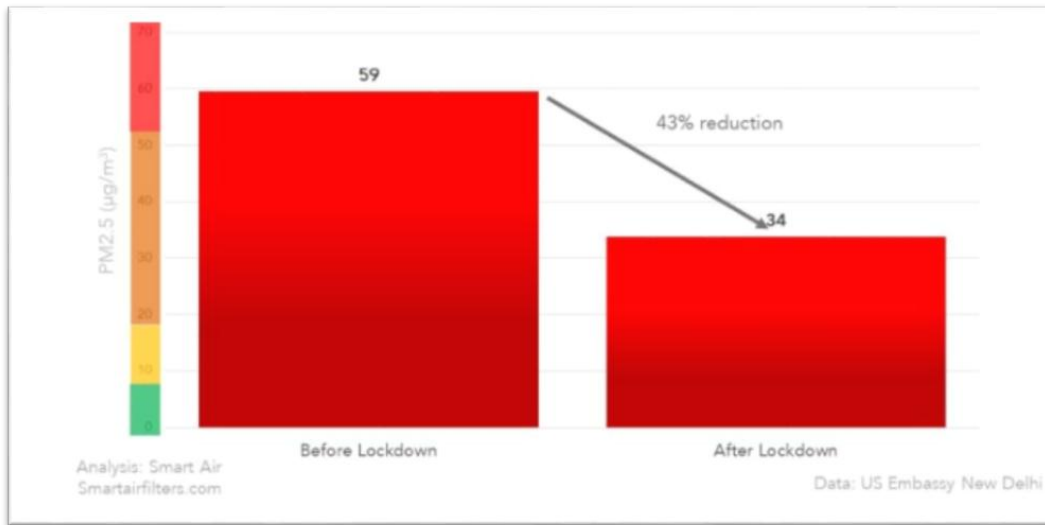
PM_{2.5} is a critical pollutant for Delhi and the rest of India. During the winter haze, the graph for PM_{2.5} is permanently shaded red or brown, with the occasional rain that leads to some sedimentation. Before the lockdown, the high wind speed of spring lowered the PM_{2.5} levels. After the lockdown began, the lowest daily average was 20 µg/m³, with a monthly average of 35 µg/m³. The main contributor to PM_{2.5} is combustion. With most activities at a minimum, what we see in the background was baseline concentration (Figure 1). For 2017-2019, the monthly average PM_{2.5} level for March was 100-140 µg/m³. If 35 µg/m³ is the lowest average possible with limited local emissions, without the help of rains, it can be concluded that 70 per cent of pollution is generated locally.

Figure 1
Box Plot of Variation in PM_{2.5} Hourly Average Concentration in µg/m³ before and during Lockdown



A reduction of 43 per cent in PM_{2.5} concentration was recorded before and during lockdown (Figure 2).

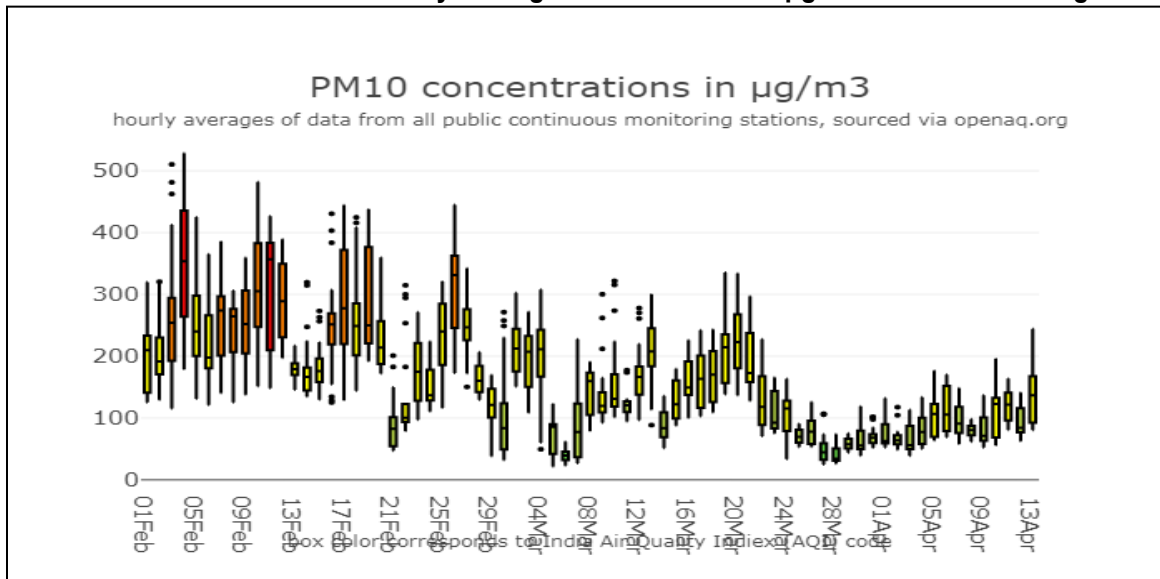
Figure No.2
Reduction in PM_{2.5} Hourly Average Concentration in $\mu\text{g}/\text{m}^3$ before and during Lockdown



PM₁₀

Construction dust and resuspended road dust are major PM₁₀ contributors. With limited traffic, road dust was under control. Complete ban on construction activities, helped to lower the overall day-wise average of PM₁₀ level at $35 \mu\text{g}/\text{m}^3$ (Figure 3). However, dust storms from the west briefly increased the levels from 10 April 2020. During 2017-2019, the annual average PM₁₀ level in Delhi⁶ was recorded to be $200 \mu\text{g}/\text{m}^3$.

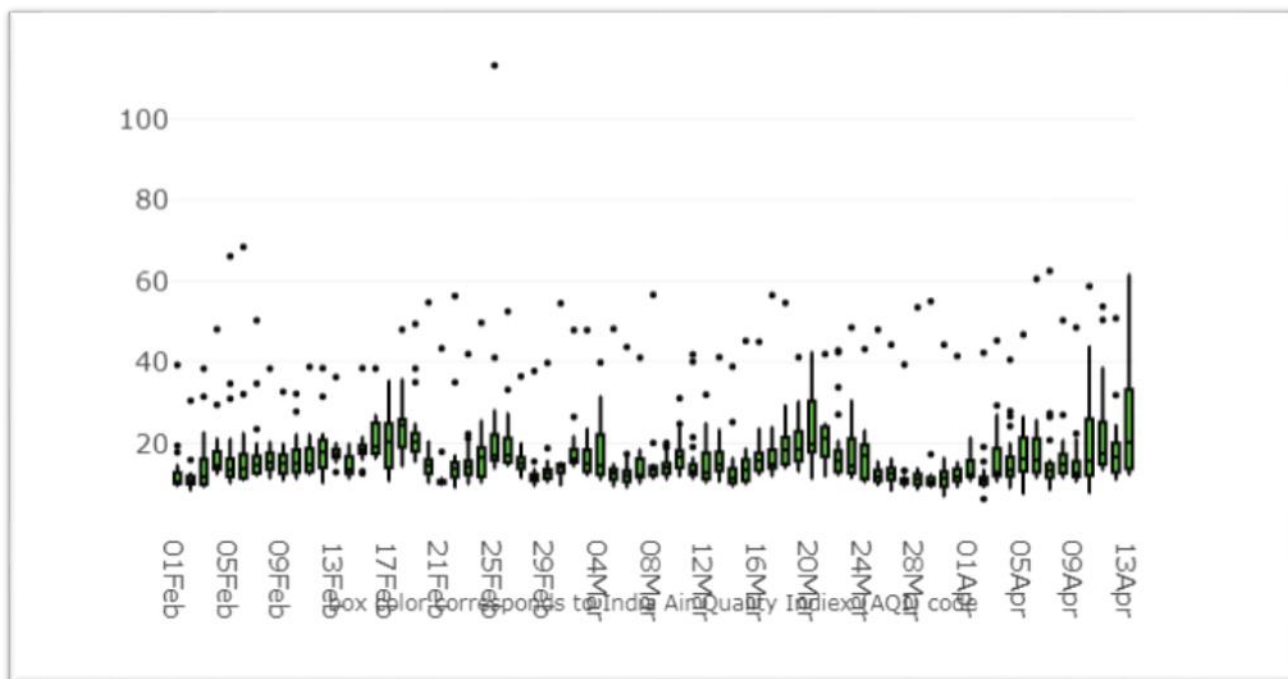
Figure No.3
Box Plot of Variation PM₁₀ Hourly Average Concentration in $\mu\text{g}/\text{m}^3$ before and during Lockdown



Sulphur Dioxide (SO₂)

Sulphur dioxide (SO₂) was the only pollutant that consistently complied with national standards before lockdown. In Delhi, there is no considerable difference between its levels before and after the lockdown (Figure 4). The principal source of SO₂ is diesel and coal combustion. Since Delhi has already shifted to Bharat Standard-6 fuel, with the lowest sulphur content possible, a drop in traffic alone did not impact the data. In the graph, we can see the background contribution to SO₂ levels from coal used at power plants, some industries, and cooking activities.

Figure 4
Box Plot of Variation in Sulphur Dioxide (SO₂) Hourly Average Concentration in µg/m³ before and during Lockdown



Nitrogen Dioxide (NO₂)

Graph indicates the dramatic drop in nitrogen dioxide (NO₂) as compared to the other pollutants (Figure 5). It is because the primary source of NO₂ emission is vehicle exhaust. With lockdown, 90 per cent of the vehicles were off the road. The change is evident at ground stations and visible in satellites columnar observations over India and other countries (Figure 6).

Figure 5
Box Plot of Variation in Nitrogen Dioxide (NO₂) Hourly Average Concentration in µg/m³ before and during Lockdown

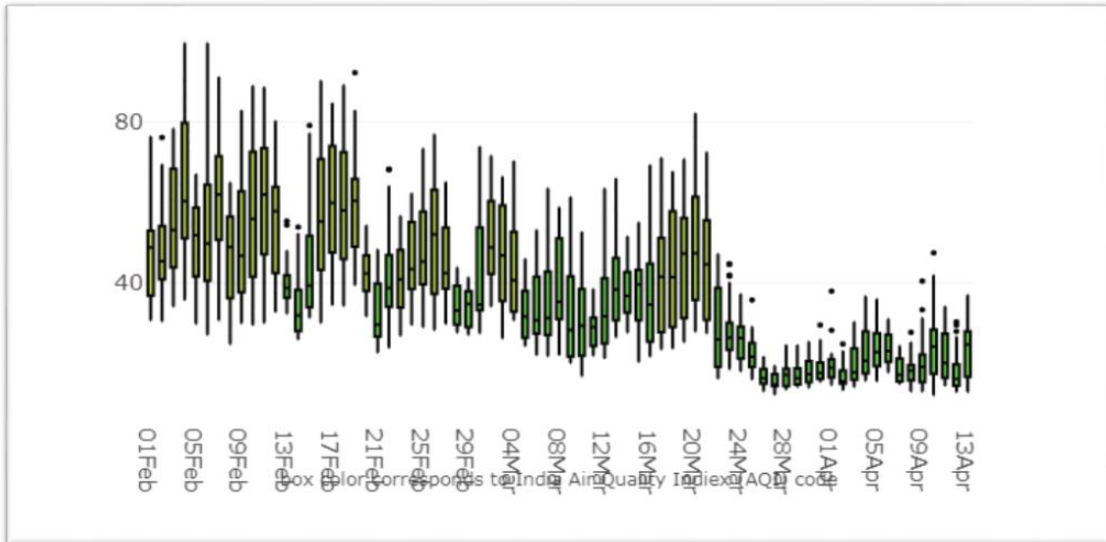
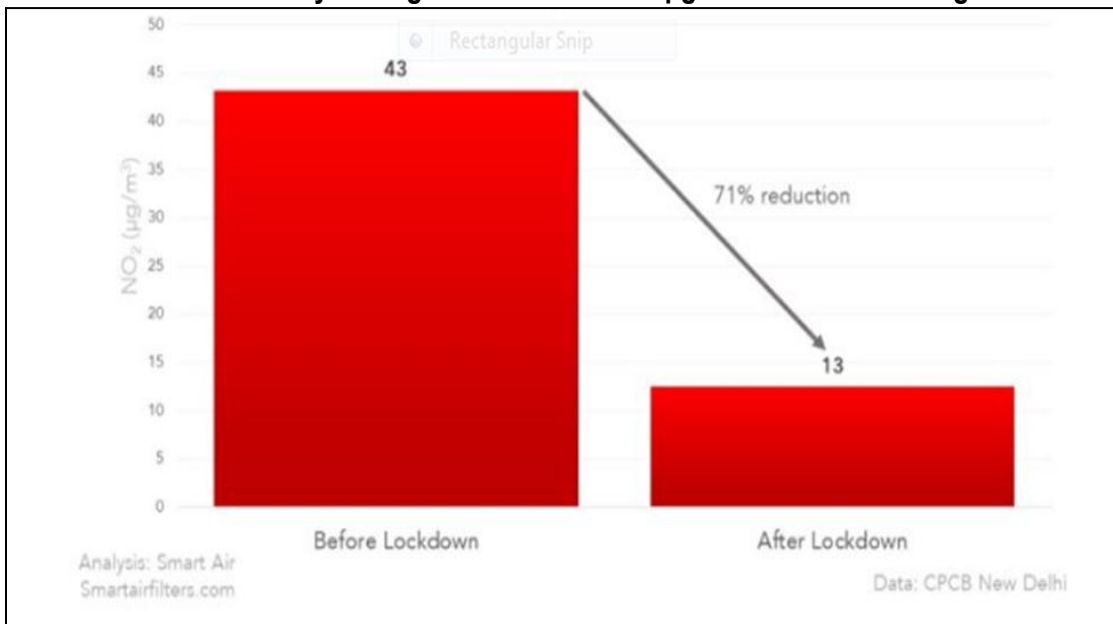
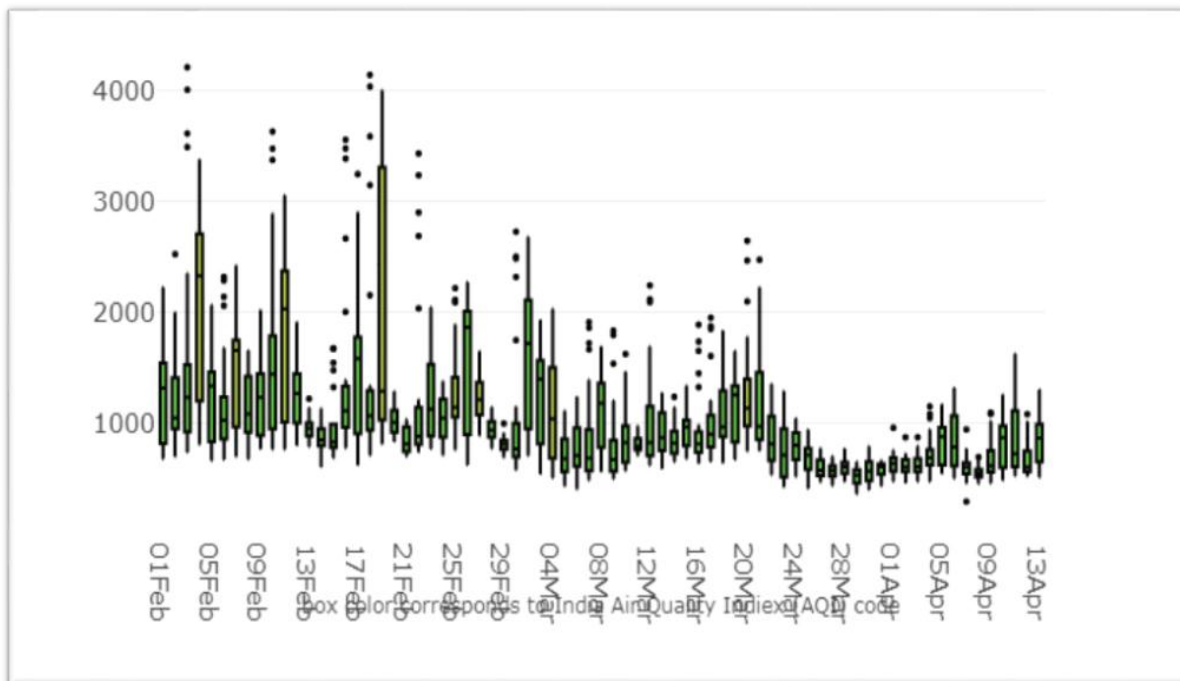


Figure 6
Reduction in NO₂ Hourly Average Concentration in µg/m³ before and during Lockdown



Carbon Monoxide (CO)

Figure 7
Box Plot of Variation in Carbon Monoxide (CO) Hourly Average Concentration
in $\mu\text{g}/\text{m}^3$ before and during Lockdown

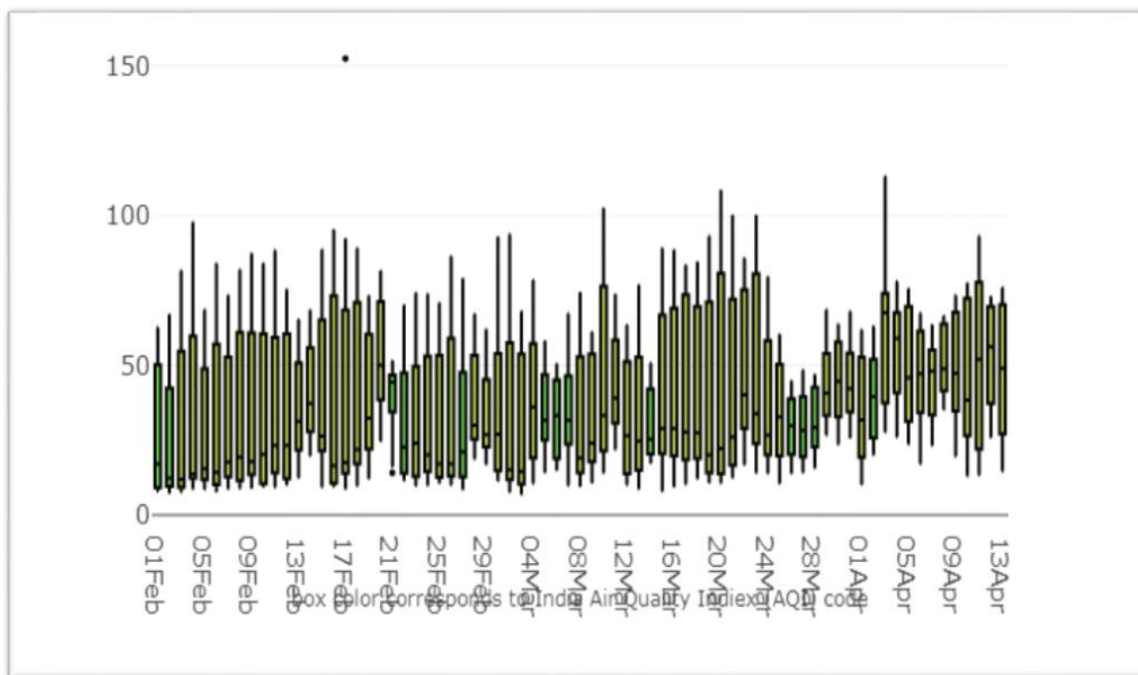


The daytime averages during February-March ranged from 600 to 1000 $\mu\text{g}/\text{m}^3$ which dipped slightly during the lockdown period, from 500 to 800 $\mu\text{g}/\text{m}^3$. As Carbon monoxide (CO) has the longest tropospheric lifetime which are approximately two months, and its levels are incapable of changing quickly (Figure 7).

Ozone (O_3)

Ozone (O_3) is the only secondary pollutant in the list of pollutants discussed above. Ozone is formed and destroyed in the presence of nitrogen oxides (NO_x) and volatile organic compounds (VOCs). Before the lockdown, the daytime average was in the range of 15-40 $\mu\text{g}/\text{m}^3$, and after the lockdown, it was considerably higher, at 25-70 $\mu\text{g}/\text{m}^3$ (Figure 8). It may be because NO_x consists of NO and NO_2 . NO consumes ozone, and NO_2 produces ozone. Transport is responsible for more than 50 per cent of the NO_x emissions in Delhi. So, because of lockdown, limited amount of NO was present which caused ozone accumulation.

Figure 8
Box Plot of Variation in Ozone(O₃) Hourly Average Concentration
in µg/m³ before and during Lockdown



Discussion

In the first three months of 2020, as the COVID-19 pandemic swept around the globe from China; governments began shutting down businesses and transportation. In Delhi, a significant air pollution reduction was seen during COVID-19 lockdown which was primarily due to the decrease in major anthropogenic activities such as vehicles, industries, and other sources such as household cooking, emissions from local industries, food eateries (street food vendors, semi-open cooking in restaurants using tandoors), including other non-exhaust emissions. The meteorology may have played an important role in emission reduction during the lockdown as intermittent rain events were also observed during the lockdown in Delhi. The most significant variation observed was for NO₂. Urban NO₂ emitted from combustion processes, mostly road traffic in urban areas, especially diesel and to a lesser extent, gasoline, vehicles, industry, and power generation. Nitrogen dioxide (NO₂) is emitted by burning fossil fuels, mostly in industry, vehicles, and domestic boilers. Satellite images detected sharp decline in NO₂ levels compared with the same period in 2019. Although the primary source of PM₁₀ in the urban background of New Delhi is road traffic (around 30% of the annual mean)⁹, other relevant sources reported include road dust (38%), vehicle exhaust emissions (20%), domestic fuel burning (12%), and industries (11%). Furthermore, crop residue burning also affects during specific seasons¹⁰⁻¹². Lockdown might have reduced the decrease of PM₁₀, but other causes could also contribute. Thus, a relevant proportion of PM₁₀ has a regional background-origin, mostly of secondary PM, and regional air mass transport might have influenced PM₁₀ to reduce the effects of local emission abatement. SO₂ emissions are low in New Delhi, with most of this pollutant arising from power plant emissions. The low reduction observed might be due to the detection limit of the instruments.

Levels of O₃ markedly increased into the city as a consequence of three possible combined causes. Firstly, the decrease of NO_x in a VOCs-limited environment might cause urban O₃ to increase, as opposed to the behaviour at the rural-regional background, mainly NO_x-limited¹³. Secondly, the decrease of nitrogen oxide (NO) reduces the O₃ consumption (titration, NO+O₃=NO₂ +O₂), causing an increase of O₃ concentrations. Thirdly, the usual increase of insulation and temperatures from February to April leads to an increase in O₃, especially during dust episodes, when the maximum O₃ is recorded. In any case, by staying at home, personal NO₂ exposure is expected to be reduced by 40 per cent as compared to outdoor exposure, as evidenced in a study carried out for 39 schools in Barcelona¹⁴. Thus, in addition to the abatement of outdoor NO₂ levels, this exposure reduction should be taken into account. Unfortunately, the current lockdown was not able to stop the rising of the SARS-CoV-2 epidemic. In conclusion, we expect that air quality will keep improving for PM₁₀, PM_{2.5}, and NO₂ down to minimal levels during forthcoming weeks because of the more restrictive actions to reduce the population's mobility and shut down a large number of industries.

New evidences are emerging that polluted air makes COVID-19 more lethal. The study carried out by Harvard University found that the tiny pollutant particles known as PM_{2.5} breathed over many years sharply raise the chances of dying from the virus. Even before the new Harvard study, scientists were convinced that air pollution was likely worsening COVID-19's impact and the wide-ranging health damage. A 2003 study of the outbreak of SARS, the closest relative of the new coronavirus, found that death rates in China's most polluted areas were twice as high as in the least polluted ones¹⁵.

Conclusion

The air pollution effects of the lockdown were a unique opportunity to evaluate the reduction of different emission sources and to assess further air quality policies. The results above show that the pollution problem can be tackled; and clean skies and breathable air is achievable in India. However, the current situation and restrictions are not recommended as a way to clean the air, which brings massive suffering to the country's citizens. However, these testing times have at least made us realize that we can have breathable clean air if we act concretely to reduce pollution at source.

The ongoing lockdown helping clean the air also shows that the linkage of air pollution levels in the South Asian region is strongly associated with bigger economic activities (Transportation, energy production, and industrial activities) and small scale interventions at city levels can reduce pollution. It tells us that to avoid pollution levels bouncing back as the economy turns back to normal and the COVID-19 crisis passes, a shift from the current highly fossil fuel-dependent economy to clean energy-based systems has to be adopted. If locking down could significantly improve the air quality in New Delhi where the baseline pollution were high, the implied health benefits would be more significant in countries with lower initial pollution levels.

Limitations

In this study, the changes produced in the air quality during the lockdown is studied. Other factors might have influenced the changes, such as meteorology, regional and long transport of pollutants. The role of the meteorology was not quantified in this study.

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स्वास्थ्य और जनसंख्या:

परिप्रेक्ष्य और मुद्दे, 44 (1):- 38-48/2021

सार्स कोव-2 महामारी के बीच नई दिल्ली में लॉकडाउन के दौरान वायु की गुणवत्ता में बदलाव

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सह-संपादक

डॉ- तापस बेहरा, सहायक प्रोफेसर, सामुदायिक चिकित्सा विभाग, एससीबी मेडिकल कॉलेज, कटक, ओडिशा।

समीक्षक

प्रोफेसर लिसा सारंगी, सामुदायिक चिकित्सा विभाग, हाईटेक मेडिकल कॉलेज, भुवनेश्वर, ओडिशा।

डॉ- सौम्या स्वरूप साहू, सहायक प्रोफेसर, सामुदायिक चिकित्सा और परिवार चिकित्सा विभाग, एम्स, भटिंडा।

सारांश

महामारी के प्रकोप को कम करने के लिए विश्व स्वास्थ्य संगठन द्वारा **सार्स कोव-2** को महामारी घोषित किए जाने के दो सप्ताह बाद 24 मार्च 2020 से भारत में लॉकडाउन लागू किया गया। लॉकडाउन के दो सप्ताह के बाद, शहरी वायु प्रदूषण में उल्लेखनीय कमी आई। इस पेपर का उद्देश्य नई दिल्ली (भारत) शहर में लॉकडाउन अवधि के दौरान वायु प्रदूषण में आये बदलाव, शहरी पृष्ठभूमि और वायु गुणवत्ता की निगरानी करने वाले स्टेशनों में दर्ज वायुमंडलीय प्रदूषकों में वृद्धि के समय का अध्ययन करना है। openaq.org, भारत सरकार द्वारा नई दिल्ली शहर के लिए दिए गए डेटा के अनुसार 1 फरवरी से 13 अप्रैल 2020 के बीच 2.5 (PM2.5), 10 (PM10), नाइट्रोजन डाइऑक्साइड (NO₂), सल्फर डाइऑक्साइड (SO₂), कार्बन मोनोऑक्साइड (CO) कम था। प्रदूषकों के बीच महत्वपूर्ण अंतर के साथ, वायु प्रदूषकों में उल्लेखनीय रूप से कमी आई। 'पार्टिकुलेट मैटर' (PM2.5) और नाइट्रोजन डाइऑक्साइड (NO₂) में सबसे महत्वपूर्ण कमी देखी गई, जो मुख्य रूप से यातायात उत्सर्जन से संबंधित दो प्रदूषक हैं। PM10 में बहुत मामूली कमी देखी गई। इसके विपरीत, ओजोन (O₃) के स्तर में वृद्धि हुई, संभवतः NO के निम्न स्तर और एक अस्थिर कार्बनिक यौगिक (VOC) सीमित वातावरण में NO_x की कमी के कारण यह वृद्धि देखी गयी। सल्फर डाइऑक्साइड (SO₂) के स्तर में आई कमी का कोई कारण स्पष्ट नहीं था, शायद कम प्रदूषणकारी बिजली संयंत्रों के प्रयोग से यह कमी दर्ज की गयी। 'क्लीनर महामारी' ने दिखाया कि जब हम मानवजनित गतिविधियों को कम करते हैं तो हम प्रदूषण को कितनी तेजी से नीचे ला सकते हैं। दिल्ली में, जहाँ हवा सामान्य रूप से घुट रही है, PM2.5 और हानिकारक गैस NO₂ दोनों का स्तर 70 प्रतिशत से अधिक गिर गया और दिल्ली ने प्रारंभिक लॉकडाउन की अवधि के दौरान राष्ट्रीय मानकों को पूरा किया।

मुख्य शब्द: कोविड-19, लॉकडाउन, एयर क्वालिटी, NO₂, PM2.5, PM10, O₃, VOC।

Book Review

Till We Win: India's Fight against COVID-19 Pandemic

***Gajanan D Velhal and **Deepika Nandanwar,**

* Professor and Head; and ** Assistant Professor;
Department of Community Medicine, Seth GS Medical College and KEM Hospital, Mumbai-400012.

The book, *Till We Win: India's Fight against COVID-19 Pandemic*, describes the evolution of COVID-19 pandemic from Wuhan, China and its spread to various countries across the world along with the recent updates in India. The authors- Dr. Chandrakant Laharia, Dr. Gagandeep Kang and Dr. Randeep Guleria have narrated the important events highlighting the disease spread potentials and factors influencing the spread of the pandemic in different countries in the world. The very elaborate description by the authors, who are stalwarts in their own fields, eminent policy experts, epidemiologist and clinicians make the topic very easily understood by the medical professionals as well as by any common educated person.

The book fulfills the needs of all those who are interested in knowing the pandemic and the challenges it creates as well as how to control of the disease. The presentation style is an art by itself, deserves a great appreciation. The terms pandemic and epidemics outbreaks are explained lucidly keeping in mind what the medical professionals should know along with applicability of this knowledge. On the background, that the problem of COVID-19 still persists all over with the threat of a second wave, importance of this type of reference book needs to be enhanced further.

The entire topic is divided into four sections- understanding the challenge; mounting a response; science, solidarity and hope; and getting future ready. The titles of these sections reveal the inclination of the authors to reach the medical fraternity at all the possible levels as well as to the lay man, keeping in mind what bare minimum should reach to everybody. It influences the beneficiaries with scientific rationale and explains how the Government's measures are for the betterment of all. Besides evolution of an epidemic to a pandemic level, evolution of therapeutic responses, importance of new drugs for COVID-19, evolution of vaccine development and their present status are covered elaborately. The section on 'frequently asked questions' is appreciated as it clearly spells out the requirements of all groups, and allays their anxiety. The explanation on COVID discipline viz. social distancing, use of masks and frequent use of sanitizers for hand hygiene is explained with great clarity along with examples and balanced use of these measures in different parts of the globe.

The authors have narrated the successful stories of initiatives undertaken by different states in India to address the issue which mainly includes Kerala state's perspectives and the story of Dharavi slum in Mumbai. These stories highlight the analytical approach undertaken by the Government actors to address the issue in the respective areas. The presentation of these success stories are truly inspiring to those who work in the public health sector.

Important, topic-wise relevant points, highlighted in boxes and summaries of the messages the authors propose to convey are in line with what everybody must know in very simple words. The book covers the

scientific information on COVID-19 known till now as well as translation of this knowledge in mounting public sector response. Thus, it fulfills the need of the academicians, public health aspirants, frontline workers and even the general public in terms of getting them familiar with new terms like isolation, quarantine, epidemic, pandemic, social distancing, importance of consistent and proper use of masks etc. Role played by media in giving timely alarm of the situation is also covered in this book.

Lots of discussions always take place around the strategy of countrywide lockdown for controlling COVID-19. The authors have very clearly explained the importance and result of using this strategy for the country. Sensitivity of the authors towards the requirement of the medical professionals and other public health aspirants is revealed in the topics covered under FAQs. Role of vaccines and likely gains through vaccination are explained appropriately.

Let us appreciate the text write up pattern of the authors which is more close to telling the story of the history of pandemic and the responses to the situation from time to time, in simple words with good practical insights. Once you start reading the book, you will not keep it down till you finish, is the major strength of this book. I am sure that whoever would read this book will experience the same.

We hope that authors will come out with the next edition of the book covering newer topics and developments including major vaccination programmes against COVID-19; beyond what is covered in present book, as the pandemic still persists and we may have to continue with it longer. There is scope to add animated pictures, photographs, insights of key personnel's in the management of this pandemic in the next editions to come. We recommend that the teaching faculty should insist the PG students to refer the book for further clarity to understand COVID-19 better.

Journal Information

The Journal is indexed in Google Scholar, The papers published in the journal are available on the Institute's website: **www.nihfw.org**

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I, Prof. Harshad Thakur, hereby declare that the particulars given above are true to the best of my knowledge and belief.

Sd/
(Prof. Harshad Thakur)

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Example of References

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THE NATIONAL INSTITUTE OF HEALTH AND FAMILY WELFARE

The National Institute of Health and Family Welfare (NIHFW) an autonomous organization, under the Ministry of health and Family Welfare, Government of India, acts as an 'apex technical institute' as well as 'think tank' for the promotion of Health and Family Welfare programmes in the country. The NIHFW is known for its Education, Training, Research, and Specialized advisory services.

Educational activities: The educational activities of the Institute contribute to Human resource development for better management of health and family welfare programmes in the country. The on campus courses are: Three-year Post-graduate Degree in Community Health Administration, a two-year Post-Graduate Diploma in health Administration, and a one year Post-Graduate Diploma in learning mode of one year duration each. These are: Health and Family Welfare management, Hospital management, health Promotion, health Communication, Public Health Nutrition and Applied Epidemiology. These courses are need based and multidisciplinary in nature. The Institute has also developed certificate courses through e-learning mode for enhancing the skills and competencies of in-service middle level health professionals in the areas of 'Professional Development in Public health and Health Sector Reforms' for Medical Officers, and "Programme Management for Public Health care for the Programme Managers working in national health Mission or in the health sector.

Training and Workshops: The training courses and workshops (intramural and extramural), numbering around 45-50 are organized by the Institute every year with an aim to familiarize the participants with the goals and the objectives of health and family welfare programmes; updating their knowledge and understanding of operational difficulties in implementation and suggesting remedial measures to overcome such constraints.

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Specialized Services: Specialized services of the Institute include Clinical services, National Cold Chain and Vaccine Resource management Centre (NCCVMRC), Centre for Health Informatics, Skill Lab, National Documentation Centre and publications. The ministry of health and Family Welfare (MoHFW) has entrusted the Institute to act as a "National Nodal Agency" to organize, coordinate and monitor the training programmes of Reproductive and Child health (RCH) in the country. The main objective of the Clinic is to render Mother and Child Health services. The clinical work in relation to infertility, reproductive disorders, especially endocrinology and sexual dysfunctions deserve special mention. NIHFW in partnership with UNICEF through the National Cold Chain Management Information System, is responsible for the overall maintenance, implantation and monitoring of NCCMIS across the country including providing support to the end users. The reference, referral, press clipping and bibliographic services of the National Documentation Centre; and the publication, art and projection services of the Department of Communication compliment the activities of the Institute.

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