

Micro Level Search for COVID-19, Bhubaneswar: Odisha, India

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Authors' contributions

This work was carried out in collaboration between both the authors. Author SPM designed the study, literature searches, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author KCS managed the collection and analyses of the data. Both authors read and approved the final manuscript.

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ABSTRACT

Outlines: Severe acute respiratory syndrome; coronavirus 2 (SARS-CoV-2) is an emerging virus from 16th Dec 2019, has created virulent pandemic situation over 217 major countries and territories including USA, India, and Brazil etc. There are multiple pharmaceuticals available for treatment. Although no vaccine yet available in the world but few Indian and Russian vaccine results are promising. The treatment procedure is compelling for lock downs and confinements. The COVID-19 is still on the trot from March 24th, 2020 in India so also Odisha and its capital Bhubaneswar killing 87 people and suffering 33454 people and accompanied by ill health, job losses, domestic violence, poverty, food scarcity and loss of mobility.

Scope: To manage the pandemic need good governance, leadership and health-care upgrading, public private partnership, public awareness, risk communication with improvising continuous supply of foods, goods, service systems. Many dynamic epidemic models *i.e.* SIR and SIS and SEIR and SEIRS are suggested, but the Ganjam practical field model has been observed successful in Odisha like Kerala, Bhilwara (Rajasthan) and Dharabi (Mumbai) models are popular

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in India. However the present focused areas is Bhubaneswar Municipal Corporation which is worst affected hotspot areas for COVID19 in Odisha.

Methodology: The search envisages collection of data of Ganjam, Bhubaneswar, Odisha and India day wise and analyzing the data statistically. The work includes preparing the adoptive model for Ganjam district and age wise. The age group and gender wise analysis of the COVID19 data of Bhubaneswar has been done along with finding the peaks of the outbreak curve in Odisha and the districts.

Results: The micro level investigation revealed that male female confirmed case has a ratio of 67%:33%. The number cases is observed higher from age group is 15 to 41 years. Still the virus has proved causing more mortality to age group >60 in Odisha including Bhubaneswar. The children and women are the least prey to COVID19. The ACE 2 receptors are responsible for infection from SARSCoV2 virus. Ganjam model is one among the successful model to combat against COVID19 for the people of Odisha.

Keywords: Active cases; COVID19; Odisha; pandemic models; SARSCoV2; teaching methods.

ABBREVIATIONS

COVID-19: Coronavirus disease 2019; MERS: Middle East respiratory syndrome; SARS: Severe Acute respiratory system; MOH&FW: Ministry of health and family welfare; GOI: Government of India; GOO: Government of Odisha; BP: Blood Pressure; RA; Renin-Angiotensin; SEIR; susceptible, exposed, infectious and removed; SIR: Susceptible, infectious and removed; COPD - Chronic obstructive pulmonary disease; CDC: Centers for Disease Control and Prevention; BMC: Bhubaneswar Municipal Corporation.

1. INTRODUCTION

The coronavirus disease COVID-19 is not novice and was emerged and identified as SARS (airborne) from 2003 and later in other form as MERS from Saudi Arabia during 2012 that affected people for last 18 years. Phylogenetic investigation advocates that the epicenter of SARS-CoV-2 is Wuhan market, China after originated in faunas, (suspected bats or pangolins). Later the virus was diffused to human kingdom like a wave, but differs regionally through viral infection and host type spread over 213 countries including India Who - [1], Noor et al. [2], Milek J et al. [3], Guo L et al. [4], Mishra S. P. et al. [5].

SARS-CoV-2 is considered to be an old virus that out broke through the human respiratory system of six different animal origin viruses out of which four are common (Cold & cough) are endemic. 8 NL63 & 229E viruses are inherited from bats and OC43 and HKU1 are of bovine origin received from rodents.

The 1918-1919 pandemic was of OC43 origin a bovine corona virus Chaplin Steve 2020 [6]. The SARSCoV2 has become wild over the world as pandemic affecting 3569.9K people and caused 1046K unseen mortalities throughout the globe since December-2019; epicenter was the Wuhan

City China. On 16th Oct 2020, the Worldometer reported 394.57mi are confirmed cases including 1107.13 K deaths of COVID-19. Major cities in India are in the clutches of COVID19 (Worldometer [7]) (Fig. 1)

1.1 History of Endemics/ Pandemics

History reveals the oldest pandemics were excavated from Hamin Manga, NE china dating back to 5kYBP. The succeeding pandemics reported were Plague, Ethen's about 2.45KYBP killing 100K people, Antonine Plague during 1.82KYBP, Plague of Justinian 1.547KYBP when 10% of human population extinguished. Later the Black Death (7.36 KYBP) due to the virus bacterium *Yersinia pestis* (Stain) killed all manual workers of the globe, Cocoliztli epidemic 575YBP, viral fever that gave 15 million deaths at Mexico and America by *Salmonella* (*S. paratyphi C*), 16th century Plague in USA 355YBP and great plague in London, & of Marseille 300YBP, Russian plague 250YBP, and Spanish flu 100YBP are the recorded pandemics in past, Jarus O. [8] and Mishra SP. [9].

1.2 Recent Past Literature

The 20th and 21st century pandemics influenza viruses are common and caused by viruses H1N1 (1918) gave fatalities to about 50–100 mi

people. H2N2 (1957-58), H3N2 (1968), Viruses H1N1 (2009), and the poultry-induced influenza viruses (H5N1 and H7N9) and the most recent viruses that have caused mass death are SARS, Ebola, Zika, and SARS 2 Taubenberger et al. [10], Kalra et al. [11], Morens et al. [12], Huremovic et al. [13] and Mishra SP [14]. Most of the viruses are that causes these aerosol diseases are having adaptations as gallinaceous (Poultry, birds or animals) later spreading to human; Dunham et al. [15], Morens et al. [16], Parish et al. [17], Mishra et al. [6]. Models both physical and mathematical models have been developed for estimating the highly vulnerable area, amplitude, frequency, and intensity daily, monthly and as total against pandemics all over the world to take necessary steps to fight CoVID-19, Chatkraborty et al. [18], Paiva et al. [19], Baig et al. [20], and Mandal et al. [21]. The pandemic's mother was the H1N1 flu outbreak during 1918-19 when 50 to 100mi deaths occurred throughout the globe, Moren et al. [22].

About history of the origin of novel corona virus Limeng Yan et al. [23], in their study about SARS-CoV-2 virus corroborated their report that it is a laboratory product in a military research laboratory modification for use as bioweapon

(Unrestricted) rather than is of a natural origin. But her findings are not conclusive as there are evidence of viruses like the RaTG13 originated from bat, pangolin coronaviruses (Malayan penguins), and the RmYN02 is from bat. They also said there was origination from a coronavirus of the SARS-CoV-2 by mutation naturally that has infected the miners of the Mojiang mine and evolved as novel corona virus, a respiratory disease of human source Ge., et al. [24], Wu et al. [25], Lam et al. [26], Anderson et al. [27], Anand P et al. [28].

Lessons learned from 1918 and more new models were framed during covid19 and the successful models are Bhilwara model Rajasthan, Dharabi Model Mumbai and the Ganjam model Odisha. The three models adopt tree model i. e. Some are quarantined, few left undetected (Asymptomatic cases), some hiding travel history for lock downs, shutdowns, and confinement zone in severe places. Ghosh P et al. [29], Schuler et al. [30], Arati et al. [31] and Prinja et al. [32] have developed mathematical models and statistical model considering different states and reported that the model results are not in favour of series of lock downs raising uncertainty among people.

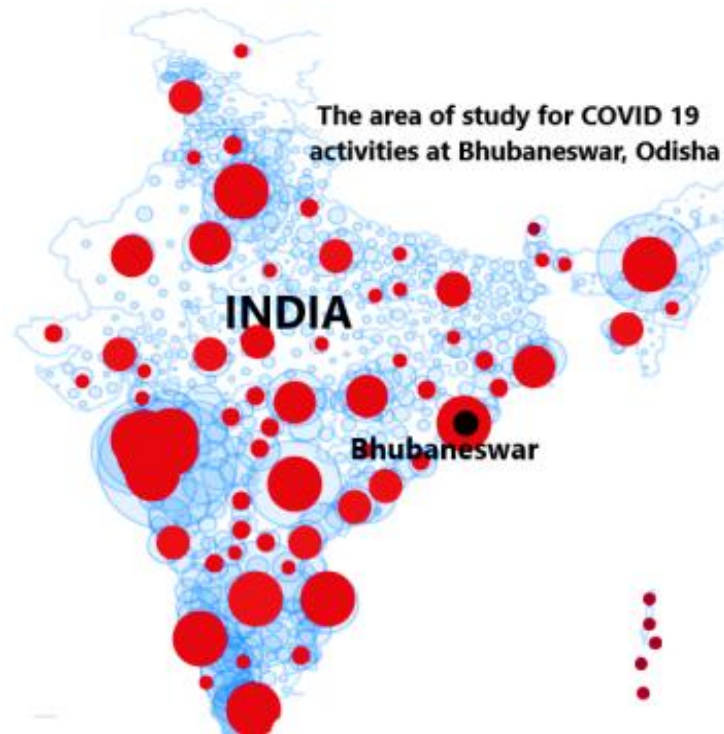


Fig. 1. The intensity wise spread of COVID19 in India

2. METHODOLOGY

Different models are recommended for combating the epidemic and statistical assessment for intensity and Longevity of the pandemic. But fewer studies are available for strategic measures to fight against the Corona Virus COVID-19. For want of vaccine against the virus, the management of spread of an epidemic can be done by the state/ government observing some procedures. The procedural models are area specific. So to have a micro level study of a hotspot area, the mostly affected Bhubaneswar Municipality area is considered for study. The data for the study are collected from the websites, State bulletins, municipal daily proceedings, and News. They were compiled to make a time series and analyzed. The case study management of the patients has been collected through interaction from COVID-19 centers and Hospitals.

3. IMPACT COVID 19 INDIA AGAINST THE GLOBE

The pandemic emerged from Wuhan city of China, propagated 213 cities till date in the globe and put countries under grim are USA, India, Brazil, Peru etc. The result of the pandemic is outburst of patients queue in hospitals, queues of refrigerated Lorries as temporary mortuaries, food-bank lines, snaking around empty streets. Simultaneously the people and pets have deserted the streets and parks, while carbon/GHG and Smog level have plummeted over almost all affected countries including India.

The Killer pandemic has covered 213 countries in the globe has cases of 2.894million cases and caused 92.546 thousand deaths all over the globe by 13th Sept 2020. India occupy 2nd of the list with 4.752 million cases with 78.614K mortalities, L-7 (Fig. 2).

The wave pulse of the COVID19 was initially in control as managed well in advance but gradually deteriorated. When India ranked fourth in confirmed case numbers on June 15th, its position was 132nd cases/million people and 107th for deaths/ million people, Parikh et al. [33]. Later the management of pandemic and spread of infection increased towards end of June. But as on date 27th Oct 2020, it is 7.95mi cases, 119.5K deaths against world's statistics of 43.78mi cases and 1165Kdeaths. India ranks second with 5740cases/mi population and 86 death per million people whereas the confirmed cases globally is 5616 cases/mi people and 149.4 deaths/mi people on 25th Oct 2020 (Worldometer data [7]).

3.1 Issues with Covid-19; India

COVID-19 in form of a wave propagated became Virulent in India from Dec 2019. The instant consequences of the spate were closures, restrictions, isolations and deaths creating panic and uncertainty of both live and livelihood. All suffer from job loss, lethargy, poverty, food scarcity which warrants immediate addressing. A number of pandemics, mass deaths have swept over Indians in past but each has its new façade and much less is learnt. The MOH & FW, GOI

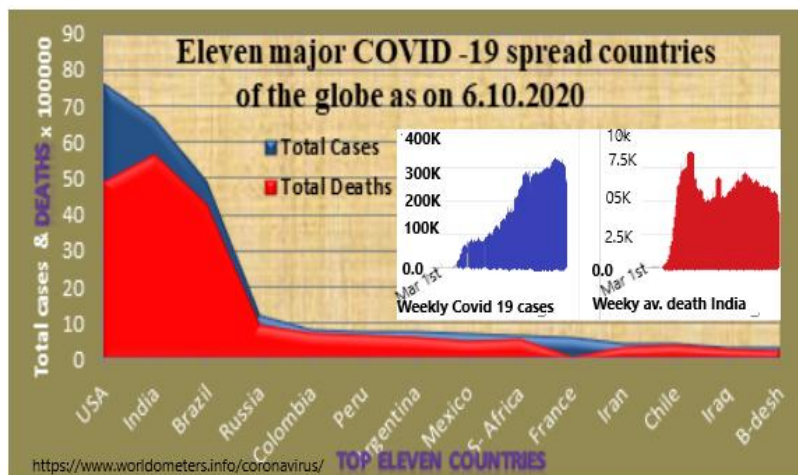


Fig. 2. The weekly cases/ deaths against COVID19 major 11 countries of globe (06.10.2020)

affirmed the India has undergone the Pandemic COVID-19 reiterating drifts in terms of risk factors in age (old, geriatrics and morbid people) and gender (more male mortality) area (swampy and unhealthy living in cities). 63% of old age group, 73% of male gender and 30% cases in cities and particularly in slums were in target indicated in India. The worst affected cities in April were Mumbai, Delhi, Hyderabad, Indore and Pune. <https://castudyweb.com/wp-content/uploads/2020/04/Hindustan-Times-6.pdf>; TUESDAY, APRIL 07, 2020 Till date (6.10.2020) about 0.86% of existing patients are critically ill, 2.93% deaths and 75.26% recovered out of the total cases suffering from SARSCoV2 with vulnerable age group (>60 years old) those who are co-morbid with cardiovascular, Kidney, Lungs diseases etc.

The infection has not only affected health sector but its vicious impact has on agriculture and the productivity, the Industry and its market, the society and its community, the politics and its developments, the religion and its activity along with individual security, family and the mental health of its members, education and many sectors (Fig. 3).

SARSCoV2 have a number of subtypes by mutation. Some cause mild infections whereas others are virulent and cause fatalities. Out of many (73 reported) there are three types of strains have been discovered in India (from Wuhan, Italy and Iran). The common two major strains found that “L” and “S” strains. “L” type strains are more dominant in Gujarat, India that has caused more mortality.

3.2 Mathematical Pandemic Models

The dynamic common epidemic models are SIR and SIS and SEIR, and SEIRS Where S: susceptible, E: exposed, I: infectious, R: recovered and further susceptible. The SIR, SEIR and SEIRS are mathematical computerized models commonly used for pandemic. SIS model is that where the infected person may return to the susceptible group after recovery because the disease confers no immunity against reinfection. The SEIR ideal model that assumes people convey lifetime immunity to an ailment even after recovery, but in case of some viral transmission the resistance after infection declines in a short time. The SEIRS model is an alternative model that allows the immunity waned over time to reappear as a susceptible state, Nakamura et al. [34], He S. et al. [35], Bjørnstad et al. [36]. The other SIR manages the susceptible, infectious and then immediately removed and isolated. The steps are to model for the rates of incubation, transmission, mortalities and recovery. It is difficult to access all the rates as achieving this information one has to gather like clinical management procedure, shedding, transmission, infection, mortalities at sub-clinical stages under uncertainty biases. The step after step procedures do not occur as per the model like delay in identification, reporting, reluctances, and inconveniences in moving hospital, diagnosis delay social restrictions etc.. The Government programs, fund allocation to health sector, fraud officials, faulty score board, and many small but complex challenges hinder the implementation of models along with manipulation of information, Abdelilah, et al. [37], Yen C et al. [38].

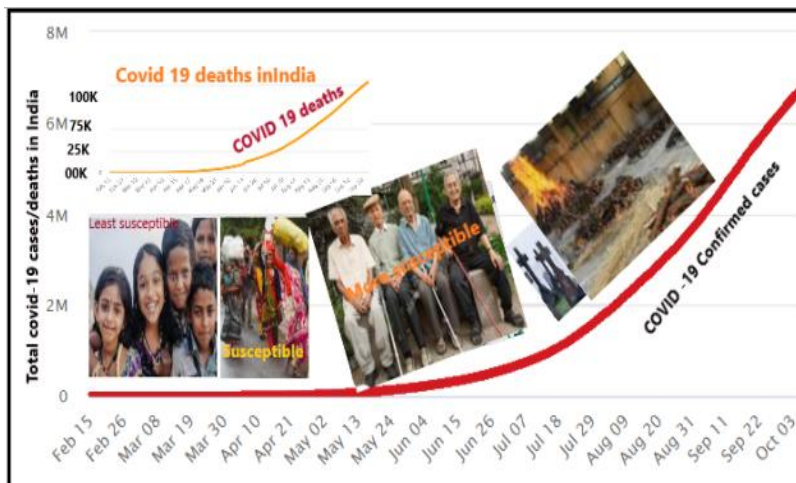


Fig. 3. The status/mortalities of COVID 19 in India till 3rd October 2020

3.3 Physical Models

The well accepted physical model in the globe is Hanoi model Vietnam. The spread could be well checked by using restriction on movement and travel, increased testing, tracing the source and quarantining the diseased and people in his surroundings. Many models as per pandemic virology have been adopted. In India, mixed procedures have been adopted in different viral clustered areas, considering the location specific problems. The popular and successful models adopted were Thiruvananthapuram, Kerala, Bhilwara in Rajasthan, Dharabi in Mumbai and Ganjam models in Odisha.

3.3.1 Kerala model

Thiruvananthapuram, the capital city of Kerala could restrict pandemic deaths of 12, confirmed cases 4000 among 2.5 million people with a large number of students returned from infected cities like New York, Sao Paulo, (Brazil) , Wuhan and Shanghai (China), UAE and Mid East countries. As precautionary measure against pandemic the Thiruvananthapuram city was sealed for any communication, there were shut downs and lock downs which could prevent the spread chain and the frequency and intensity could be restricted though Kerala was the first state to receive the first SARSCov2 infected student from Wuhan. On 15th Oct 2020, it is in news that the spread has recurred in Kerala, Delhi, Mishra SP, [39].

3.3.2 Bhilwara model or Bhatt's model; Rajasthan

Before announcement of national lockdown (24th March), the collector, Bhilwara, Rajasthan, Rajendra Bhatt, issued the first directive to close all marble sector, textile hubs, brick kilns and all establishments employing more than 10workers with part or full pay to save their life so also livelihood. The state had declared imposition of Sec; 144 in all the districts of Rajasthan. The debut was a COVID19 patient from Italy in Bhilwara, Jaypore. Bhatt's relentless hard work could contain the outbreak of the pandemic where the peak was reached with 27patients 31st march with 4 doubling days the pandemic started receding. The Brijesh Bangar Memorial Hospital was the epicenter of the pandemic in Bhilwara. Under the model, the hospitals were reorganized with sufficient ICU's and the hotels, and guest houses were converted to quarantine centers, police department and corona fighters are made

alert. Food and fodder were supplied in time to people. Later initiations are made to screen >90 of people to avoid community transmission. However the Bhilwara model was successful, L-3, L-4, L-5.

3.3.3 Dharabi model, Mumbai

Dharabi is the largest slum in a cosmopolitan city Mumbai which is violently got an outbreak of SARSCoV2 virus during COVID19 pandemic which has been recognized by WHO. Dharabi is a 2.1 km² spread of slums in the heart of the town with population density 277137persons/Km2 (\approx 700K residents). It is the financial and the service cum activity hub of not only Mumbai but also Maharashtra (L-5). The debut of the first COVID19 patient was traced on 1st April 2020, Dharavi role model is named as chase the Virus model, which is an amalgamation of stringent lock downs and shut downs, up surging health care sector, Governance, Public participation and risk sharing, Multi sectoral co-ordination, driving out migrants, Public Private Participation (PPP), driving on maximum quarantine and home isolation, finally imposing on testing, screening, contact tracing and surveillance with all government initiatives from time to time. The Bhilwara model was not possible to implement at Dharabi. The chasing the virus model comprised of 4T's (tracing, tracking, testing, and treating). It was very successful to curb the pandemic (1st April to 31st Aug-2020) and the model is exemplary with growth rate recede from April (12%), May (4.3%) and in June rapidly declined to 1.02%, which is a example for future policy makers. Golechha M. [40].

3.3.4 Ganjam Model; Odisha

Ganjam is a south coastal district of Odisha along east coast of India. It spreads over 8,206 km², population of 3529031 peoples; reside in 758267 houses in the district as per 2011 census. The thickly populated district comprises of 22blocks and 470 Gram Panchayats. The collector of the Ganjam district was Mr. V. A. Kulange. The debut COVID19 case was identified in the district. The state administration played a crucial role in managing the pandemic under control by decentralizing the power where power of collector was partly conferred on the Sarapanch, (The education, Panchayat head). During initial stages the district including the whole state was away from the pandemic as the village units took the charge of fighting COVID19.

The shutdowns lock downs, quarantine centers could be efficiently managed by the local people including Ganjam initial stages till the months March, April. But the action of the federal government during May/June by bringing back their migrant worker had to cost highly as Ganjam district as the highest has highest number of migrants in Odisha. During March/2020 to end of June the numbers of confirmed cases were 1446 but after the migrants arrived their native places the cases raised up. After home coming of migrant workers, gradually the district became the hotspot areas of the state and total number of confirmed cases 19188 persons between July 1st to 12th Oct 2020 (Fig. 3). The courses applied are 5T's by the Government i.e. *tracing, tracking, testing, treatment, and transparency but in time*.

From 1st July to 12th Oct, the total confirmed cases were 19188 people and the peak has reached on with 732 numbers on 23rd July 2020. Ganjam could not confine the migrant workers with adequate work and parallel job opportunities during the Pandemic. Just after a month the workers started returning to their original work place and considered the home coming during panic as a temporal travel tour. But the agony made was that a 2nd wave encompassed Ganjam after the migrants completed their quarantine days, Which caused the 2nd outbreak during August, when the confirmed cases rate hiked to 59% which was considered one among the highest in India then. The Simultaneously the confirmed cases reported by BMC has been collected and plotted

3.3.5 The Comparison of date wise cases

On comparison of the figures (Fig. 4 and Fig. 5) for the Ganjam district and the Bhubaneswar city it can be inferred that

- i. From 1st July to 15th July 2020; The Ganjam district has higher numbers of COVID19 cases than Bhubaneswar when both the places are under equal restrictions of lock downs and shut downs. The higher rate of confirmed cases in the Ganjam district is due to inflow of migrants from other states influenced by the virus.
- ii. The Ganjam district reached the peak on 25th July 2020 much prior to the Bhubaneswar statistics and also that of India. Bhubaneswar reached the peak on 5th September after two months. The Ganjam model of fighting against flood like segregation, Isolation, testing susceptible, not allowing exposure to public, asymptomatic cases were sheltered in infectious COVID centers, acute cases in COVID placed in Hospitals with ventilator provision and after recovery released for home. Strict adherence to above had successfully worked in the Ganjam district.

3.3.6 WHO's guidelines issued

On 11th Mar 2020, WHO affirmed COVID-19 as a pandemic outbreak and reiterated to all countries to impart prompt actions and surge retorts to detect, treat, and reduce to protect human lives. As per WHO's Strategic guidelines, and responses to health emergencies as per the Epidemic Act Of India 1897 imposed the restrictions are: To interrupt human-to-human spread through social distancing and close contacts for 2ndry infections through close contacts between the health, police and auxiliary health care people associated with the patient. Stress was imposed upon identifying the cases, isolations from people and animals, medical attention, and early optimum care for severely infected patients.

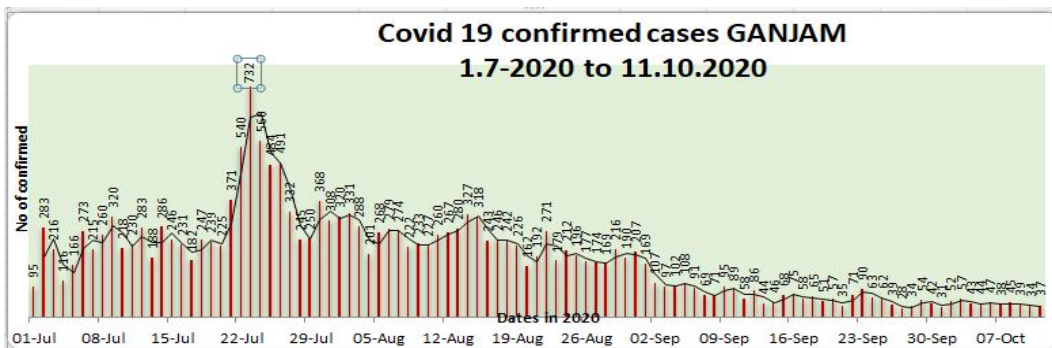


Fig. 4. Cases in Ganjam district as results of the Ganjam model against COVID 1st July to 11th Oct

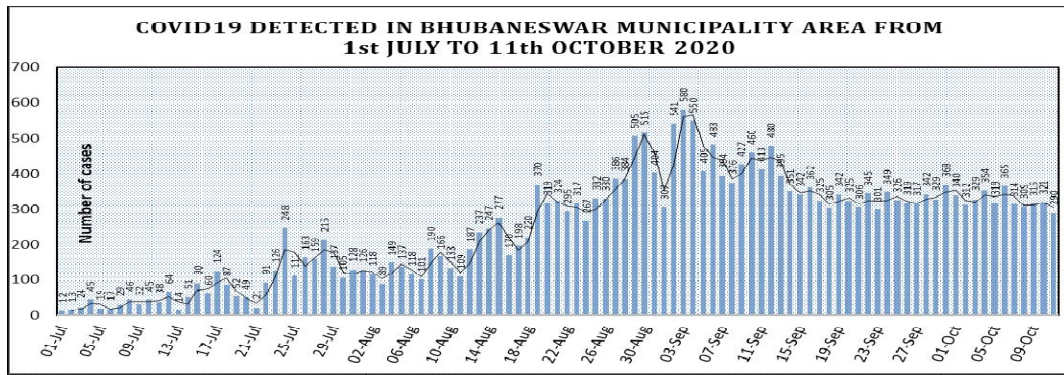


Fig. 5. Cases of COVID19 patients from Bhubaneswar Municipality; 1st July to 11th Oct 2020

4. IMPACT OF COVID-19 IN INDIA

The pandemic threat posed in India was so fast that it was in 12th rank state towards fag end of June 2020. The spread was so fast that it has been the 2nd in the list as on today. The pandemic has not zone specific but has covered all over India not leaving a single township except glacier part of Himalaya's. The thickly populated cosmopolitans like Mumbai, Chennai, Delhi, Gujarat, Rajasthan, Calcutta and Hyderabad were the deadly affected cities. The number of cases since the date of first attack went on rising and probable had reached the peak during 25th Sept 2020. Against this figure, India ranks 2nd in the list with 6685.08K numbers of cases, 103.6K numbers of deaths and 5662.5K cases recovered and the epicenter on 7th Oct 2020 is Dharabi, Mumbai.

4.1 Impact of COVID19

4.1.1 Age people India

It is observed that old, geriatrics and morbid suffering from cardiovascular, kidney, lungs and many ancillary diseases are the worst suffer and the death rate is high if they are infected by SARSCoV2 virus. The ACE2 system carried by X-chromosome varies between gents and ladies. Gents are more susceptible than the ladies to SARSCoV2 virus. The ACE system also differs significantly subject to age (from birth to death i.e. kids compared to adults). The Renin-Angiotensin (ACE2) was considered (before Covid-19) that controls the gives relief of pro-inflammatory cytokines which has been proved to be take a vital role and the children are less affected than old.

The statistics reveals that the ratio of male and female confirmed from SARSCoV2 infections are

70:30 (due to more exposure) where the different age group infection and death were reported as 0-17 years (1%), 18-25 years (1%), 26-44 years (10%), 45-60 years 35% and >60 years are 53% vulnerable in India as per Health Department (GOI) as on 11.10.2020. A survey was conducted by Sharma S, 2020 [41], considering sample size 56288 persons and found mortalities in decadal age group from 00-10, to > 90 years of age (Fig. 6)

Sharma S. 2020 [41] had taken data sample of size data of 56288 persons considering the frequency of vulnerability of male and female and decadal increment in age group and from the data female/ male ratio, Female/total ratio and % of deaths curve a has been done and in Fig. 6. The curve takes the shape of normal curve or Gaussian curve.

4.1.2 Sex wise morbidity by COVID19

The COVID19 reduces the immune system of the body and aggravates the High BP, Atherosclerosis, Malfunction of heart like cardiac arrest, enlargement, fibrosis. The SARSCoV2 also affect kidney, liver, lungs, eye, skin and cell. The related diseases are Asthma, COPD, arterial hypertension, and many other lungs related diseases), nervous system, Diarrhea, Glaucoma and Diabetic retinopathy (Eye), affect coagulation blood, Dermatitis, and dysfunction of immunity, many auto immune diseases (Fig. 7).

4.2 Social Insecurity

The unparalleled out broke pandemic from the SARSCoVID-19 is in vogue which has remarkable impression on the globe including Indians. The administrative restrictions and the insecurity and uncertainty like quarantine, social restrictions have imposed both physical and

mental stress from children to geriatrics have continued for months together. The people are accustomed to the panic. They were behind their doors.

When the situation continued; people are forced to under boredom, increased domestic violence, felt social insecurity along with loss of livelihood. Without work they increased drinking and become intoxicated. The frontline workers like health worker, policemen, moratorium people, administrative personnel in charge of COVID19 and waste disposal community in India are the worst sufferer both physically and mentally. Isolation from home, children are developing more ferocity and barbarous acts. The geriatrics, the women and school goers should be well planned for their normalcy.

4.2.1 Teaching mode change

The pandemic, COVID-19 has tattered teaching learning process around the world, upsetting about 1.5 bi. Students i.e. close to 90% student population of the world, (UNICEF education system). Educational institutions across the world were forced to close down and students enforced to stay at home. The learning is a continuous phenomenon of the modern society. Its instantaneous break could jeopardize the education Industry and the acquiring knowledge process.

A paradigm shift to online teaching and learning are bottleneck during the pandemic. The teacher's inexperience and unpreparedness to the novice system has back geared the teaching and learning process. It can be only scaled up through adequate training for which there was no time. However the class room teaching offer superlative degree of students undertaking through interactions but the e-learning lags that.

However online platforms, e-learning, video conferencing and ed-tech sector has assimilated a massive innovative development both in number of users and technical viability with an innovative form. As online teaching and learning has become integral part of teaching learning process, the students and teachers have gained e-knowledge using IT technology. But a financially backward state hilly state like Odisha adaptation to e-teaching and blended learning has become a hard nut to crack for the teachers, students, and topography which has been experienced during last four months of the

pandemic switching from black board system of teacher student interaction.

4.2.2 Pandemic statistics Odisha state

Odisha is ranked in 8th position in area wise, 46millions people (projected) positioned as 11th state in India. The state has a stable government, financially sound. Since the inception of (last week of Mar' 2020) SARS2 in Odisha the state took immediate prompt action to fight the respiratory droplet contacted disease. But still by 10th of Oct 2020, COVID19 confirmed patients; active on date and death till date as reported by Government of Odisha (Dash Board, Odisha) are 246839 Thousand, 25407 and 991 respectively which are 3.58%, 2.84% and 0.93% of the same statistics of India. The small state Odisha is prompt in taking preventions against spread of COVID 19 from 23rd March 2020.

The state has employed all its resources like money, power, health care, Panchayat level politicians and administration to fight against the impact of the pandemic. The todays' widespread was considered futile as actions like welcoming the migrants from affected areas (Gujarat, Maharashtra), confining diseased and healthy in COVID shelters concentrated, non-developed herd immunity against the virus, mismanagement in the COVID shelters and intermittent relaxation in lockdown and shutdowns has spread the disease at a later stage (Fig. 8).

4.3 District Wise Total Cases/Deaths

District wise total deaths and number of confirmed cases in Odisha were collected and shown in Fig 9. Similarly the confirmed cases were collected and the graph is shown in Fig. 10.

The graph reveals that only five districts such as Balasore, Cuttack, Ganjam, Khurdha, Puri and Sundergarh has got deaths more than 40 people though the numbers of confirmed cases are much more. It is inferred from the data that old and aged people are the worst susceptible whereas the children are the least in the ratio (Fig. 9) and (Fig. 10).

The male female confirmed case has a ratio of 67%:33%. Out of 252239 confirmed cases the age groups 0-14, 15-40, 41-60 and >60 years infected by SARSCoV19 are 5.10%, 52.43%, 32.28% and 10.19%. The highest % of age group infected are 15 to 40 years followed by 41-60 years indicating these group belongs to migrant

people those who runaway after closure of their livelihood outside Odisha which is a global contradiction that the age group >60% are the worst infected. It can be inferred that if the

government would have initiated not to bring back the migrant labours from other states the status of Odisha in case managing CPVID19 would have reversed.

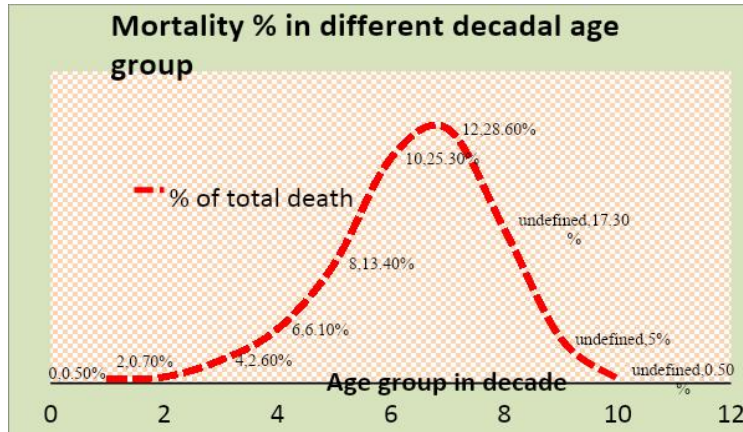


Fig. 6. Mortality % in different decadal age group (Follows Gaussian model)

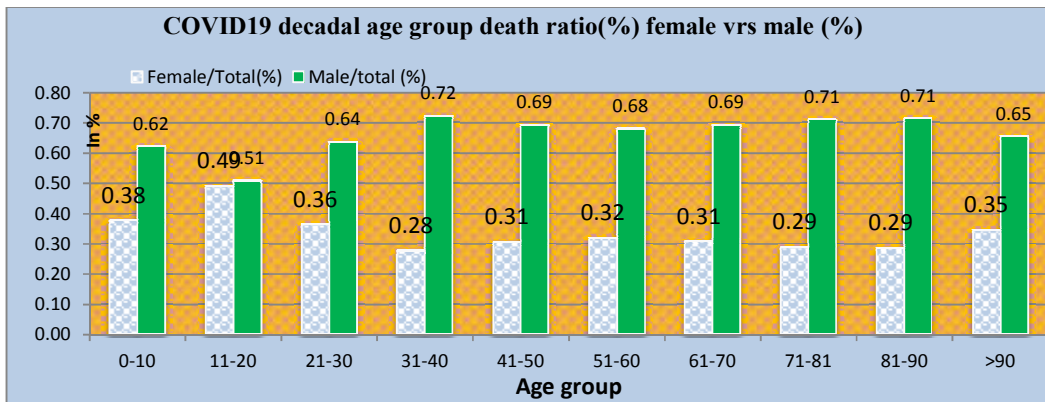


Fig. 7. Decadal age group wise confirmed cases infected from SARSCoV2 (India)

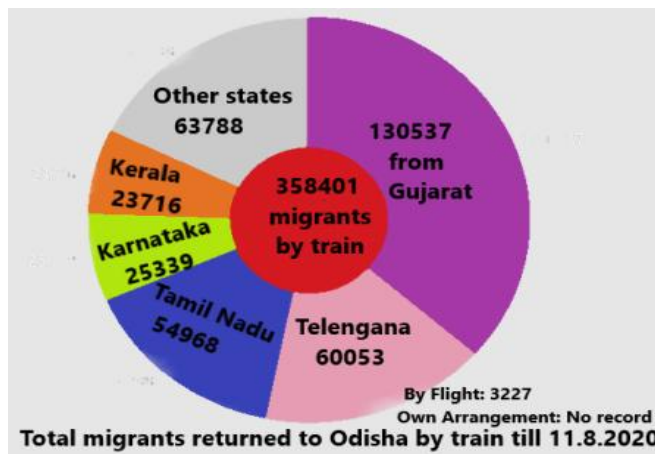


Fig. 8. The total home incoming by people of Odisha during COVID19 by 11.8.2020

4.3.1 The status of COVID 19: Bhubaneswar

The capital of the state Odisha can be geospatially portioned as old city of temple dating back to 3000years old centered with Lingaraj temple and the present city built up from 1948 encircling the secretariat of Odisha state. Presently the Koenigsberger's city encompasses an area of 151.96 km² extended to 393.57 Km² (Wikipedia),projected population 1.163 million inhabitants staying in 67 wards in three zones i.e North, South east and South west zone. The SE zone is old Bhubaneswar having more slum habitation with insanitary dwelling, Fig. 11.

On 11th Sept Bhubaneswar enrolled in 10th cities having COVID19 patients more than 15000 confirmed cases where the top ranked are Delhi 200k COVID patients and 2nd rank 161k patients respectively in spite of exhaustive door wise surveillance in the Bhubaneswar Municipality area with initiative to surge the ICU bed as they were inadequate for the spike of number of referred patients.

4.3.2 The slums worst outbreak

The Bhubaneswar city is developing at fast rate as a smart city comprising of the permanent residents with BMC plan with them, and the other group are the Labour class who are the service providers and live in unhygienic slums consisting of temporary houses. Total slum population as per BMC is 301K people as per 2011 census (Fig. 12).

The slum map and the pandemic map of COVID-19 have been compared. It is found t From the above data and figures it is observed that the ward numbers Ward No- 27 (655 cases), 63 (355 cases) and 40 (348 cases) were reported. Ward Number 27 and 63 are in the heart of the city; of population 13414 and 3850 people and

accommodating a number of slums of working class live in huts and are of down to earth (Fig. 12). The ward Number 40 is around railway station where slums along with daily passengers congregate and have spread the disease. It is also inferred that the permanent planned colonies are less affected than the temporary and scattered dwellings, Mishra S. P et al 2020 [42]. The slum areas are mostly affected as the restrictions about the spread of the disease are less adhered.

4.3.3 Education system during pandemic

The crisis continued even after months and there was no end in sight. But schools can't be kept shut forever; education on has to continue. This has led education stakeholders to think about alternative ways of providing education to ensure the continuity of teaching and learning. As a result, most countries rushed to online distance education using online platforms, e-learning, and ICTs, etc. which set off an unplanned and rapid shift in the education sector. The people of Bhubaneswar are not so reach that a family consisting of four members shall have to maintain four laptops or G-4 mobiles and the cost of internet charges etc. In remote areas signal add to the problem.

4.4 Health Care Units BBSR

Though Bhubaneswar is the medical hub and the hospital facilities are sufficient during normal days. With spike of confirmed/ referred cases at Bhubaneswar, new COVID19 Hospitals (with and without ICU's), COVID19 care centers are opened by the government and private organization, the numbers are incapable to meet the demand. The statistics of health care facilities and their GIS position in Bhubaneswar is in Fig. 13.a and Fig. 13.b.

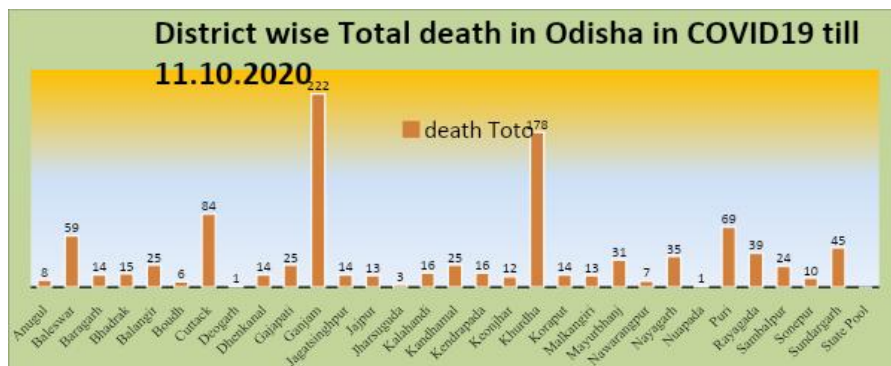


Fig. 9. District wise total death due to COVID19 pandemic Odisha state till 11.10.2020

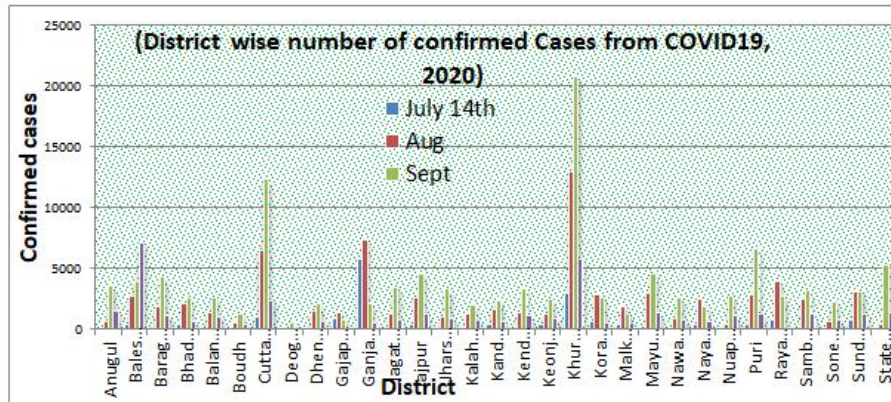


Fig. 10. District wise number of confirmed cases during month July(p) to Oct(P) 2020 in Odisha

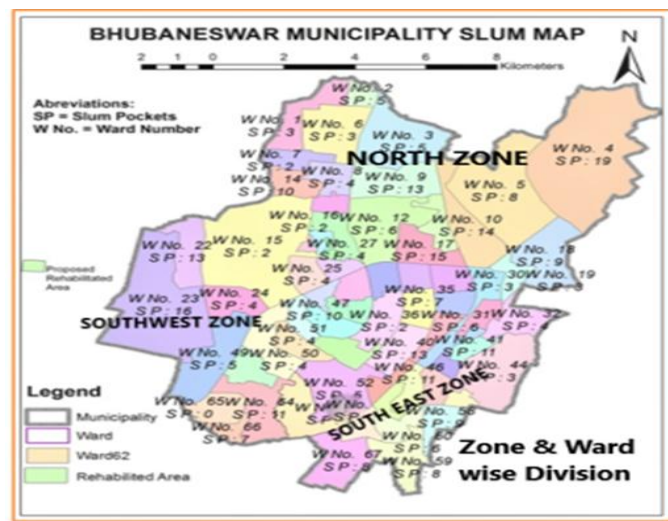


Fig. 11. Zone & Ward wise division and the slum map of Bhubaneswar

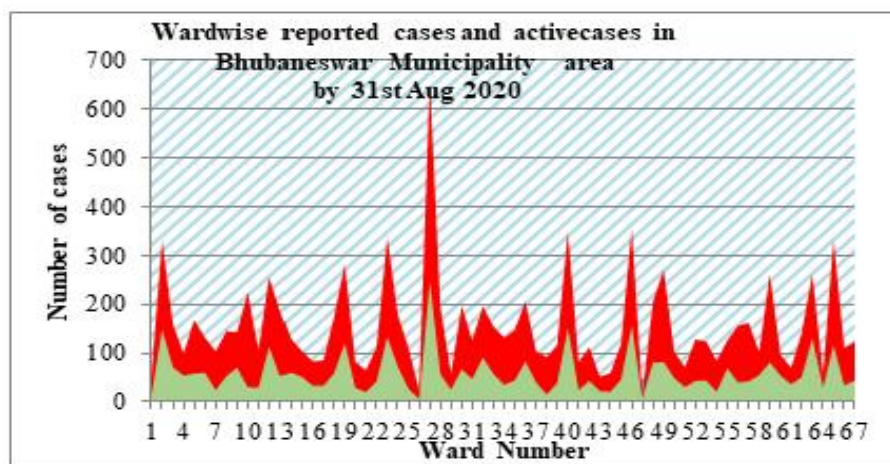


Fig. 12. Ward wise confirmed active and cured cases of COVID-19 in Bhubaneswar

4.4.1 Ward wise Infection intensity and frequency

Out of 67 wards in BMC the ward No 27 (IRC Village area) is the most affected area in BBSR having 633 peak positive cases and the 2nd ranked is the Ward No 23 (SUM Hospital outskirts & Sampur area) having 325 cases. The 3rd and the 4th ranked wards have confirmed infections from COVID19 were 319 and 304 cases in wards 65 (Dumduma area) and 46 (UnitVI) respectively till 29th Sept. 2020.

All the areas are in the periphery slums in the cosmopolitan city of the SW zone. During September, the cases have ramped up daily in Odisha more than 4000 patients/daily where about 20-25% was from the capital Fig. 14.

4.4.2 Achieving Peak

Many Natural phenomena's in nature the best probability distribution is the normal distribution (Gaussian distribution) as it satisfies phenomenon like heights of persons, blood pressure, measurement error, and IQ scores and many other real data series, L-8. But the symmetrical distribution only changes shape with same mean but different skewness of fit. The Epidemiological models used for pandemics are Gaussian distribution curves referred by Volbrecht A. et al. [43]. With interventions in the management; the curve may flatten depending upon the divergence of skewness of the old data. Zonal pulse wave propagation of infections with a constant people of susceptibility is given by normal Gaussian curve, Edward Beltrami [44]. A Gaussian model has been prepared phase/stage of severity of illness for pandemic 15(a), 15(b).

The infection by SARSCoV2 affecting in an area take the shape of a gaussian model graph or unit hydrograph shape of storm (as trend is similar) and the Stage and phase against severity of illness is given I Fig. 15(a). India reached its peak of infection on 25th of August and thereafter the rate infection receded.

But Odisha reached a flatter peak from 21st September to 25th September whereas the city Bhubaneswar has its optimum on 25th September 2020 Fig. 15(C) and Fig. 15(d).

5. DISCUSSION

The emergency measures during Lockdowns include restrictions and closures of education sector, closings of public places, workplaces, industries, trade, businesses; curfews; home confinements etc. COVID19 forced the society various aspects to close all aspects of life and even without a wife. To save life's challenging hours, and public health many of which transcend the issue of mere scientific effectiveness. Public health crises and ethical issues has challenged nation's commitment like freeness in movement, food, dwelling, talking, habits, kinness, friendship and many human social requirements. Staying under administrations restrictions like shut downs and lock downs, eating monotonous food stuffs, without drinks, liquors, education and social freedom. By putting life at the blade of a razor and living beyond livelihood, civil liberties/justice and economic instability made the life hale for months together Tseng K et al. [45].

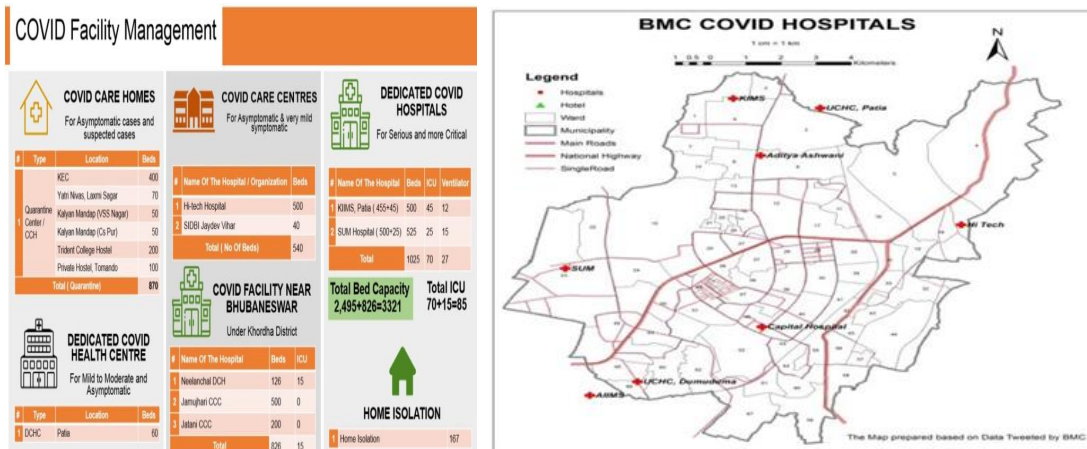


Fig. 13. (a and b): The COVID Facility & management, at Bhubaneswar, Capital City Odisha (Dash Board Oata)

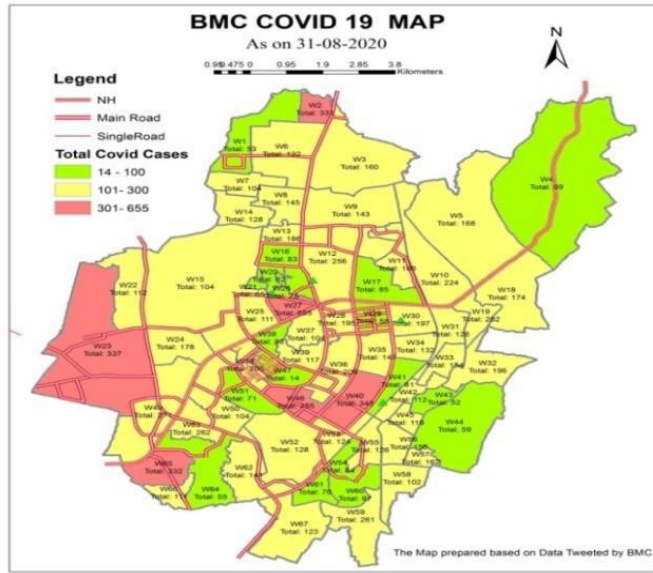


Fig. 14. Ward wise COVID 19 patients detected where SW has highest cases by 31.8.2020

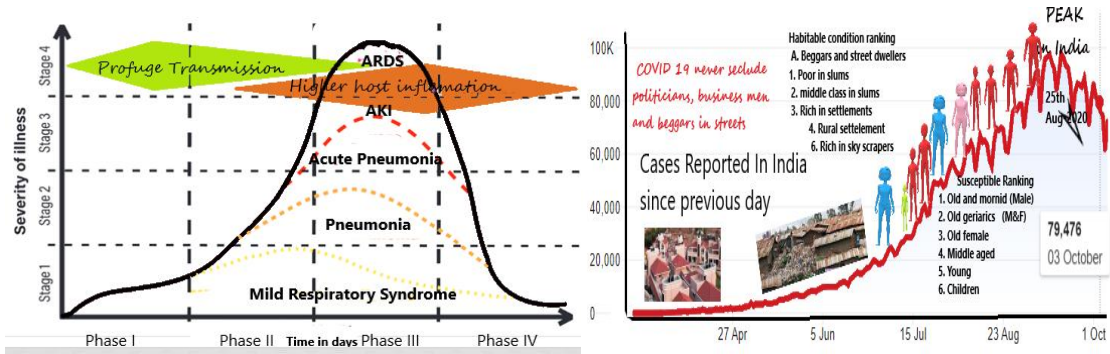


Fig. 15. (a): Phase/stage diagram of severity of COVID19 with interventions; (b); The daily covid cases (India) since outbreak with peak

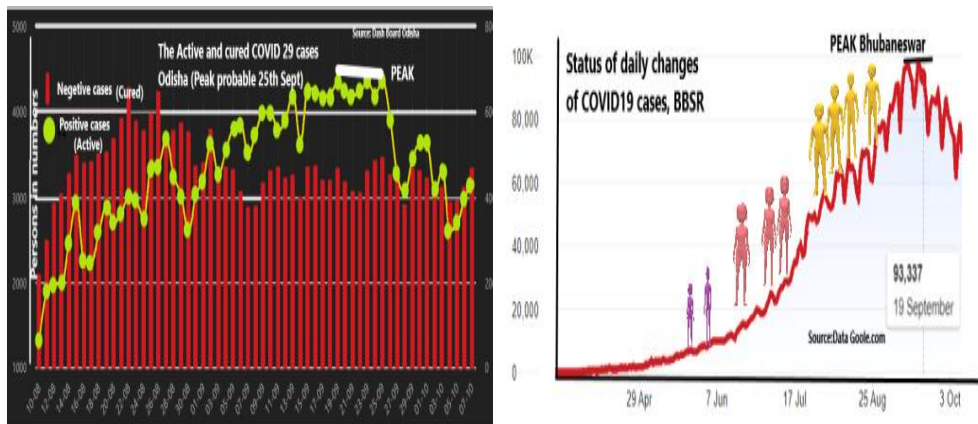


Fig. 15. (C): Daily active vrs cured cases in Odisha (with peak) (d): Daily active COVID 19 cases BBSR

The COVID-19 is the 3rd known coronavirus after SARS-coronavirus (SARS-CoV) and middleeast respiratory syndrome-coronavirus (MERS-CoV) that was first described in late December 2019, until the epidemic began in Wuhan, China, and induces extreme respiratory disease and human pneumonia-like infection. The pandemic spread of novel coronavirus (COVID-19) has been declared a global health emergency by the WHO. Asthma, chronic lung disorder and cardiovascular disease are the main three health disorders for those infected with COVID-19. An inclusive approach of awareness, prevention, and mitigation from global to the local levels is required to overcome this challenging situation in developing countries [2].

5.1 Ecology and Food

During pandemic planning the ecosystem is worst affected along with food chain. The non-vegetarians are at higher risk than vegetarians. In panic the forests are chopped down for fire and bats. The poultry, pig farms, sea fish and the meat markets became places of no man's land where as organic farming gained popularity during the Pandemics. The lonely industrial places were visited by wilds nearby sea fishes are almost banned. The nonfunctioning of industries, the CO₂ level has come down so that the grey sky over some Industrial towns turned blue.

5.1.1 Trade during pandemic

From the outbreak of COVID-19 however, India endeavored to boost domestic trade in e-procurement through Self-contained India Creativity through own skill development. India is trying to reduce its dependence on coal, fossil fuels to deplete air pollution and moderate climate change. However during pandemic many lost their jobs, social security, curtailment in salary in many sectors, closure of small and medium sector production has forced depletion of GDP ≈29% in comparison to same period of previous year.

5.1.2 Migration impact

Migrants are the worst affected in the globe. Initially Odisha, till mid of May observed all procedures of combating the pandemic with lock downs at work places, Industries. The local Government had taken initiative for their people to return back from other industrial states of India. As a result millions of Odiyas migrated in

Panic for their life and livelihood, returned back to their native places. But after home coming they could not get an appropriate job in their expertise arena with higher income. Paucity of money and food they are forced to return back their old work place only after spreading the disease in their places.

5.1.3 Market during pandemic

The pandemic has invited instability in market for salt to heavy machineries along with market volatility. There were hoarding, black marketing of all goods in the market in the name of disrupted supply chain or Government restrictions. Unnecessarily the buyer are either short supplied at high price or deprived of the commodity.

5.2 Epidemic Models Efficacy

Though the virus SARSCoV2is same, but, they get mutated. Their stain become different from place to place. To manage the outbreak of any pandemic infection it is essential to test the strain type and also the socio-political scenario and the area, economic status and the topography. So Bhilwara model could not fit in in Dharabi area and similarly the successful Ganjam model cannot exactly fit the Bhubaneswar area Joshi T., [46], Kakehashi Masayuki; [47] Prinja S,et al. [32].

5.2.1 Agrarian crisis in pandemic

Agriculture system comprises of producing, storing, and marketing. Though villagers are less infected and the existing agriculture fields in 391Km² affected maximum. The lock downs and shutdowns compelled the agrarians confined at home, the stores were closed adequate helping hand and the market became melancholies places forced the agriculture sector to a doldrums atmosphere. The foods and goods are hoarded and black marketed in the town. The pisci-culture, poultry and agro based industries due to closure of market; no selling produce gave a huge financial loss to the farmers amidst the pandemic panic due to disruption in the supply chain.

5.2.2 Tourism industry

Under global tourism value chains, India was prospering but the outbreak became a barrier. Bhubaneswar city is a tourist excellence with Siva culture surrounded by the many religious places, zoo's, Gardens and lagoon etc. The

tourism sector was paralyzed for 7 months causing a huge fiscal loss and unemployment to the stakeholders dependant on temples, tourism and transportation sector.

5.2.3 Responses on climate change

Due to stringent pandemic impositions like emergency actions have made a remarkable climate change. Bhubaneswar area became devoid of traffic emission and depletion level was NO_x by 67%, CO by 14%, Black carbon(BC) by 47% and Ozone by 3% by August 2020, i.e a natural climate now existing at BBSR. Influence of the natural climate Bhubaneswar is receiving good spell of rain and there is forecasting of an intense winter by IIT Bhubaneswar, L-6 and Panda S et al. [48].

5.2.4 Social violence's and crimes

When people are in quest for food and job, confined at home, the life is like in a dungeon. Domestic violence, thefts and crimes have surged up in Bhubaneswar city during the Pandemic period. The Pandemic not only focused on human health but also upset the economy status and the child and women security in Bhubaneswar but also everywhere in the globe. The harassment is both physical and sexual assault even by the intimate partner.

5.2.5 Under reporting of mortalities

Some nations/ and many cities were suspected to under report their number of their mortalities due to COVID-19 Pandemic. Some cities of India also started hiding their death numbers due to pandemic to have administrative gain. However lack of vaccine for the novice virus, ignorant about medical treatment procedures, want of adequate hospitals, health care staffs and doctors, and want of adequate PPE kits have handicapped the doctors to save the patients and their deaths. The under reporting countries may suffer in future for the present hiding.

5.2.6 Improvement in IT Sector

During the pandemic, when people were confined at home, the technology, social media, IT and the internet has been a blessing like google, Weibo, Zoom etc. have facilitated for e-learning, e-marketing and e-medical assistance and statistics has made it possible to serve the people. Odisha's IT hub, Bhubaneswar was closed for four to five months.

5.2.7 Slums are worst affected

Though the pandemic do not discriminate the poor and the rich; yet the frequency of the infection is more among the people below the poverty line staying in Industrial areas and slums than economically facilitated group living above health norms. Similarly Mumbai has two classes of people according to dwelling. People living in planned areas with amenities of all life style of dwelling are less affected whereas people living under health conditions are suffering from the pandemic in large.

5.2.8 Political and regional

COVID-19, like past pandemics, unduly affected the poor, people of slums and certain minority ethnic groups. To fight the virulent pandemic there should not be any discrimination politically or regionally. With a huge financial incurrence and public participation indiscriminating cast, creed and financial stability only the outbreak can be checked with least damage if combatted unanimously.

5.3 Herd Immunity

It is the community immunity, when major part of the people of the area is vaccinated or immune to a virus or bacteria so that they cannot propagate. It is the fight between the virus/bacteria and the whole group. As told in Bhubaneswar minimum 80-90% people to vaccine to achieve herd immunity but it is a dream when the vaccine shall launch so that a patient in a population spawns <1 2ndry case on average Fontanet A. [49].

5.3.1 Obesity

Though very less data is available but it is observed that the older age groups with association of obesity are at high risk group to infection and in terms of acute illness along with diseases like asthma, cardiovascular diseases, Kidney and lungs. Doctors claim for study about how obesity boosts PD-1+ CD8 T cells in a substantial number of COVID-19 viral patients, Finelli C. [50].

5.3.2 Waste water

Limited studies have been done since Dec-19 about the transmission of COVID-19 through solid and liquid wastes whereas many researchers considered the propagation of the

virus with faunal base. It is highly pertinent at present for COVID-19 investigation transmitting through both solid and liquid waste and sewage monitoring and dissemination in countries like India where appropriate sewerage system is unavailable, Pandey et al. [51].

5.4 Causes for Differential Acuteness along Gender and Age Group

Human body has Renin-Angiotensin (RA) system. The RA controls BP, Heart, kidney, lungs and other organs. The ACE2 receptor transmutes Angiotensin 2 (bioactive) into Angiotensin 1-7 (inactive). The ACE2 receptors were found in lab (prior to SARS-CoV-2 virus) in cardiovascular, acute pulmonary lesions and renal diseases. Thsae are the causes of death in acute cases, (Fig. 2). The ACE2 receptor is essential for the amino acid transporters in the intestine that is binding site which is blocked SARS-CoV-2. So the SARSCoV2 inhibit ACE2 that moderates innate immunity and alter the microflora of the intestinal. That is the cause of inflammation of intestine leading to diarrhea. It was considered prior to COVID 19 that the RA system controls the release of pro-inflammatory cytokines. But during the pandemic it is observed that men are more susceptible than women to the virus and, children the least. Young's are less affected than adults, due to the explosion of cytokines in the crowd. So it can be ascertained that the RA plays a vital position in Covid-19, Jean Mark Sabitier; 2020, (L-1).

The RA system and increased BP are the lethal effects linked with SARS-CoV-2 infection in humans. The virus affects the nervous system leading to headache syndromes, striving for breathing, cardiology problems, anosmia (loss of smell), ageusia (loss of taste), diarrhea, dermatitis, etc. are controlled by the RA system. So during COVID-19; the RA system should be prioritized by the virologists and doctor's to find means for immunity development and an effective treatment of Covid-19 patients.

6. ETHICS TO BE FOLLOWED DURING PANDEMIC

The ethics to combat pandemic like COVID19, it is essential for the state to follow the guideline laid down by CDC during 2007 [52]. The plan and programme of a state during start of pandemic should Identify the disease and chalk out a clear plan of goals, commitment and vigilance of transparency in dealing the case and

the money spent for prevention, public participation, maximizing public alertness, clear-cut guidelines based on expertise and scientific stand, cooperation with neighboring states and nations, harmonizing personal specific liberty and community concern; taking diversified but proper ethical decision along with maintaining fair process with procedural justice could save them from the pandemic.

The male female confirmed case has a ratio of 67%:33%, but the worst infected age group is 15 to 41 years due to carelessness, casually taking the infection and increased numbers of migrants from the group. The virus is fatal for age group >60 in Odisha including Bhubaneswar is due to their increased conditions of morbidity and obesity. The children and women are the least prey to COVID19; c) the ACE 2 receptors are responsible for infection from SARSCoV2 virus; d) Ganjam model is one among the successful model to combat against COVID19 for the people of Odisha.

7. CONCLUSION

The study reveals that the male female confirmed case has a ratio of 67%:33%. Out of 252239 confirmed cases the age groups 0-14, 15-40, 41-60, and >60 years infected by SARSCoV19 are 5.10%, 52.43%, 32.28%, and 10.19%. Ganjam model is one among the successful model to combat COVID19 for the people of Odisha. The male female ratio of infection is 67%:33% in Odisha and Bhubaneswar is in synchronous with Global ratio. The Bhubaneswar city battled to "flatten" the runaway from COVID-19 and economic curves caused by the pandemic. The peak of the COVID19 wave passed the areas in different dates.

Instead of all panic during COVID, given us the depletion of CO₂ level. The natural climate has returned back good rain and expected to have strong winter. The pandemic has brought in teaching and learning process, work from home and live with constraints. People are in peace being confined with their family but under the stresses of economy, monotony, mental agony, loss of job. However lock downs and quarantine is not the solution to fight the pandemic but discovery of vaccine is the need of the hour.

The domain of this study is to manage the pandemic; the need of the hour is good governance, strong leadership and upgraded

health-care, proper training to COVID19 Workers, public private partnership, public awareness, risk communication with improvising continuous supply of foods, goods, service systems.

DECLARATION

Any medical evaluation or statistical information is for a common man/health care personnel and not an instrument for use by a medical professional. Kindly consult your doctor if there is any query about COVID19 and SARSCoV2.

WEB LINKS REFERRED

- L-1 <https://www.linkedin.com/posts/dr-emmanuelle-faucon->
- L-2 [https://economictimes.indiatimes.com/news/politics-and-nation/centre-may-adopt-bhilwara-model-to-contain-spread-of-covid-19-in-other-hotspots/articleshow/75021963.cms,](https://economictimes.indiatimes.com/news/politics-and-nation/centre-may-adopt-bhilwara-model-to-contain-spread-of-covid-19-in-other-hotspots/articleshow/75021963.cms)
- L-3 [https://theprint.in/opinion/modi-govts-post-lockdown-containment-plan-and-the-bhilwara-model-thats-key-to-it/396714 /](https://theprint.in/opinion/modi-govts-post-lockdown-containment-plan-and-the-bhilwara-model-thats-key-to-it/396714/)
- L-4 <https://www.wionews.com/india-news/bhilwara-model-indias-covid-19-containment-strategy-291620>
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- L-6 <https://www.news18.com/news/india/covid-19-spread-may-spike-in-monsoon-winter-with-fall-in-temperatures-iit-aiims-study-2723795.html>
- L-7 <https://www.worldometers.info/coronavirus>
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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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