Nature and Magnitude of COVID-19 First Wave in Tamil Nadu, India

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OPEN ACCESS

Manuscript ID:
ECO-2021-09044162

Volume: 9

Issue: 4

Month: September

Year: 2021

P-ISSN: 2319-961X

E-ISSN: 2582-0192

Received: 28.06.2021

Accepted: 20.07.2021

Published: 01.09.2021

Citation: Devi Priya, P. "Nature and Magnitude of COVID-19 First Wave in Tamil Nadu, India." *Shanlax International Journal of Economics,* vol. 9, no. 4, 2021, pp. 30–36.

DOI:
https://doi.org/10.34293/economics.v9i4.4162

Abstract
The first case of COVID-19 Tamil Nadu was confirmed on 7th March 2020 in Chennai after an international travel from Muscat. The specific objectives of the study were to analyze the trends in COVID 19 in Tamil Nadu from March 2020 to January 2021 and examine the pattern of it sex-wise among the age groups. The risk of COVID-19 was accessed with the computation of positive test rate, prevalence rate and fatality rate. The prevalence rates were highest in August, with a slight downfall in September 2020 in the state. The positivity test rate was high in June and July. Then it started declining and has been one percent in January. About 83 percent of the occurrence of the virus was among the middle age group, 13 percent among the elderly and four percent among the children. Intensifying immunity boosters, personal and public hygiene, vaccination on a large scale probably would contain the second wave and prohibit the third wave for the survival of humanity.
Keywords: Pandemic, Covid-19, Positive test rate, Prevalence rate, Fatality rate, Co-morbidity

Introduction

The substantial spread of disease among many people in a particular region within a short period is known as the outbreak of an epidemic. When the epidemic spreads across nations and continents, it becomes global and is termed a pandemic. As humanity started creating permanent settlements, civilizations began and agricultural revolutions took place; the world witnessed the spread of bacteria and viruses among humans and between humans and animals. The natural disaster influenza pandemic (Spanish flu) 1918 devasted more people than the number killed in First World War. In India alone, 12 million people were victims a century ago.

The invention of antibodies and vaccines, along with the advancements in sanitation, sewerage system, clean water, and personal hygiene practices, eradicated few epidemics like smallpox, cholera. But there was the emergence of new epidemics like swine flu, Ebola, Zika, Nipah viruses threatening humanity then and there. The challenge encountered by the world today is a coronavirus. The novel coronavirus originated in Wuhan, China, 2019and was transmitted to humans from animals. The virus is likely to cause mild to severe acute respiratory syndrome (SARS) and death in human beings. The infection spread from person to person while coughing or sneezing. The gestation period for the virus is up to two weeks. The first case in India was confirmed on 30th January 2020 in Kerala when World Health Organisation declared a Public Health Emergency of International Concern. On 11th March 2020, COVID 19 was declared a pandemic.

Background of the Study

India imposed a lockdown to mitigate the spread of the epidemic from 24th March to 14th April 2020, which was extended to 3rd May 2020. The effective reproduction number during the pre-lockdown was approximately two. It reduced to 1.04 on 9th May 2020 but reached 1.14 on 17th May 2020 because of a case increase in Punjab and Tamil Nadu. The major rise was in Bihar, Odisha, Rajasthan, and Uttar Pradesh due to the home return of migrant workers (Rishabh et al, May 2020). Though initially, the number of tests conducted in Tamil Nadu and Andhra Pradesh were low, the positive cases hit 39.7 percent and 33.5 percent in the states, respectively, by the end of March 2020 (Laxminarayan et al, 2020).

Tamil Nadu, a better performing state in India in terms of health indicators, is no exception. The analyses of the first wave of the pandemic would help to overcome the second wave and curb the third wave likely to occur.

Objectives of the Study

- To analyze the trends of COVID 19 in Tamil Nadu from March 2020 to January 2021
- To examine the pattern of the pandemicsex-wise among the age groups

Methodology

Data Source

Secondary data consolidated from Daily Bulletin dated March 2020 to January 2021 published by Health and Family Welfare Department, Government of Tamil Nadu on the confirmed positive cases, active, recovered and dead along with the testing facilities for COVID 19 in Tamil Nadu.

Tools of Analysis

The collected data were tabulated and graphically presented for analysis and interpretation. To examine the increase in the outbreak, weekly percentage growth rates were computed for confirmed, active, recovered and death cases, respectively.

The Risk of COVID-19 was Accessed with the Following Rates

$$Positive\ Test\ Rate = \frac{Total\ Confirmed\ Cases}{Total\ Number\ of\ Testing\ Done} x100$$

$$Prevalence\ Rate = \frac{Total\ Confirmed\ Cases}{Total\ Population/Month} x100$$

$$Fatality\ Rate = \frac{Total\ Number\ of\ Deaths}{Total\ Confirmed\ Cases} x100$$

Results and Discussion

Prevalence of COVID-19 in Tamil Nadu

The first case in Tamil Nadu was confirmed by a resident of Kancheepuram district who tested coronavirus positive on 7th March 2020 in Chennai after an international travel from Muscat. The estimated growth and decay rates for the first 41 days in the state revealed that the growth and decay rates indicated the doubling time as 3.96 days and reducing the time as 12.08 days. The decay phase progressed after 26 days of the outbreak but was slower. The doubling time in provinces of China was Hunan 1.4 days and Hubei 2.5 days(Bhaskar et al, 2020).

The period of eleven months from March 2020 to January 2021were considered for the analysis. Vaccination was administered on 16th January 2021. Initially, the effects of it were doubtful among the common public and supply was also inadequate. Hence it was directed to field workers and population above age 45.

Figure 1-3 depicts the positive, recovered, active and death cases in absolute numbers. The confirmed cases were at their peak in August until which the recovery was in the same trend but at a lesser rate. After that, there was a curvature change in both the confirmed and recovered cases. The positive environment endured that the recovery was higher than the confirmed cases. It was a sign of hope with the effect of timely lockdown and strategy of social distancing.

The epidemic curve was in the upward trend attributed to the spillover of urbanization (48 percent) and population density (555/km2), increasing the decadal census. The vulnerability of overcrowding and uneven distribution of basic amenities was a hindrance in executing the home quarantines and the containment zones. The immediate catastrophic impact on the middle-income earners and people below the poverty line questioned the possibility of personal hygienic practices, especially affordability

and usage of sanitizers in the struggle of livelihood. The restriction of physical mobility and prolonged lockdowns were the only way to control the spread, disabled the huge informal force to share their minimal resources and banned social living, the dominant culture of the state that created psychological anxiety among the people.

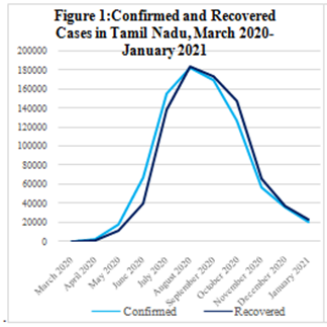
Robust monitoring of public health and sanitation, uninterrupted supply of essentials and medicines, price control of food grains and addressing public grievances were the combating measures undertaken to overcome the influenza pandemic 1918 in the Mysore province (Sekher 2021).

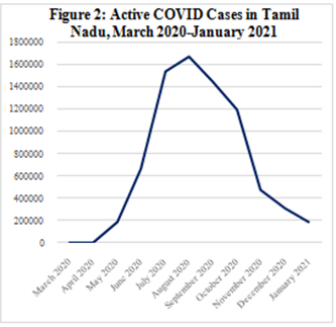
Similarly, the state government undertook the immediate move of adequate provision of essential commodities and cash assistance to the eligible population through the public distribution system during the initial lockdown. The distribution mechanism was systematic with the prior issue of tokens and delivery earmarked cardholders on the specified dates. The relief assistance through fair price shops was regulated with proper social distancing, no crowding and panic among the masses. The homeless, migrant workers and people without ration cards left out of the food safety net were ensured their necessities through the community kitchen, Amma canteen and temporary shelters arranged in each district.

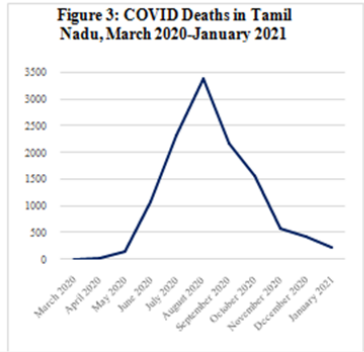
Among the initiatives taken by the states to overcome the crisis, Tamil Nadu's digital health has been noted as a remarkable measure undertaken. Effective use of technology in contract tracing and ePass system managing the movement of people and workers have enabled to control of the spread of the virus. Without a preparedness of protective environment in facing the covid period, better management of health infrastructure, containment zones and hotspots were facilitated through GIS mapping (Prasad. et al. 2020). War room a Unified Command Center with integrated technology and human touch by field workers, contained the spread. Spatial, temporal data of zones helped to minimize the time in identifying streets that needs to be contained strictly. The population for Tamil Nadu was projected for 2020 with the average annual exponential decadal growth rate of 1.45 percent for calculating the prevalence rate. The prevalence rates (Figure 4) substantiated the trend of COVID-19 in Tamil Nadu, recording the highest in August with a slight downfall in September in the state.

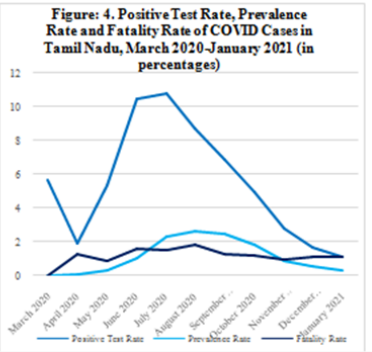
The increasing inclination was observed till August. The positivity rate was high in June (10 percent) and July (11 percent). Then it started declining and has been one percent in January. The positivity rate helps to monitor the magnitude of the disease. It depends on the volume of testing and the population tested. The highest testing was done in October when 40 percent of the monthly state population underwent testing. The five percent positivity rate in that month was a good sign in control of the pandemic. At the onset of the epidemic, two-third of screening was done by public care centers. The role of private was less. But as months rolled on by January 2021, the role of private became three-fourth. Overall, the number of private facilities attained a maximum (63 percent) which was initially the level of public care. This trend likely aggravated inequality and marginalized the population further.

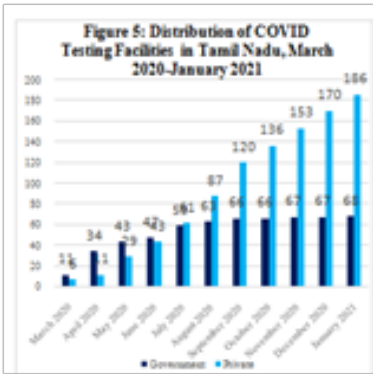
A remarkable advancement by a private hospital in Madurai district was devising a six-layered protection model with Artificial Intelligence and Robotics for detecting symptoms. Smart infrared helmets and thermal surveillance cameras reducing the need for contact with the patients were used.

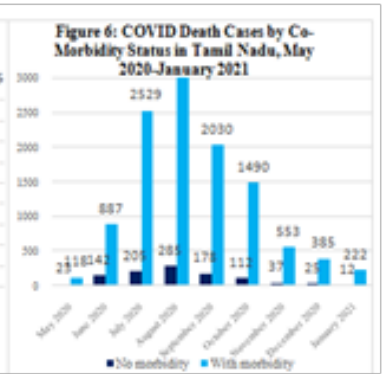












Source: Compiled with data from https://stopcorona.tn.gov.in/daily-bulletin/.

A matter of concern was regarding the insurance claim of expenditure for COVID-19 victims undergoing treatment in private hospitals. The viral attack had to be confirmed by the test done in government authorized lab and the information conveyed to the insurance company at the earliest. For hospitalized cases, a cashless facility could be availed if treatment was availed at a network hospital. If treatment was availed at a non-impaneled hospital, then reimbursement could be made only after incurring the expenditure from out-of-pocket. In such a situation fitting with the bed availability in the hospitals along with the economic stress may be a double burden to the households. In cases where there were simultaneous corona attacks in the same family, it emotionally and financially collapsed them.

The case fatality rate of 1.27 in April was the highest in August 2020 but declined to 1.09 in January 2021. Comorbidity was another factor that delineated the occurrence of mortality due to the epidermal attack. The analysis of the details expressed that 92 percent of the deaths during the nine months were among people who already were suffering from long-term illness, except in May and June when the death was in double digits (around 15 percent) among people without co-morbidities. It was consistently high (Figure 6) among people with co-morbidities who could not restore health from pandemics. As per estimates from unit-level data of National Sample Survey 71st round 2014, Tamil Nadu (103 per 1000) ranked second in terms of chronic illness next to Kerala (Devi Priya 2017). Intensive analysis of hospitalized cases in China and the USA revealed that the clinical outcomes for those with pre-existing diseases were poorer than those without. Multiple comorbidities are associated with disadvantaged consequences of life (Guan et al., 2020 and Richardson et al. 2020). Therefore, more precautious measures are to be undertaken by people with long-term illness. They have to stay safe at home and increase their immunity level.

Growth of Covid-19 in Tamil Nadu

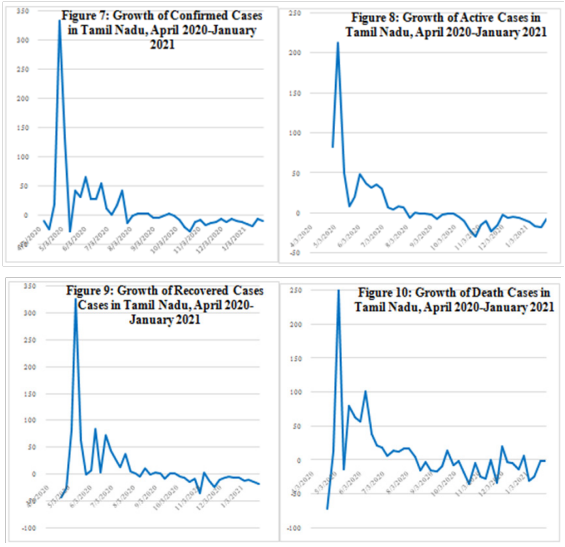
Percentage growth rates for all the four variables on weekly averages revealed a hike till May. In

November and December 2020, the active and death cases showed a remarkable decline (Figures 7-10). The COVID death rates in Tamil Nadu were low and for the whole India, it was claimed to be the least compared to other nations.

In several confirmed cases, India stood third in the world next to the USA and Brazil. Because of effective clinical management, the case fatality rate of the nation was brought to 1.8 percent on 30th August 2020. Based on WHO ICD-10 Codes, the Indian Council of Medical Research specified that suspected or probable COVID-19 be included in the mortality data. A public health analyst of Kerala doubted whether there was under-reporting of deaths as 65 percent of total COVID deaths were from four states Maharashtra, Tamil Nadu, Karnataka and Delhi, which had a 100 percent death registration system in existence. Not all states adhere to RT-PCR tests to full capacity. Tamil Nadu has added backlogs of 400-plus deaths (Patralekha Chatterjee 2020). This confirms that there were chances for under-reporting or exclusion of suspects from the list.

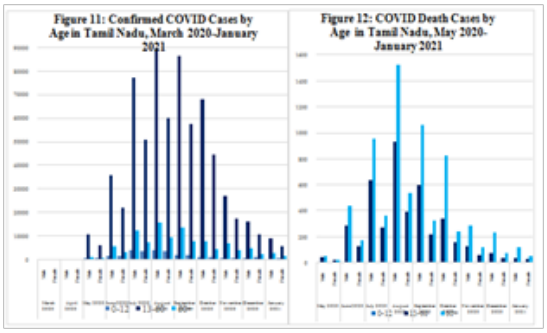
The numbers and the rates though showing a drastic decline in January 2021 was almost in the stage of stagnancy but have not yet recorded zero order of attack. This was a significant caution towards the rigorous continuance of the preventive measures which would otherwise lead to exponential growth resulting in a severe second wave.

WeeklyPercentage Growth Rate of COVID Cases in Tamil Nadu



Source: Computed with data from https://stopcorona.tn.gov.in/daily-bulletin/.

Differentials by Sex and Age-groups



Source: Compiled with data from https://stopcorona.tn.gov.in/daily-bulletin/

The gender differences were observed in Figure 11 among the confirmed cases. Men affected were equal to or greater than 60 percent throughout all eleven months. The highest positive cases recorded

in the three months from July to September 2020 also witnessed the same pattern. As per the 2011 census, there was an approximately equal distribution of males and females in the state. An improvement in the sex ratio to 996 per 1000 was also recorded. Compared to this scenario, the more attack of the epidemic in the individuals, particularly among the men, underlines the risk of exposure and the biological susceptibility of infection. The low incidence of the pandemic among the women may be due to their social practices, less workforce participation, or less screening. The increase in cases among the female in the course may be due to contacts from the head of the family and other income earners with whom they live under one roof. 34 cases were confirmed among transgender people.

About 83 percent occurrence of the virus was among the middle age group, 13 percent among the elderly and four percent among the children (Figure 12). The estimated overall dependency ratio in the state for 2011, 2011 and 2018 were 48, 43 and 46, respectively. The child dependency ratio declined (40, 34 and 30 percent), whereas the old-age dependency ratio increased (8, 9 and 16 percent). This highlighted that more care must be taken on the senior citizens to safeguard them in all aspects like health, socio-economic and psychologically happy living. So that the increase in their life years would be spent in optimal health and mental peace. Half the coronavirus attacked were male adults and one-third were female adults—proper preventive care in that age group to be insisted as they are the foundation in the families. Protecting the adult population who were in access with the outside world even in times of relaxed lockdowns would increase the stamina of the family system. Mortality was double among the elderly (63 percent) compared to adults (37 percent). Again, it was more than two times among males than females and was observed to be the maximum in August.

Implications

- Economic security is a prime requirement to maintain and prioritize personal hygienic practices like hand washing, using sanitizers etc
- Strategies to be evolved for upholding safe distances in congested housing localities with limited living space
- With the increase in private health care services, people insured has to be alert in following the procedures to avail of the claim.
- People with co-morbidity have to be taken special care of at home and in vaccination.
- The non-zero cases in terms of prevalence and fatality are an alarming red bell for continuous measures to overcome second-wave disasters.
- As a long-term measure, resilience in preventing and handling future epidemics had to be planned from the lessons in this war room.

Conclusion

The virus outbreak in the state was showing decay from September 2020 both in the number of infections and in terms of rates calculated. This highlighted the effectiveness of control measures. Zero-order success was not yet attained. Hence sustained gearing up of the health system, intensifying immunity boosters, making inhabitants conscious about personal and public hygiene, augmenting the production of necessary medical supplies and vaccination on a large scale probably would contain the second wave and prohibit the third wave for the survival of humanity.

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