Research Article

Influenza A in Southern states of India from 2010 to 2018: A trend analysis

Chandar Sahanaa, Amit Kumar Mishra

Department of Community Medicine, Pondicherry Institute of Medical Sciences, Puducherry, India

Correspondence to: Amit Kumar Mishra, E-mail: dramitvss@gmail.com

Received: May 23, 2019; **Accepted:** August 30, 2019

ABSTRACT

Background: In the past 100 years, many influenza pandemics were reported including the Spanish flu in 1919–1920 with 40–50 million deaths worldwide. After the pandemics, the strain of influenza virus continues to circulate as seasonal flu. Every year 650,000 people die of respiratory diseases linked to seasonal flu. The Government of India has done many interventions in the past few years to reduce the burden in the country. **Objective:** The objective of this study was to assess the burden and trend of morbidity and mortality due to influenza A H1N1 infection in the Southern states of India from 2010 to 2018. **Materials and Methods:** A secondary data analysis of available data (2010–2018) from reliable sources was conducted to assess the burden and trend of morbidity and mortality due to influenza A H1N1 infection in the Southern states of India from 2010 to 2018. The data were compiled, tabulated, and plotted in graphs for both morbidity and mortality. **Results:** As per the data, in 2018, the Southern states contribute 47.7% of morbidity and 20.2% of mortality of India due to influenza A H1N1. The contribution toward morbidity by Southern states was lowest 2013 and gradually increasing after 2015. The contribution toward mortality by Southern states is also similar to morbidity trend. **Conclusion:** The trend analysis showed that the burden, i.e., morbidity and mortality of influenza increases every alternate years in Southern states. The contribution toward morbidity and mortality of influenza by Southern states is gradually increasing after 2015. Detailed trend analysis for a long time period of morbidity and mortality taking the environmental changes into account, forecasting of the burden could help the concerned authority to plan the intervention effectively.

KEY WORDS: Influenza; Morbidity; Mortality; Trend Analysis

INTRODUCTION

Worldwide, within the past decade, one of the life-threatening pandemics is influenza A H1N1 contributing to high morbidity and mortality. In the past 100 years, many influenza pandemics were reported including the H1N1 (Spanish flu) in 1919–1920, where around 40–50 million deaths were reported. In 2009 influenza pandemic, the first case of influenza A H1N1 was reported in Mexico in April 2009.[1]

Access this article online	
Website: http://www.ijmsph.com	Quick Response code
DOI: 10.5455/ijmsph.2019.0515030082019	

In India, the first case was reported from Hyderabad on May 16, 2009, during the same pandemic period. The WHO declared "post-pandemic phase" on August 10, 2010.[2] In 2009, predominance of influenza A H1N1 pandemic was during the winter season.[3] After the pandemics, the strain of influenza virus continues to circulate as seasonal flu. Every year 650,000 people die of respiratory diseases linked to seasonal flu.[4] Airborne droplets from infected human beings affect individuals irrespective of age and gender. However, incidence is higher in extremes of ages (children and elderly people) due to low immunity status.

The Government of India (GoI) has taken many interventions such as strengthening the diagnostics, risk categorization, guidelines for management, and emergency preparedness at both state and central level to reduce the burden in the country. There is a wide variation in the burden of influenza A H1N1 cases reported from different states of India which

actually depends on various factors including environmental conditions. Trend analysis provides an insight into the pattern of change over a timeline from one geographical area or other and between different populations. This will aid in making future projections for the state-specific approach for planning of health services, resource requirements, etc.

The objective of the current study is to assess the burden and trend of morbidity and mortality due to influenza A H1N1 infection in the Southern states of India from 2010 to 2018.

MATERIALS AND METHODS

A secondary data analysis of freely available morbidity and mortality data from 2010 to 2018 from reliable sources was conducted to assess the burden and to analyze the trend of influenza A H1N1 morbidity and mortality in Southern states of India. Data on morbidity and mortality due to influenza in the Southern states which include Tamil Nadu, Kerala, Andhra Pradesh, Karnataka, Telangana, Puducherry, and Andaman and Nicobar and Lakshadweep Islands[5,6] were extracted from the freely accessible web portal of National Centre for Disease Control (NCDC), Director General of Health Services, Ministry of Health and Family Welfare, GoI. The data on number of cases and deaths due to influenza A H1N1 were compiled year wise and state wise for 9 years from 2010 to 2018.[6] The data available to public from the above-mentioned source are not individually identifiable. The collected data are the state-wise gross morbidity and mortality data. The data were compiled and tabulated, and secondary data analysis was carried out. The results were plotted in graphs for both morbidity and mortality of the disease. As there were no cases and deaths reported from Lakshadweep Islands during the concerned period, the state was not included in the graphical presentations.

RESULTS

As per the compiled data, in 2018, the Southern states contribute 47.7% of morbidity and 20.2% of mortality of India due to influenza A H1N1. Among the Southern states of India, Karnataka and Telangana states had reported majority of laboratory-confirmed cases 3565 and 2956, respectively, in 2015. In 2015, more than 75% of the laboratory-confirmed cases in South India were reported by these two states. However, in 2016, there is a tremendous fall in the number of cases of influenza A H1N1 [Table 1].

The virus spread has increased laboratory-confirmed cases to 10,800 in the year 2017. This is 25 times higher than the previous year's morbidity in South India (434 cases). Tamil Nadu, Karnataka, and Telangana states share a large proportion of morbidity among the other Southern states of India [Figure 1]. There is a peak in 2015 and fall in 2016 in terms of morbidity; later, there is a steady rise in 2017.

Table 1: Laboratory-confirmed cases and deaths of influenza A H1N1 state wise from 2010 to 2018

State	2010		2011		2012		2013		2014		2015		2016		2017		2018	
	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D
Andaman and Nicobar	2	0	0	0	0	0	0	0	0	0	4	0	0	0	2	1	0	0
Andhra Pradesh	733	49	1	1	326	34	71	8	10	5	258	36	12	5	476	14	402	17
Karnataka	2575	116	100	12	878	48	122	19	303	33	3565	94	110	0	3260	15	1733	72
Kerala	1533	89	210	10	623	14	10	1	62	25	928	76	23	1	1414	76	879	53
Puducherry	50	6	1	0	63	2	0	0	0	0	57	4	1	0	168	9	319	10
Tamil Nadu	1184	13	34	4	750	40	37	6	58	8	898	29	122	2	3315	17	2812	43
Telangana	-	-	-	-	-	-	-	-	78	8	2956	100	166	12	2165	21	1007	28
Total (Southern States)	6077	273	356	27	2640	138	240	34	511	79	8666	339	434	20	10,800	152	7152	223
Total (India)	20,604	1763	603	75	5044	405	5253	699	937	218	42,592	2990	1786	265	38,811	2270	14,992	1103

#C; Cases, D: Death. *Source: National Centre for Disease Control (NCDC), Director General of Health Services, Ministry of Health and Family Welfare, Government of India

Considering the number of deaths, 339 deaths (2015) have been reported which is highest between 2012 and 2017 followed by 223 in 2018. In the year 2015, Telangana state and Karnataka had more number of deaths, 100 and 94, respectively, which are more than 57% (194 deaths) of the total mortality (339 deaths) in South India. However, in 2017, approximately 65% of the influenza A deaths were from Kerala and Telangana state [Figure 2]. On interpreting the mortality trend curve for influenza A, there seems to be peak in the year 2015 followed by a dip in 2016 and after that, there is a gradual increase in mortality in 2017 and 2018. As per the recent 2018 data, the number of cases was reduced by 34%, but the mortality was increased by 47% as compared to 2017. The Figures 3 and 4 show the morbidity and mortality contribution by Southern states to India for last 9 years. There is increase in the proportion of Influenza A H1N1 cases in Southern states after 2015. But the proportion of mortality in southern states decreased for few years after 2014 followed by an increase in the mortality proportion of Southern states in 2018.

DISCUSSION

In 2018, the morbidity due to influenza H1N1 was decreased by 34%, but the mortality was increased by 47% as compared to the previous year (2017) morbidity and mortality. In the past year, the mortality rate was increased in all the Southern states, but the main contributing state for the high overall mortality in Southern states was Karnataka, the state in which morbidity was reduced by 47%, but mortality was increased by 4.8 times as compared to the previous year, 2017.

The morbidity pattern of H1N1 flu cases in Karnataka has been changed over the years since 2014 due to change in weather and monsoon rains.[7] The spike in the number of positive cases of H1N1 limits in the month of September and 1st week of October. The intermittent rains in Tamil Nadu have caused a rise and fall in the morbidity pattern of swine flu cases every alternate year since 2010. However, the incidence is reduced in recent past. There has also been an increase in number of cases in October followed by a gradual decrease in November in 2018. The proactive management of swine flu cases (monitoring, vaccination, and availability of medication) by the health department officials has reduced the incidence when compared to the previous years. The Gaja cyclone may have an impact on the vector-borne disease and swine flu in the state.[8] The Director of Institute of Preventive Medicine, Telangana state reported the peak season, is usually in the past 2 months of the year. The number of cases will increase further with dip in temperature.[9]

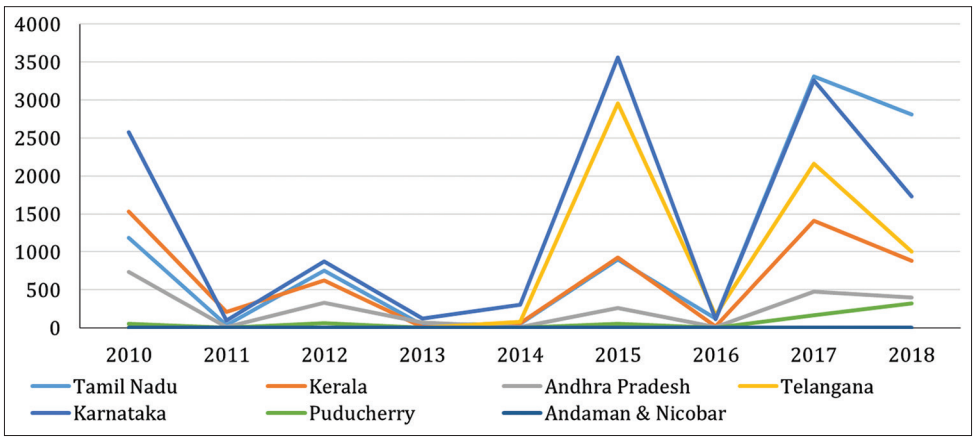

Figure 1: Year-wise morbidity pattern of influenza A H1N1 in different Southern states

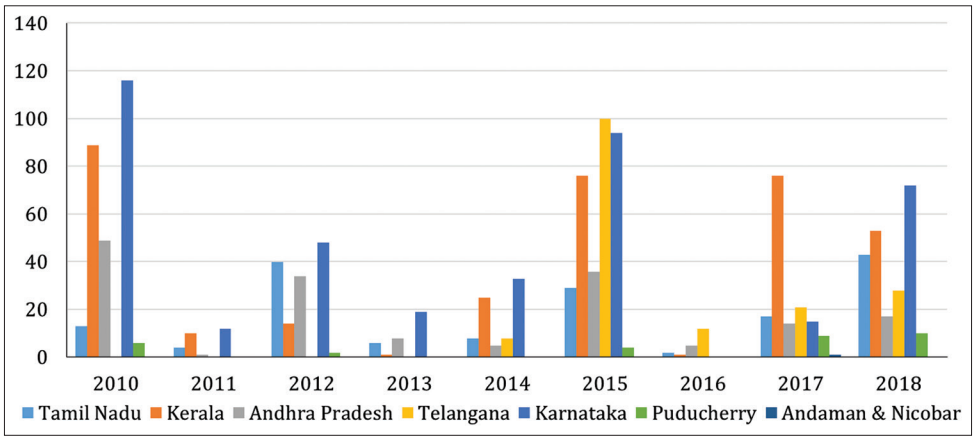

Figure 2: Year-wise mortality pattern of influenza A H1N1 in different Southern states

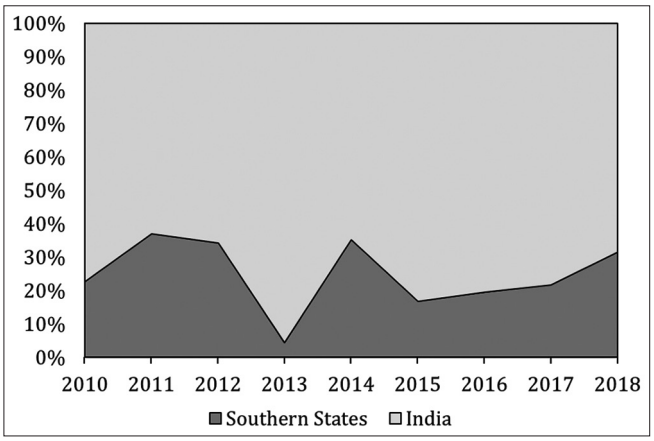

Figure 3: Trend of morbidity of influenza A H1N1 in India and Southern states

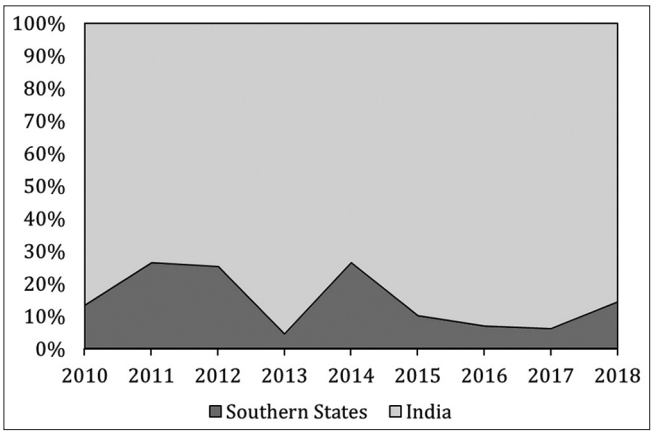

Figure 4: Trend of mortality of influenza A H1N1 in India and Southern states

In India, the influenza A H1N1 outbreak caused nearly 30,000 laboratory-confirmed cases and 1700 deaths by March 15, 2015.[10] The virus had acquired mutation which made it easier to infect humans. A real-time surveillance with phenotypic and genotypic analysis was made that time to confirm the diagnosis.[11] In a study by Murhekar *et al*. reported that the resurgence in the number of cases could be due to gaps in the herd immunity and change in the climatic condition (prolonged cold season) in many states in India.[11] Kannan *et al*. study mentioned that improvement has to be made to treat and manage the spread of virus during an outbreak.[12]

The central and state governments work hand in diagnosis of H1N1 virus. The Integrated Disease Surveillance Programme (IDSP) and its state units, IDSP-assisted laboratories, and laboratory network of Indian Council of Medical Research have been activated exclusively for the test of H1N1 cases. The diagnostic kits and viral transport medium kits for state laboratories/hospitals have been provided by the NCDC.[13] The MOHFW has also recommended vaccination for health-care personals.[14] There is also a 24 h call number (011-23921401) to attend public queries by the Outbreak Monitoring Cell of NCDC.[13]

The National Immunization Schedule in India does not include influenza vaccine in the mandatory list.[15] The health care workers are the high-risk groups, so influenza vaccines were given to health care workers working in conjunction with the influenza patients during the 2015 outbreak.[13]

CONCLUSION

The present study shows that in Southern states of India, the morbidity due to influenza H1N1 is gradually decreasing, but the mortality has been increased to a significant level, which needs urgent attention by the health-care professionals. The central and state governments have taken many steps to reduce the burden of the disease in the country, but the change in environmental conditions may be the reason for the increased burden/outbreaks of the disease in recent years.

Strengths and Limitation

In the current study, the trend analysis of influenza H1N1 for specific Southern states of India provides an idea about the burden and the trend of morbidity and mortality due to influenza H1N1. It also helps in proper planning for an intervention to reduce the burden of the disease. As the data compilation and analysis is restricted to the Southern states, the burden of disease could not be compared with other states of India. Time series analysis[16] with forecasting of disease burden taking the risk factors into account could help for better planning and intervention which was one of the limitations of the current study.

Recommendation

The focus should be on risk factor identification to prevent the occurrence and transmission of the disease agent and focusing the high-risk groups for early hospitalization and management. Detailed trend analysis for a long time period of morbidity and mortality considering the environmental changes into account, forecasting of the burden could help the concerned authority to plan effectively.

ACKNOWLEDGMENT

The authors would like to acknowledge the source of the data such as National Health Profile 2018, the WHO fact sheets in influenza (seasonal) and official website of NCDC, and Ministry of Health and Family Welfare from where the information were collected for the study.

REFERENCES

1. Centers for Disease Control and Prevention (CDC). Update: Novel influenza A (H1N1) virus infection Mexico, March-May, 2009. MMWR Morb Mortal Wkly Rep 2009;58:585-9.
2. H1N1 In Post-pandemic Period, WHO. Available from: http://

www.who.int/mediacentre/news/statements/2010/h1n1_vpc_20100810/en. [Last accessed on 2018 Oct 25].
3. Choudhry A, Singh S, Khare S, Rai A, Rawat DS, Aggarwal RK, *et al.* Emergence of pandemic 2009 influenza A H1N1, India. Indian J Med Res 2012;135:534-7.
4. Influenza (Seasonal). World Health Organization. Available from: http://www.who.int/news-room/fact-sheets/detail/influenza-(seasonal). [Last accessed on 2018 Nov 15].
5. South India States, Maps of India. Available from: https://www.mapsofindia.com/maps/south. [Last accessed on 2018 Dec 14].
6. National Health Profile (NHP) of India, Central Bureau of Health Intelligence. Ministry of Health and Family Welfare, Govt. of India 2018. Available from: http://www.cbhidghs.nic.in/index1.php?lang=1&level=2&sublinkid=88&lid=1138. [Last accessed on 2018 Dec 05].
7. People in 30-45 Age Group Worst Affected by Swine Flu-The New Indian Express. Available from: http://www.newindianexpress.com/nation/2015/mar/18/People-in-30-45-Age-Group-Worst-Affected-by-Swine-Flu-730353.html. [Last accessed on 2018 Nov 06].
8. Murhekar M, Mehendale S. The 2015 influenza A (H1N1) pdm09 outbreak in India. Indian J Med Res 2016;143:821-3.
9. Tharakarman K, Sassisekharan R. Influenza surveillance: 2014-2015 H1N1 "Swine" derived influenza viruses from India. Cell Host Microbe 2015;17:279-82.
10. Cases of H1N1 flu Virus Rising in Bengaluru-India News. Available from: https://www.indiatoday.in/india/story/cases-of-h1n1-flu-virus-rising-in-bengaluru-1359728-2018-10-10. [Last accessed on 2018 Dec 14].
11. Tamil Nadu: More than 850 Swine Flu Cases in Last one Month. Available from: https://www.deccanchronicle.com/nation/current-affairs/251118/tamil-nadu-more-than-850-swine-flu-cases-in-last-one-month.html. [Last accessed on 2018 Dec 14].
12. Swine Flu: Woman Dies, 11 Critical, 16 New Cases. The Times of India. Available from: https://www.timesofindia.indiatimes.com/city/hyderabad/swine-flu-woman-dies-11-critical-16-new-cases/articleshow/66200950.cms. [Last accessed on 2018 Dec 14].
13. Seasonal Influenza, Ministry of Health and Family Welfare, GOI. Available from: https://www.mohfw.gov.in/media/disease-alerts/list-outlets-having-schedule-x-license-authorized-sell-oseltamivir-formulation-swine. [Last accessed on 2018 Oct 25].
14. Seasonal Influenza-Technical Guidelines, Ministry of Health and Family Welfare, GOI. Available from: https://www.mohfw.gov.in/media/disease-alerts/Seasonal-Influenza/technical-guidelines. [Last accessed on 2018 Oct 25].
15. National Immunization Schedule (NIS) for Infants, Children and Pregnant Women-India. Available from: https://www.mohfw.gov.in/sites/default/files/24545352106148966387 3.pdf. [Last accessed on 2018 Dec 25].
16. Mishra AK, Sahanaa C, Manikandan M. Forecasting Indian infant mortality rate: An application of autoregressive integrated moving average model. J Family Community Med 2019;26:123-6.

How to cite this article: Sahanaa C, Mishra AK. Influenza A in Southern states of India from 2010 to 2018: A trend analysis. Int J Med Sci Public Health 2019;8(11):939-943.

Source of Support: Nil, **Conflict of Interest:** None declared.