

# EPIDEMIOLOGICAL CHARACTERISTICS OF DECEASED H1N1 CASES IN CIVIL HOSPITAL, GANDHINAGAR DURING FIRST QUARTER OF 2015

Bhavesh Modi<sup>1</sup>, Gaurav Desai<sup>2</sup>, Mallika Chavada<sup>2</sup>, Pranay Jadav<sup>2</sup>, Bhautik Modi<sup>2</sup>, Pramod Verma<sup>3</sup>

**Financial Support:** None declared

**Conflict of Interest:** None declared

**Copy Right:** The Journal retains the copyrights of this article. However, reproduction of this article in the part or total in any form is permissible with due acknowledgement of the source.

**How to cite this article:**

Modi B, Desai G, Chavada M, Jadav P, Modi B, Verma P. Epidemiological Characteristics of Deceased H1N1 Cases in Civil Hospital, Gandhinagar during First Quarter of 2015. *Ntl J Community Med* 2016; 7(9):777-781.

**Author's Affiliation:**

<sup>1</sup>Associate Professor; <sup>2</sup>Assistant Professor; <sup>3</sup>Professor & Head, Community Medicine Department, GMERS Medical College, Gandhinagar, Gujarat

**Correspondence:**

Dr. Bhavesh Modi  
bhavmod@yahoo.com

**Date of Submission:** 08-05-16

**Date of Acceptance:** 28-08-16

**Date of Publication:** 30-09-16

## ABSTRACT

**Introduction:** In preparation for future waves of H1N1 influenza, determining the correlates of the severity of disease may be very important.

**Methodology:** A retrospective, descriptive study was carried out at the Civil Hospital, Gandhinagar which included all the deceased patients of Influenza A H1N1 from 1<sup>st</sup> January 2015 till 31<sup>st</sup> March 2015. The admission history and their medical records including certified cause of death of all deceased H1N1 patients were collected and assessed for clinico-epidemiological details.

**Result:** Mean age of fatal cases was 51.4 years, male to female ratio was 1:0.9 and 68% resided in Gandhinagar rural area. Majority (68%) were referred from private hospital. Almost 50% of the deceased had some form of comorbid conditions. Fever (78.9%), breathlessness (73%) and dry cough (73.7%) were reported mainly among the deaths due to H1N1. Median time, from onset of symptoms to date of admission was 4 days; whereas that from admission to death was 2 days.

**Conclusion:** Adult age, residing in rural area, delayed referral from private practitioner, presence of comorbid conditions were found to be the few reasons associated with deaths due to H1N1.

**Keywords:** Influenza A (H1N1), Epidemiology, Comorbid, Gandhinagar

## INTRODUCTION

Influenza virus is a common microorganism that has caused serious respiratory illness and death over the past century.<sup>1</sup> It spread easily from person to person and has potential to cause pandemics whenever a new type of Influenza strain introduced in human population.<sup>1</sup> In April 2009, the novel influenza A (H1N1) virus was first detected in Mexico<sup>2</sup> and then in the United States (US).<sup>3,4</sup> This was originally referred to as "swine flu" because many of the genes in this new virus were found in pigs in North America.<sup>5</sup> Further on, it has been found that this new virus has gene segments from the swine, avian and human flu virus genes. The scientists called this a "quadruple reassortant" virus and hence this new (novel) virus was christened "Influenza A (H1N1) virus".<sup>6, 7</sup> Afterwards

the disease transmitted to many other parts of the world and WHO had declared the pandemic on 11<sup>th</sup> June 2009.<sup>2</sup> The pandemic influenza A H1N1 virus is now circulating as seasonal influenza A H1N1 virus.<sup>8</sup>

India confirmed its first case on 16<sup>th</sup> May 2009 in Hyderabad.<sup>9</sup> The second case was reported by the National Institute of Virology (NIV), Pune.<sup>1</sup> After that, a large numbers of positive cases were reported throughout India. From Gujarat state, the first H1N1 positive confirmed case was reported in June 2009.<sup>10</sup>

Problem statement in India in recent years In the year 2009, total 27,236 cases with 981 deaths were reported throughout India<sup>11</sup>. During year 2010, 20,604 cases with 1763 deaths were reported. In

year 2011, 603 cases with 75 deaths were reported. During 2012, 5044 cases with 405 deaths were reported<sup>11</sup>. In year 2013, 5253 cases with 699 deaths were reported. In year 2014, 937 cases and 218 deaths were reported. During 2015 till March, 33761 cases and 2035 deaths were reported<sup>12</sup>.

Problem statement in Gujarat in recent years<sup>11</sup>: In year 2009, total 697 cases with 125 deaths were reported. During 2010, 1682 cases with 363 deaths were reported. In year 2011, 7 cases with 4 deaths were reported. During 2012, 101 cases with 30 deaths were reported. In year 2013, 989 cases with 196 deaths were reported. In year 2014, 157 cases and 55 deaths were reported. During 2015 till March, 6495 cases and 428 deaths were reported.

Predicting disease and mitigating hazard in at-risk population is an important aim of public health epidemiology, and in preparation for future waves of Pandemic H1N1 influenza, determining the correlates of the severity of disease may be very important.<sup>13</sup> Initial reports have suggested that in addition to many of the previously known risk factors, underlying co-morbidities may be the risk factors for severe disease.<sup>14</sup>

The present study summarizes the clinical and epidemiological characteristics of deceased cases of influenza A (H1N1) patients, hospitalized in Civil Hospital of Gandhinagar, the capital of Gujarat State from January 2015 to March 2015.

## METHODOLOGY

**Study setting and design:** In order to study the epidemiology and establish the magnitude and severity of Influenza A H1N1, a retrospective, descriptive study was carried out at the Civil Hospital, Gandhinagar. The study population included all the deceased patients of Influenza A H1N1. The study included analysis of the epidemiological characteristics of the deceased H1N1 patients from 1<sup>st</sup> January 2015 till 31<sup>st</sup> March 2015.

**Data collection:** The admission history and their medical records including certified cause of death of all deceased H1N1 patients were collected and assessed for clinico-epidemiological details. Additional details were also collected by visiting home of the deceased by trained faculties and staff of Community Medicine Department, GMERS Medical College, Gandhinagar. Detailed micro plan was made with for field investigation and training was conducted for all the faculties and staff who collected the data. Before proceeding with the field work, family members of deceased patients were contacted by telephone and visits for the verbal autopsies were scheduled according to their feasibility.

**Study tools:** Standard Verbal Autopsy Investigation Form received from Health & Family Welfare Department, Government of Gujarat was used, while informed consent forms were developed by Department of Community Medicine for the field work. Several types of data collected from the patients include: demographic information, any comorbid conditions, regarding onset of illness and treatment taken, hospitalization, whether intensive care was needed, duration of antiviral drug administration and disease outcome were collected from medical records of Civil Hospital, Gandhinagar.

**Data processing and analysis:** The data collected was entered in MS Excel 2007 and analyzed using Epi Info 3.5.1 from CDC.<sup>15</sup> Epidemiological characteristics were analyzed in terms of demographic characteristics, clinical presentation and outcome. Continuous variables were expressed as Mean and Standard Deviation.

**Ethical consideration:** Approval by institutional review board was not required because of this infectious disease was covered under epidemic act and the State Health Department<sup>16</sup> had implemented Epidemic Disease Control Act, 1897 from 18<sup>th</sup> August, 2009 and issued a notification that it was in the interest of the public health to collect data on an emerging pathogen. Informed written consent was taken from the close family member of the deceased before conducting verbal autopsy.

**Laboratory confirmation of infection:** The H1N1 virus was detected with the use of a real time RT-PCR assay in accordance with the protocol from the US CDC centers for Disease Control and Prevention, as recommended by the WHO.<sup>17</sup> Two swabs from naso-pharynx and one from pharynx were collected from suspected patients and their contacts for detection of influenza A (H1N1) virus by real-time RT-PCR assay.

**Certification of cause of death:** In India, all deaths are recorded on a standard death certificate, which distinguishes between direct causality (Part I) and contributory factors (Part II). Part I of the certificate records diseases or conditions directly leading to death and part II records conditions contributing to the death but not related to the disease or condition causing it. Death certificates were also analyzed according to the methods of ICD-10 (international classification of diseases, 10<sup>th</sup> revision)<sup>18</sup>, used nationally and internationally to produce national mortality statistics.<sup>19</sup>

## RESULTS

A total of 1584 suspected cases were screened at Civil Hospital of Gandhinagar during the period from 1<sup>st</sup> January 2015 to 31<sup>st</sup> March 2015.

**Table 1: Baseline characteristics of H1N1 deceased. (N=19)**

Variable	Number (%)
Age group	
< 12 years	0 (0)
13-18 years	0 (0)
19-30 years	1 (5.2)
31-45 years	4 (21.1)
46-60 years	11 (57.9)
>60 years	3 (15.8)
Mean age ± SD years	51.4 ± 10.3
Sex	
Male	10 (52.6)
Female	9 (47.4)
Place of residence	
Gandhinagar city	3 (15.9)
Gandhinagar rural	13 (68.2)
Outside of Gandhinagar district	3 (15.9)
Occupation	
Housewife	8 (42.1)
Farmer	4 (21.0)
Laborer	2 (10.5)
Skilled worker	2 (10.5)
Teacher	1 (5.3)
Retired	1 (5.3)
Government servant	1 (5.3)
History of travelling/ participating in social gatherings	
Yes	10 (52.6)
No	9 (47.4)
Referred from private hospital	
Yes	13 (68.4)
No	6 (31.6)

**Table 2: Clinical features and associated comorbid conditions among H1N1 deceased (N=19)**

Variable	Number (%)
Clinical feature	
Fever	15 (78.9)
Breathlessness	14 (73.7)
Dry cough	14 (73.7)
Sore throat	9 (47.4)
Body ache	4 (21.1)
Blood in sputum	3 (15.8)
Running nose	3 (15.8)
Productive cough	2 (10.5)
Vomiting	1 (5.3)
Associated co-morbid condition	
Cardio-vascular	4 (21.1)
Diabetes Mellitus (DM)	1 (5.3)
Cardio-vascular and DM	5 (26.3)
Ventilator support	
Given	11 (57.9)
Not given	8 (42.1)

**Table 3: Duration between onset of symptoms and date of admission (N=19)**

Time duration	Number (%)
< 24 hours	1 (5.3)
1-3 days	8 (42.1)
4-7 days	10 (52.6)
8-14 days	0 (0)
>15 days	0 (0)
Mean duration: 3.58 days, Median duration: 4 days	

**Table 4: Duration between date of admission and death of the patient (N=19)**

Time duration	Number (%)
< 24 hours	8 (42.1)
1-3 days	4 (2.1)
4-7 days	4 (2.1)
8-14 days	3 (15.8)
>15 days	0 (0)
Mean duration: 3.8 days, Median duration: 2 days	

Out of 1584, 122 (7.7%) were diagnosed as H1N1 positive. The case fatality rate was 17.2% (21 patients deceased out of 122 positive). Out of this 21 deceased, the family member of one could not be reached and the family of another did not respond. Hence details of only 19 of the deceased could be studied. The demographic analysis of the deceased H1N1 patients revealed that the mean age was 51.4 years with a standard deviation of 10.3 years, male to female ratio was 1:0.9 and 68% resided in Gandhinagar rural area. Majority (68%) were referred from private hospital. [Table 1]

Fever (78.9%), breathlessness (73%) and dry cough (73.7%) were reported mainly among the deaths due to H1N1. Almost 50% of the deceased had associated comorbid conditions, either cardio-vascular alone or a combination of cardio-vascular and diabetes mellitus. It was revealed that ventilator support was given to majority (57.9%). [Table 2]

Median time, from onset of symptoms to date of admission was 4 days. Majority (52.5%) of the deceased were admitted after 4 days of appearance of first symptoms. This could be due to the late reporting of the patients to the hospital or late referral of critically ill patients from private hospitals. Mean duration between onset of symptoms and date of admission in Gandhinagar Civil Hospital was 3.58 days. [Table 3]

Table 4 shows that little less than half (42.1%) patients expired within 24 hours of admission in Civil hospital of Gandhinagar, followed by 15.8% patients who expired between 8-14 days. Median time, from date of admission to death was 2 days, whereas mean duration was 3.8 days.

**DISCUSSION**

During the previous pandemics of 20<sup>th</sup> century and during seasonal influenza, most cases involve transient illness, not requiring hospitalization. Deaths were described mainly in young adult population or those with underlying disease.<sup>20</sup> Seasonal influenza caused significant morbidity and mortality throughout the world.<sup>21</sup> The present study identified all the deaths due to H1N1 that occurred in Civil Hospital of Gandhinagar from 1<sup>st</sup> January

2015 till 31<sup>st</sup> March 2015 and analyzed for their epidemiological characteristics.

The majority of the deceased patients belonged to age group 46-60 years, suggesting high mortality among the adults. The mean age of fatal cases was 51.4 years, which is lower than that reported in South Africa<sup>22</sup> and France<sup>23</sup>. Majority of the deaths occurred in patients residing in the rural areas. Poor environmental and hygienic conditions may be the reason for spread of H1N1 in rural areas. Most patients who expired at Civil Hospital were referred from private practitioner. The median time between onset of illness and hospital admission was more in this study than studies of other countries.<sup>24, 25</sup> The justification for both is that patients seek treatment at local level from general practitioners and physicians, but with little or no more improvement, they are referred to Civil Hospital for further management.

Fatal cases, on hospitalization, mainly presented with fever (78.9%), breathlessness (73%) and dry cough (73.7%). These observations are similar to studies done by others in United States<sup>24</sup>, Australia and New Zealand.<sup>25</sup> In the present study, the proportion of deceased cases who had at some comorbid conditions is almost 50%, which was 36% in England,<sup>26</sup> and 53% in France.<sup>23</sup>

In present study, highest proportion of cases expired within 24 hours of admission to the hospital. This may be due the fact that Civil hospital receives the patient in mostly critically ill condition from the periphery or from private practitioner. However, similar time matrix could be studied from data collected from other districts/ all of the State and analyzed.

## CONCLUSION

The present study was conducted to analyze the epidemiological and other baseline characteristics of the deceased H1N1 cases in Civil Hospital of Gandhinagar. Deaths due to H1N1 were more prevalent in Adult age, residing in rural area, delayed referral from private practitioner, presence of comorbid conditions. However, further research on large sample of data should be conducted to present with a clear picture.

## LIMITATION

The data was taken only from hospitalized fatal cases of Civil Hospital of Gandhinagar, so patients who became infected, remained undiagnosed, died in the community and did not go to the hospital were not included in our study.

## ACKNOWLEDGEMENT

The authors acknowledges the Dean of GMERS Medical College, Gandhinagar and Superintendent of Civil Hospital, Gandhinagar for their administrative clearance and support. The authors are also thankful to all the Faculties and Medical Social Workers (MSWs) of Community Medicine Department, Gandhinagar for their willful participation and support to carry out this study.

## REFERENCES

1. Khanna M, Kumar P, Choudhary K, Kumar B. Emerging influenza virus: A serious global threat. *J Biosci.* 2008 ;33:475-82.
2. World Health Organization. Weekly Epidemiological Record No. 41 [Internet]. Available at <http://www.who.int/wer/2009/wer8441/>. Accessed may 5<sup>th</sup>, 2015
3. Swine influenza A (H1N1) infection in two children - Southern California, March - April 2009. *MMWR Morb Mortal Wkly Rep*; 2009;58:400-2.
4. Swine-origin influenza A (H1N1) virus infection in a school - New York City, April 2009. *MmWR Morb Mortal Wkly Rep*; 2009: 58:470-2.
5. Dawood FS, Jain S, Finelli I, Sbaou MW, Lindstrom S, et al. Novel Swine - Origin Influenza A (H1N1) Virus Investigation Team-Emergence of a novel swine origin influenza A (H1N1) virus in humans. *N Engl J Med.* 2009; 360:2605-15.
6. Ministry of health and Family Welfare, Government of India: Factsheet Influenza A (H1N1). 2010 [Internet]. Available at <http://www.pib.nic.in/h1n1/factsheet.pdf>. Accessed 22<sup>nd</sup> August, 2015
7. Garten RJ, Davis CT, Russell CA, Shu B, Lindstrom S, Balish A, et al. Antigenic and genetic characteristics of swine origin 2009 A (H1N1) influenza viruses circulating in humans. *Science.* 2009; 325:197-201.
8. Singh M, Sharma S. An Epidemiological study of recent outbreak of Influenza A H1N1 (Swine Flu) in Western Rajasthan region of India. *Journal of Medical & Allied Sciences.* 2013 Aug 31;3(2):48.
9. The Times of India. First confirmed case of swine flu in India. Available at <http://timesofindia.indiatimes.com/india/Firstconfirmed-case-of-swine-flu-in-India/articleshow/4538930.cms>. Accessed May 3<sup>rd</sup>, 2015.
10. The Times of India. First swine flu case surfaces in Gujarat. Available at <http://www.timesofindia.indiatimes.com/city/ahmedabad/first.swine-flu-case-surfaces-in-Gujarat/articleshow/4669250.cms>. Accessed May 3<sup>rd</sup>, 2015.
11. National Health Profile 2013 (January to December). Central Bureau of Health Intelligence, Director General of Health Services, Ministry of Health & Family Welfare.
12. Centers for Disease Control and Prevention. Available at <http://www.cdc.gov/h1n1flu/qa.htm>. Accessed September 9<sup>th</sup>, 2015
13. Zarychanaki R, Stuart TL, Kumar A, Doucette S, Elliott L, Kettner J, et al. Critically ill patients with 2009 influenza A (H1N1) infection in Canada. *JAMA.* 2009; 302:1872-9.
14. Webb SA, Pettila V, Seppelt I, Bellomo R, Bailey M, Cooper DJ, et al. Critical care services and 2009 H1N1 influenza in



- Australia and New Zealand. *N Engl J Med*. 2009; 361:1925-34.
15. Centers for Disease Control and Prevention. Epi Info version 3.5.1, 2008. Available from: [www.cdc.gov/epiinfo](http://www.cdc.gov/epiinfo).
  16. Ministry of Health & Family Welfare, Government of Gujarat. Epidemic Disease Control Act, 1897. Available from: <http://www.expressindia.com/latest-news/epidemic-control-act-invoked-to-thwart-h1n1-scare-in-state/504144/>. Accessed on December 03, 2014.
  17. World Health Organization. CDC protocol of real-time RTPCR for swine influenza A (H1N1). Geneva. Available at [http://www.who.int/csr/resources/publications/swineflu/CDCrealtimeRTPCRprotocol\\_20090428.pdf](http://www.who.int/csr/resources/publications/swineflu/CDCrealtimeRTPCRprotocol_20090428.pdf). Accessed on December 15, 2014.
  18. World Health Organization. International classification of diseases and related health problems, 10th rev. WHO, 1992.
  19. Mathers D, Ma Fat D, Inoue M, Rao C, Lopez AD. Counting the dead and what they died from: an assessment of the global status of cause of death data. *Bull World Health Organ* 2005;83:171-177.
  20. The European scientific working group on influenza (ESWI). Pandemics of the 20th century, 2009. Available at <http://www.flucentre.org/files/Pandemics%20of%20the%2020th%20century.pdf>. Accessed on January 25, 2015.
  21. World Health Organization. Influenza (seasonal) factsheet. April, 2009. Available at <http://www.who.int/mediacentre/factsheets/fs211/en/>. Accessed on February 02, 2015.
  22. Archer BN, Cohen C, Naidoo D, Thomas J, Makunga C, Blumberg L, et al. Interim report on pandemic H1N1 influenza virus infections in South Africa, April to October 2009: epidemiology and factors associated with fatal cases. *Euro Surveill* 2009;14:pii=19369. Available at <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19369>. Accessed on March 18, 2015.
  23. Vaillant L, La Ruche G, Tarantola A, Barboza P. Epidemiology of fatal cases associated with pandemic H1N1 influenza 2009. *Euro Surveill* 2009;14:pii=19309. Available at <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19309>. Accessed on January 19, 2015.
  24. Jain S, Schmitz AM, Louie J, Druckenmiller JK, Chugh R, Deutscher M, et al. Hospitalized patients with 2009 H1N1 influenza in the United States, April-June 2009. *N Engl J Med* 2009;361:1935-1944.
  25. The ANZIC influenza investigators. Critical care services and 2009 H1N1 influenza in Australia and New Zealand. *N Engl J Med* 2009;361:1925-1934.
  26. Donaldson LJ, Rutter PD, Ellis BM, Greaves FEC, Mytton OT, Pebody RG et al. Mortality from pandemic A/H1N1 2009 influenza in England: public health surveillance study. *BMJ* 2009;339:b5213. doi:10.1136/bmj.b5213.