



## HEALTH CARE SEEKING INTERVAL AND FATALITY RATE IN SWINE FLU (H1N1) EPIDEMIC IN SURAT CITY

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**Financial Support:** None declared

**Conflict of interest:** None declared

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### How to cite this article:

Patel PB, Patel MJ, Patel K, Jadawala H, Prasad R, Bansal RK Health Care Seeking Interval and Fatality Rate in Swine Flu (H1N1) Epidemic in Surat City. Natl J Community Med. 2015; 6(1):25-9.

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**Date of Submission:** 23-03-15

**Date of Acceptance:** 30-03-15

**Date of Publication:** 31-03-15

## ABSTRACT

**Objectives:** This study was conducted to assess influence of reporting time to health care setup on fatality rate in early 2015 swine flu epidemic.

**Method:** All Swine flu positive cases reported to Surat Municipal Corporation (SMC) from Jan to March 2015 were included in the study. Hospital records were studied retrospectively to gather desired information.

**Results:** Incidence rate and fatality rate of swine flu was 16.38 per lac and 5.91% respectively. Mean differences of interval between onsets of symptoms to reporting to hospital is not significant, however lesser interval between onset of symptoms to swab collection and diagnosis of swine flu were significantly associated with lesser fatality. Fatality Rate declines from January to March.

**Conclusion:** After patient report to the health care setup, prompt sample collection and quick diagnosis help to reduce fatality rate.

**Keywords:** Swine flu, H1N1, epidemic, Surat, fatality rate, incidence

## INTRODUCTION

Swine flu (Swine Influenza) pandemic of 2009 was started by swine origin Influenza A virus subtype H1N1 virus strain.<sup>1,2</sup> Pregnant individuals, children under 2 years of age, young adults, and individuals with any immune compromise are likely to have a worse prognosis.<sup>3-6</sup> Although the basic determinants of swine flu transmission are common, the magnitude and nature of these factors vary from community to community.<sup>7</sup> Moreover, disease severity vary from mild illness in one country to much higher morbidity and mortality in another. In addition, virulence of the virus changed over time as the pandemic goes through subsequent waves of national and international spread.<sup>8</sup>

There have been small outbreaks of H1N1 since the pandemic; a recent one was in India where approximately 1900 people have died out of 32000 reported cases of swine flu.<sup>9</sup> Gujarat was counted as worst affected state with 397 deaths out of 6226 laboratory confirmed cases of swine flu in the year 2015 only.<sup>10</sup> First lab confirmed case of swine flu in Surat city was found on 16<sup>th</sup> Jan, 2015.<sup>11</sup> Till 18<sup>th</sup> March, Surat city was having 727 lab confirmed cases with 43 deaths.<sup>12</sup>

The specific risk factors for acquiring swine flu infection, incidence rate and fatality of the epidemic could be unique to each community.<sup>13</sup> An understanding of these factors in the community and the behaviour of community is essential for planning strategies for prevention and control.

With this background, present study was conducted with objective to understand clinical-epidemiological factors affecting fatality rate among laboratory confirmed swine flu (H1N1) patients in Surat city during Jan-Mar 2015. The study helps in understanding level of awareness and behaviour regarding seriousness of swine flu among people of Surat city which can help further for future management of the infection.

**METHOD**

All clinically suspected cases of swine flu were categorized in three categories A, B & C according to the national guidelines.<sup>14</sup> Category C patients were subjected to Taqman® realtime RTPCR protocol for confirmation of swine flu as recommended by Centre for Disease Control (CDC), Atlanta<sup>15</sup> using throat swabs. Positive case by this method was labelled as laboratory confirmed swine flu case. All laboratory confirmed cases reported to Health department of Surat Municipal Corporation from 16<sup>th</sup> Jan to 18<sup>th</sup> March 2015 were included in the study.

Hospital records of all cases were studied retrospectively to gather information on sociodemographic and clinical profile as well as time interval between onset of symptoms to reporting to any health care facility. Time taken to swab collection and diagnosis after reporting to health care facility was also noted. Fatality rate was calculated for different time interval and compared. Incidence rate was calculated using midyear population of the year 2011.

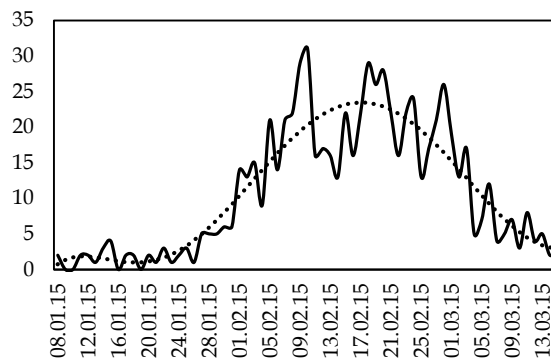
All the data were entered into MS Excel and analyzed by using Epi Info software (version 7.1.3) of the Center for Disease Control (CDC).<sup>16</sup>

**RESULTS**

Total 727 H1N1 positive cases and 43 deaths reported during month of 1<sup>st</sup> Jan, 2015 to 18<sup>th</sup> March 2015 were included in the study.

As shown in fig 1, initially cases raised gradually followed abrupt increase in cases in February with peak in second and third week. Cases decline gradually in March.

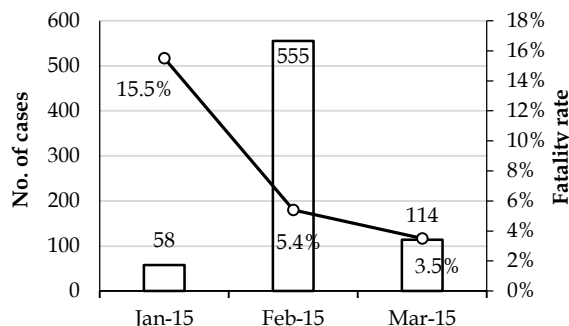
Overall incidence rate was 16.28 per lakh population (Table 1). Incidence rate was highest in Southwest zone (46.34 per lakh) followed by west zone (29.41 per lakh).



**Figure 1: Epidemiological curve of Swine flu outbreak in Surat city during Jan-Mar 2015**

**Table 1: Zone-wise incidence rate of H1N1 infection in Surat City during Jan- Mar, 2015**

| Zone of Residence | Cases (%)  | Population (2011) <sup>19</sup> | Incidence Rate per Lakh pop. |
|-------------------|------------|---------------------------------|------------------------------|
| North             | 117 (16.1) | 705163                          | 16.59                        |
| East              | 150 (20.6) | 1137138                         | 13.19                        |
| South             | 49 (6.7)   | 695028                          | 7.05                         |
| West              | 125 (17.2) | 424986                          | 29.41                        |
| Central           | 67 (9.2)   | 408760                          | 16.39                        |
| South-East        | 58 (8.0)   | 748304                          | 7.75                         |
| South-West        | 161 (22.1) | 347447                          | 46.34                        |
| Total             | 727        | 4466826                         | 16.28                        |



**Figure 2: Monthwise distribution of cases and Fatality rate of swine flu epidemic in Surat city during Jan-Mar 2015**

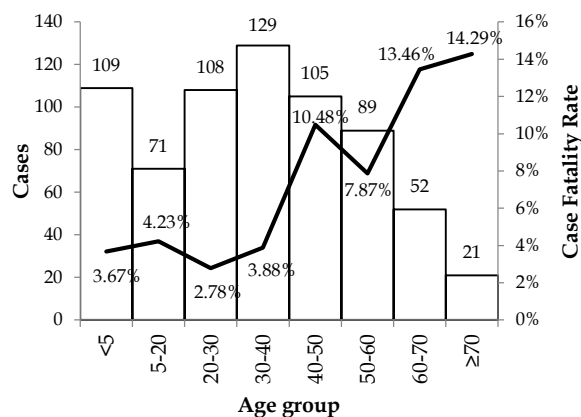
Overall case fatality rate (CFR) was 5.9% for this epidemic in Surat city. CFR was highest in January (15.5%) (Figure 2). Mean duration of onset of symptoms to admission in hospital was 3.78 days (sd 2.49) while median was 3 days. Mean time taken from onset of symptoms to swab collection & final diagnosis were 4.24 days (sd 2.6) & 5.09 days (sd 2.59) respectively and median for the same was 4 days & 5 days respectively. Table 2 intervals from onset of symptoms to various stages of clinical care.

**Table 2: Clinical care intervals in H1N1 positive patients in Surat city during Jan-Mar, 2015**

| Interval   | No. (%)    |
|--|------------|
| <b>Onset of symptoms to admission (n=341)</b>      |            |
| <=1 day  | 50 (14.7)  |
| 2-4 days   | 178 (52.2) |
| 5-10 days  | 103 (30.2) |
| >10 days   | 10 (2.9)   |
| <b>Onset symptoms to swab collection (n=727)</b>   |            |
| 0-2 days   | 194 (26.7) |
| 3-5 days   | 350 (48.1) |
| 6-10 days  | 166 (22.8) |
| >=11 days  | 17 (2.3)   |
| <b>Onset symptoms to diagnosis of H1N1 (n=727)</b> |            |
| 0-2 days   | 89 (12.2)  |
| 3-5 days   | 372 (51.2) |
| 6-10 days  | 242 (33.3) |
| >=11 days  | 24 (3.3)   |

**Table 3: Comparison of various intervals between onset of symptoms to clinical care with outcome**

| Interval from First symptoms | Survived Mean ± SD | Death Mean±SD | p value |
|------------------------------|--------------------|---------------|---------|
| to admission (n=341)         | 3.71 ± 2.49        | 4.67 ± 2.26   | 0.070   |
| to swab collection (n=727)   | 4.19 ± 2.59        | 5.14 ± 2.56   | 0.019   |
| to diagnosis (n=727)         | 5.04 ± 2.58        | 6.02 ± 2.54   | 0.015   |



**Figure 3: Age-wise Case Fatality Rate of H1N1 positive patients in Surat City**

**Table 5: Comparison of Case Fatality Rate of H1N1 positive patients in Surat City**

| Sex    | Cases | Death | Case Fatality Rate |
|--------|-------|-------|--------------------|
| Male   | 350   | 21    | 6.0%               |
| Female | 377   | 22    | 5.8%               |

Chi square 0.009, P value 0.925

Table 3 shows that mean duration between onset of symptom to admission to hospital was more in deceased patients, however the difference was not significant ( $p>0.05$ ). Whereas the mean duration between onset of symptom to swab collection and diagnosis were more in deceased patients; and the difference was not significant ( $p<0.05$ ).

## DISCUSSION

Overall incidence rate (IR) of H1N1 cases was 16.28 per lakh population in Surat city. The IR of H1N1 cases in Gujarat and Delhi per population of 100000 was 10.69 & 24.69 respectively for the period.<sup>17,18</sup>

The study showed that among the 727 swine flu (H1N1) positive patients, male and female were almost equally affected. In the contrary, previous study done by Bhatt et al<sup>20</sup> showed that more males (55.84%) were affected than females (44.16%) in Surat district during swine flu epidemic of year 2009-10. Studies by Samara et al<sup>21</sup> and Puvanalingam et al<sup>22</sup> also showed higher prevalence of swine flu in males, 61.5% and 55.6% respectively. This difference may be attributed to difference in sociodemographic and cultural variation in the community surveyed. The study by Bhatt et al<sup>20</sup> covered entire surat district including rural and tribal areas while the present study was conducted only in urban area.

Mean and median age for swine flu positive patients was found 33.38 years and 34 years respectively. Median age was higher compared to other studies done in India.<sup>21,23,24</sup> In our study, approximately 50% of the patients belong to age group 20-50 years. Out of all, 25% patients were below 20 years of age. In studies done by Rao et al<sup>25</sup>, Mehta et al<sup>23</sup> and Taklikar et al<sup>26</sup>, patients in age group of 20-50 years were 90%, 74% and 68% respectively. In our study, 69% of total patient to age group of 20-50 years.

In months of February and March, distributions of patients were almost equal in all the age groups. There was drastic rise of H1N1 positive cases below 20 years age group in the month of February and March. Patients in age group of 30-50 years were almost halved in the month of February and March compared to month of January. This difference may be due extensive IEC activities carried out by government and local authorities for prevention and control of swine flu. People in the middle age started taking any flu very

seriously and consulting their physicians early after onset of symptoms of flu.

Interval between onset of symptoms to throat swab for diagnosis and interval between onset to diagnosis of H1N1 positivity were also declined over months. These two intervals can serve as proxy indicator for health seeking behaviour and awareness regarding swine flu among population. This decline in above intervals may be due to early care seeking behaviour developed among people after extensive IEC and publicity by media. A median time interval of 3 days from onset of illness to hospital admission was found in this study as compared to 5 days in studies done in India<sup>24</sup>, 4 days in Australia and New Zealand<sup>27</sup>, and similar to United States.<sup>28</sup>

Out of 727 H1N1 positive cases, South-West zone of Surat Municipal Corporation (SMC) area had the highest number of cases (161) followed East zone (150), West zone (125) and North zone (117). Swine flu mortality rate for the month of January to March were found 15.5%, 5.4% and 3.5% respectively. The higher mortality rate in the early phase of epidemic may be due to failure to seek early clinical care, normal tendency of ignoring flu like symptoms & lack of suspicion of swine flu among the healthcare providers. As any epidemic, there were sudden rise in H1N1 positive cases in the month of February which might had happened due to fast spread of infection and increased awareness due to extensive IEC activities carried out by SMC and state government. Prompt clinical care seeking behaviour on onset of early symptoms of flu and high quality clinical care lead to decreased mortality trends in subsequent months of the epidemic.

Overall case fatality rate was 5.9 which is very less compared to studies done during 2009-10 epidemic in Gujarat by Rana et al<sup>13</sup> (19.9%) and Chudasama et al<sup>24</sup> (25.9%) and in Rajasthan by Singh et al<sup>29</sup> (19.1%) and similar to study done by Samara et al<sup>21</sup> in Northern India (5%). Lower fatality rate in our study may be due to availability of well-equipped multispecialty hospitals with trained staff to tackle with swine flu within Surat city and increased awareness among people regarding swine flu. Our study comprised of citizens living in SMC area. These people have better and faster accessibility to tertiary care healthcare services than people residing in rural places which may be the reason for low fatality compared to above mentioned studies of Gujarat and Rajasthan which comprised of both urban and rural population. In the present study, case

fatality rate was slightly higher in males (6%) compared to females (5.8%).

Case fatality rate was observed highest in South-East zone of SMC (12.1%) followed by North, South and East zone of SMC. South-East zone is having higher population density, highest proportion of people living in slums per square kilometre area and higher proportion of migratory population compared to other zones of SMC contributing to higher case fatality rate in the zone.<sup>30</sup> Case fatality rate was nearly 12% in patients aged 60 years or more which is higher in comparison to other age groups which is obvious because of presence of other comorbid conditions and risk factors in elder age group.

## CONCLUSION

From this study, we can conclude that overall fatality rate among confirmed swine flu cases declined to 6% compared to earlier epidemic in the state. There was gradual decline in fatality rate over months, may be due to widespread awareness campaign by the government. After patient report to the health care setup, prompt sample collection and quick diagnosis help to reduce fatality rate

## ACKNOWLEDGEMENT

We acknowledge the support provided by the Health Department of Surat Municipal Corporation; government; and private hospitals.

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