1 **Article Summary Line:** Meta-analysis and the COVID-19 adjusted case fatality risks

2 (aCFRs) in India are reported and states likely to report a higher aCFR have been identified.

3 **Running Title:** Meta-analysis of COVID-19 aCFR in India

4 **Keywords:** Adjusted case fatality risk; Comorbidities; COVID-19; Health indicators; India;

5 Meta-analysis; Social indicators

6 **Title:** Meta-analysis and adjusted estimation of COVID-19 case fatality risk in India and its

7 association with the underlying comorbidities

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18   **Abstract**

19   There is a lack of COVID-19 adjusted case fatality risk (aCFR) estimates and information on

20   states with high aCFR. State-specific aCFRs were estimated, using 13-day lag for fatality. To

21   estimate country-level aCFR, state estimates were meta-analysed. Multiple correspondence

22   analyses (MCA), followed by univariable logistic regression, were conducted to understand

23   the association between aCFR and geodemographic, health and social indicators. Based on

24   health indicators, states likely to report a higher aCFR were identified. Using random- and

25   fixed-effects models, the aCFRs in India were 1.42 (95% CI 1.19 – 1.70) and 2.97 (95% CI

26   2.94 – 3.00), respectively. The aCFR was grouped with the incidence of diabetes,

27   hypertension, cardiovascular diseases and acute respiratory infections in the first and second

28   dimensions of MCA. The current study demonstrated the value of using meta-analysis to

29   estimate aCFR. To decrease COVID-19 associated fatalities, states estimated to have a high

30   aCFR must take steps to reduce co-morbidities.

31   Novel severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) was first reported in

32   Wuhan, China in December 2019 (1). Coronavirus disease 2019 (COVID-19) progressed

33   rapidly into a serious pandemic and within 10 months, despite mitigation efforts, > 30M

34   cumulative cases and 0.95M deaths due to COVID-19 have been reported worldwide (2).

35   Furthermore, an unmitigated outbreak was estimated to cause ~ 7B infections and ~40 M

36   deaths worldwide in 2020 (3).

37   SARS-CoV-2 is transmitted via respiratory droplets and aerosols from infected individuals

38   (4, 5). Virus particles present in small droplets released while speaking or coughing can

39   remain viable and infectious in aerosols for 3 hours (6, 7). These virus particles can be

40   transmitted directly or by contact transfer via contaminated hands (8). Furthermore,

41   transmission of SARS-CoV-2 has been linked to temperature and humidity (9, 10).

42   COVID-19 symptoms include fever, cough, shortness of breath, pneumonia and other

43   respiratory tract symptoms, and can progress to death (11, 12). The median incubation period

44   is 5.1 days (95% CI, 4.5 to 5.8 days) and 97.5% will develop symptoms within 11.5 days

45   (95% CI 8.2 – 15.6 days) of infection (13). Only ~1% of cases will develop symptoms after

46   14 days of active monitoring or quarantine (13).

47   Case fatality risk (CFR) estimates for COVID-19 vary across countries and over time. As of 5

48   March 2020, a CFR of 3.5% was reported from China, 4.2% was reported across 82

49   countries/territories, and 0.6% from a cruise ship (after accounting for a lag time for fatality)

50   (14). On 17 March 2020, a CFR of 7.2% was reported from Italy (15). A CFR of 5.65% (after

51   accounting for right-censoring) was reported in mainland China, based on data collected from

52   29 December 2019 to 17 April 2020 (16). Case fatality rates of 1.2% in Germany (17), 9% in

53   Spain, 11.9% in Italy, 8.6% in the Netherlands, 7.1% in France and 8% in the UK, have been

54   reported across varying intervals (18). Thus, there appears to be great variability among CFR

55   estimates, from < 1 to > 10%.

56   COVID-19 prognosis and progression vary among individuals. Diabetes has been reported to

57   be a risk factor for a poor COVID-19 prognosis (19). Coronary artery disease, heart failure,

58   cardiac arrhythmia, chronic obstructive pulmonary disease, current smoking and > 65 years

59   of age were associated with an increased risk of in-hospital death among COVID-19

60   hospitalized patients (20). A higher frequency of obesity was reported in intensive care

61   COVID-19 patients (21).

62   The first case of COVID-19 in India was reported on 30 January 2020 (22). As of 22

63   September 2020, the country had reported 5,562,663 cumulative cases, a total of 88,935

64   deaths and >65M tests conducted (23). The disease has been reported in all states and union-

65   territories. To our knowledge, state-specific CFRs (after accounting for a lag-time for fatality)

66   and the case fatality risk at the country level using a meta-analysis approach have not been

67   reported. In addition, little is known about the risk factors associated with COVID-19 CFR in

68   India. Therefore, our objectives were to estimate the aCFR for COVID-19 and its association

69   with various health and social indicators in India.

70   **Methods**

71   **Source of data**

72   *COVID-19 case and death data*

73   State/Union territory-specific COVID-19 cumulative case (27 July 2020 – 08:00 AM IST)

74   and death (27 July 2020 – 08:00 AM IST and 09 August 2020 – 08:00 AM IST) time-series

75   data were extracted from the Ministry of Health and Family Welfare and Indian Council for

76   Medical Research, Government of India websites (23).

77   Combined data for the union territories Jammu and Kashmir and Ladakh are presented (old

78   state of Jammu and Kashmir), as other health and social indicators were only available for the

79   old state of Jammu and Kashmir. No data were available for UT of Lakshadweep.

80   Furthermore, individual data for the two UTs Dadra and Nagar Haveli and Daman and Diu

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81   were not available and were therefore excluded. Mizoram state had limited cases with no

82   deaths reported; therefore, this state was also excluded from the analysis. The final dataset

83   had information on 32 states/union territories (Fig. 1).

84   *State/UT-specific parameters*

85   Data for 17 state-specific geodemographic (n=4), socio-economic (n=1), health and

86   comorbidity-related (n=12) factors were collected (Table 1). Information on the 2016

87   projected total human population and number of persons who attended Non-communicable

88   disease (NCD) clinics in 2018 were also collected to derive estimates per 10,000 population

89   (Table 1).

90   **Database development**

91   Annual incidence of malaria, acute respiratory infection, and pneumonia per 10,000 human

92   population were estimated by dividing the total number of cases reported due to malaria,

93   acute respiratory infection, and pneumonia in 2017 by the projected human population in

94   2016, and finally multiplied by 10,000.

95   Similarly, incidence of diabetes, hypertension, cardiovascular diseases, stroke, and common

96   cancers (from those who attended NCD clinics) were divided by the total number of persons

97   attending NCD clinics and finally multiplied by 10,000 to estimate number of patients

98   diagnosed with diabetes, hypertension, cardiovascular diseases, stroke, and common cancers

99   per 10,000 population that visited NCD clinics.

100   **Statistical analyses**

101   Statistical analyses were conducted using R (R statistical package version 3.4.0, R

102   Development Core Team [2015], http://www.r-project.org).

103   *Adjusted case fatality risk (aCFR)*

104   State-specific aCFR was estimated using a lag time for fatality. We used a previously

105   reported median time delay of 13 days from illness onset to death (24). The number of

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106   COVID-19 cumulative cases on 27 July 2020 was used as the denominator value. Based on

107   Wilson, Kvalsvig (14), we assumed that half of the additional cumulative reported deaths on

108   9 August 2020 corresponded to cases reported on 27 July. As noted, this approach is simple,

109   albeit likely to be modified or replaced accurate studies to overcome associated limitations

110   become available (14).

111   Finally, the aCFR (proportion of cumulative deaths to cumulative cases) was estimated via

112   meta-analysis using the R function *metaprop,* with inverse-variance weighting. Separate

113   estimates using both fixed- and random-effects models are presented (25). Proportions were

114   logit transformed.

115   *Predictors and outcome*

116   Information on the 17 state-specific geodemographic, social, health and comorbidity-related

117   factors as key predictors were collected. State-specific aCFR was used as the outcome

118   variable.

119   *Descriptive analyses*

120   Descriptive analyses were performed and data were tested for the assumptions of linearity

121   and normality. Initially, a variable was log-transformed if the assumption of normality was

122   not met. Later, non-linear variables were converted into categorical variables using quartiles

123   for further analysis. Fisher's Exact test was used to determine the association between

124   categorical predictor variables.

125   *Multiple correspondence analyses*

126   Due to expected associations among categorical predictor variables, multiple correspondence

127   analysis (MCA) was conducted to determine potential groupings of predictor variables with

128   the aCFR. For the purpose of MCA, categorical predictor variables were re-categorised using

129   their medians and converted into dichotomous low- or high-value predictor variables.

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130   Adjusted CFR was also dichotomised as low versus high aCFR before conducting the MCA.

131   States with missing values were excluded from the MCA.

132   *Univariable logistic regression*

133   Predictor variables grouped with aCFR (in the same quadrant as the group centroid in the

134   first- and second dimensions following MCA) were assessed using univariable linear

135   regression ($p \leq 0.05$). In addition, incidence of patients with stroke that visited NCD clinics

136   was also assessed as it was placed closer to the variable aCFR in the MCA (albeit in a

137   different quadrant). Dichotomised aCFR was used as the outcome variable and the selected

138   geodemographic and health indicators (after categorising by their quartiles) as key predictors.

139   *Identification of states with high aCFR*

140   Based on the subjective evaluation of the univariable analysis (using significant predictor

141   variables), states having a low, medium, or high aCFR were determined. The predictor

142   quartile having the lowest odds ratio was assigned a score of 1 and that of the highest odds

143   ratio was assigned a score of 4. Predictor quartiles having similar odds ratios were assigned

144   average scores for their respective rank quartiles. Scores of all the significant predictors were

145   combined to produce an overall risk score of aCFR. States having scores of 0–8, 8–16 and

146   16–24 were categorised as low, medium, and high risk aCFR states. Choropleth maps

147   describing risk score of aCFR for the Indian states were generated.

148   **Results**

149   *Case fatality risk*

150   Overall, in the selected states/union territories by 27 July 2020 1,434,178 cumulative

151   COVID-19 cases had been reported, whereas by 9 August 2020 43,377 deaths had been

152   reported. Using the random-effects model and meta-analysis, the aCFR (%) was estimated to

153   be 1.42 (95% CI 1.19 – 1.70). Furthermore, using the fixed-effects model and meta-analysis,

154   the aCFR was estimated to be 2.97 (95% CI 2.94 – 3.00). Heterogeneity was very high at

155   99.57% (p < 0.001) in the effect of sizes in both fixed- and random-effect models (Fig. 1).

156   Based on high heterogeneity, random-effects model estimates were more likely to be

157   representative of the true aCFR for India.

158   *Multivariable correspondence analysis*

159   Case fatality risk grouped with certain geodemographic and health indicators in the first and

160   second dimensions of MCA (Fig. 2); potentially associated variables listed (Table 2).

161   Grouping of aCFR with the incidence of diabetes, hypertension, cardiovascular diseases and

162   acute respiratory infections was apparent in the first and second dimensions of the multiple

163   correspondence analysis.

164   *Univariable analysis*

165   Univariable analysis revealed that the 2011 proportion of urban population, 2017 incidence of

166   diabetes, 2017 incidence of hypertension, 2017 incidence of cardiovascular diseases, 2017

167   incidence of stroke, and 2017 incidence of pneumonia were positively correlated with

168   COVID-19 aCFR (Table 2).

169   *Identification of states with high aCFR*

170   Based on the predictor variables, we categorised 10, 17 and 1 Indian states as likely to have a

171   high, medium, and low aCFR risk, respectively (Fig. 3, Table 3).

172   **Discussion**

173   To our knowledge, the aCFR, using meta-analysis and a lag time for fatality using state-

174   specific data, has not been estimated for India or many other countries. However, this will

175   help inform COVID-19 response in the country. Similarly, identifying states with high CFR

176   will help to better allocate health resources across states and enhance preparedness levels in

177   these states.

178   Accurate estimation of CFR is a serious challenge worldwide. We used a previously reported

179   median time delay of 13 days from illness onset to death and accounted for half of the deaths

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180   during this interval in aCFR estimations. Any bias in this estimate may have under- or over-

181   estimated the COVID-19 aCFR in India. However, we believe this estimate to be much more

182   accurate than the crude CFR estimations using same day COVID-19 case and death data. We

183   agreed with a previous study that this approach is simple, albeit likely to be superseded when

184   accurate studies to overcome associated limitations become available (14). In addition,

185   asymptomatic cases, testing criteria and capacity further complicate COVID-19 case

186   estimations.

187   Using the random- and fixed-effect models, the estimated aCFR was 1.42 (95% CI 1.19 –

188   1.70) and 2.97 (95% CI 2.94 – 3.00), respectively. Due to high heterogeneity, estimates using

189   the random-effects model were more likely to represent the true aCFR for India. Previous

190   studies used random-effect models to estimate the CFR of COVID-19 (26, 27) or presented

191   CFR using both random-effects and fixed-effect models (28). Using a random effects model,

192   we ensured that states with high numbers of cases and deaths received more weight compared

193   to states with fewer cases and deaths.

194   For India, the aCFR appeared to be lower than in many European countries. This might be

195   due to the fact that only 6.38% of the population in India was above 65 years of age in 2019

196   (29). Elderly people (>60 years) have been reported to be at a higher risk of death due to

197   COVID-19 (30, 31). However, many other health and social indicators, changes in the

198   virulence of SARS-CoV2 in regions over time, and country-specific COVID-19 response

199   indicators may be associated with CFR, and this needs to be investigated.

200   Heterogeneity was as high as 99.57% in the effect sizes in state-specific aCFRs (both fixed-

201   and random-effect models), perhaps due to differences in state-specific sub-populations,

202   health facilities, infrastructure hospital care and COVID-19 testing protocols. In addition,

203   specific states might be in different phases of the COVID-19 epidemic, as the CFR has varied

204   during the progression of the COVID-19 epidemic (28). High heterogeneity needs to be

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205   further investigated; regardless, the current estimates suggest uncertainty of aCFR point

206   estimates.

207   Multiple correspondence analyses and univariable logistic regression were used to summarise

208   associations between state-specific aCFR and several geodemography, social and health

209   indicators. Based on these analyses, health indicators such as incidence of diabetes,

210   hypertension, stroke and cardiovascular diseases were associated with the aCFR in India,

211   consistent with previous studies in other countries (19, 20).

212   The current study had some limitations. Differences in COVID-19 testing and hospital care

213   may have caused differences in aCFR at the state level. Although health indicators were

214   estimated from NCD clinic data, there may be differences among states in the population that

215   visit NCD clinics. The Government of India has NCD clinics for screening and early

216   diagnosis of NCDs under the National Programme for Prevention and Control of Cancer,

217   Diabetes, Cardiovascular Diseases and Stroke. As of March 2020, 665 District NCD Cells,

218   637 District NCD Clinics, 4472 CHC NCD Clinics, 181 Cardiac Care Units and 218 Day

219   Care Units were reported to be functional (32). Overall, 35.72M patients have been reported

220   to attend NCD clinics in 2017 (33). In addition, the role of many health indicators, e.g.

221   obesity, could not be evaluated. Furthermore, we could not account for the migration between

222   the states. That COVID-19 testing capacity varies across states may have influenced the

223   aCFR estimations in the current study. Lastly, the risk factor investigation at the state level

224   may not be applicable at the individual level. Despite these shortcomings, we believe the

225   aCFR and the risk factor investigation in the current study to be sufficiently valid to inform

226   COVID-19 response in India and populations in similar settings.

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Table 1. Country-specific geodemographic, environment, social, health and comorbidity-

related variables used in the study.

Variable	Reference
Geodemography	
Population density (people per square kilometre), 2011	(33-35)
Death rate, 2016	(33)
Proportion of urban population, 2011	(34-36)
Proportion of population $\geq$ 60 years, 2011	(37)
Projected total human population, 2016	(38)
Socio-economic indicators	
Percentage of population below poverty line, 2011-12	(33)
Health status (Communicable diseases)	
Cases due to malaria, acute respiratory infection or pneumonia, 2017	(33)
Leprosy prevalence, 2017	
Children aged 12-23 months that received BCG (%)	
Health status (Non-communicable diseases)	
Number of persons that attended NCD clinics	(33)
Out of those screened at NCD Clinics, number of persons diagnosed with diabetes, hypertension, cardiovascular diseases, stroke or common cancers in 2017	
Health finance indicators	
Per capita health expenditure (Rs), 2015-16	(33)
Health human resource	
Average population served by government allopathic doctors, 2015-17	(33)

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Table 2. Summary of univariable logistic regression analyses of state-specific geodemography and health indicators associated with adjusted COVID-19 case fatality risk in India

Parameter	Variable	Estimate	Standard error	Odds Ratio	95% CI	P-value
Geodemography						
Population density (people per square kilometre), 2011	[17,175]	Reference		1.00		0.376
	(175,316]	1.61	1.10	5.00	(0.58,42.8)	
	(316,560]	1.10	1.08	3.00	(0.36,24.92)	
	(560,11300]	1.61	1.10	5.00	(0.58,42.8)	
Death rate, 2016	[4,5.5]	Reference		1.00		0.86
	(5.5,6.1]	0.73	0.99	2.08	(0.3,14.55)	
	(6.1,6.73]	-0.06	1.02	0.94	(0.13,6.87)	
	(6.73,7.8]	0.22	0.97	1.25	(0.19,8.44)	
Proportion of urban population, 2011	[10,23.8]	Reference		1.00		0.02
	(23.8,29.3]	1.44	1.30	4.20	(0.33,53.12)	

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	(29.3,39.8]	3.05	1.35	21.00	(1.5,293.25)	
	(39.8,97.5]	3.05	1.35	21.00	(1.5,293.25)	
Proportion of population ≥ 60 years, 2011	[4.6,6.95]	Reference		1.00		0.799
	(6.95,7.85]	0.51	1.02	1.67	(0.23,12.22)	
	(7.85,9.55]	0.51	1.02	1.67	(0.23,12.22)	
	(9.55,12.6]	1.02	1.03	2.78	(0.37,21.03)	

Health status (Communicable diseases)

Incidence of acute respiratory infection (in 2017) per (cases/10,000)[1]	[4.44,33.5]	Reference		1.00		0.054
	(33.5,171]	0.59	1.10	1.80	(0.21,15.41)	
	(171,383]	1.10	1.08	3.00	(0.36,24.92)	
	(383,1150]	3.04	1.35	21.00	(1.5,293.25)	
Incidence of pneumonia (in 2017) (cases/10,000)[1]	[0.0545,0.448]	Reference		1.00		0.011
	(0.448,1.86]	-1.44	1.29	0.24	(0.02,3.01)	
	(1.86,3.81]	1.02	1.03	2.78	(0.37,21.03)	

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	(3.81,27.4]	2.46	1.29	11.67	(0.92,147.56)

Health status (Noncommunicable diseases)

Incidence of diabetes (in 2017) (cases/10,000)[1]	[8.49,84]	Reference		1.00		0.001
	(84,580]	0.18	1.17	1.20	(0.12,11.87)
	(580,1510]	0.18	1.17	1.20	(0.12,11.87)
	(1510,5400]	19.66	2306.10	346946379.79	**
Incidence of hypertension (in 2017) (cases/10,000)[1]	[10.6,140]	Reference		1.00		0.001
	(140,508]	0.18	1.17	1.20	(0.12,11.87)
	(508,1790]	0.18	1.17	1.20	(0.12,11.87)
	(1790,9760]	19.66	2306.10	346946378.19	**
Incidence of cardiovascular diseases (in 2017) (cases/ 10,000)[1]	[0.122,5.08]	Reference		1.00		0.001
	(5.08,22.6]	-0.69	1.35	0.50	(0.04,7.1)
	(22.6,56.7]	1.39	1.12	4.00	(0.45,35.79)
	(56.7,268]	19.66	2465.33	346946379.53	**

Incidence of stroke (in 2017) (cases/10,000)[1]	[0.233,2.68]	Reference		1.00		< 0.001
	(2.68,8.87]	0.34	1.53	1.40	(0.07,28.12)
	(8.87,22.3]	2.23	1.31	9.33	
					(0.71,122.57)
	(22.3,102]	20.51	2465.33	809541549.07	**

*Reference value; **inestimable

[1]Population that visited NCD clinics

Table 3. Qualitative risk evaluation of the adjusted case fatality risk (aCFR, %) in different states of India.

State	Proportion of urban population, 2011	Incidence of specific diseases in 2017					aCFR (%)	Risk score-aCFR	Risk score-aCFR level
		Pneumonia	Diabetes[1]	Hypertension[1]	Cardiovascular diseases[1]	Stroke[1]			
Andhra Pradesh	3.5	4	4	4	4	4	1.55	23.5	High
Arunachal Pradesh	1	2	1	2.5	2	2	0.26	10.5	Medium
Assam	1	3	2.5	2.5	3	3	0.34	15	Medium
Bihar	1	4	2.5	1	1	1	0.80	10.5	Medium
Chhattisgarh	1	1	2.5	2.5	1	2	0.89	10	Medium
Goa	3.5	1	2.5	2.5	1	2	1.10	12.5	Medium
Gujarat	3.5	2	4	4	4	4	4.44	21.5	High
Haryana	3.5	1	2.5	2.5	1	2	1.38	12.5	Medium
Himachal Pradesh	1	3	2.5	2.5	1	1	0.60	11	Medium
Jammu and Kashmir	2	3	2.5	2.5	1	2	2.04	13	Medium

Jharkhand	2	1	2.5	2.5	3	3	1.45	14	Medium
Karnataka	3.5	3	2.5	2.5	3	3	2.58	17.5	High
Kerala	3.5	1	2.5	2.5	3	2	0.44	14.5	Medium
Madhya Pradesh	2	4	2.5	2.5	4	3	3.22	18	High
Maharashtra	3.5	1	4	4	3	4	4.13	19.5	High
Manipur	2	2	1	1	2	1	0.25	9	Medium
Meghalaya	1	1	1	1	2	1	0.78	7	Low
Nagaland	2	2	1	1	2	1	0.41	9	Medium
Odisha	1	3	2.5	2.5	1	3	0.79	13	Medium
Punjab	3.5	3	4	4	4	4	3.28	22.5	High
Rajasthan	2	4	4	4	4	4	1.95	22	High
Sikkim	2	2	1	1	2	1	0.09	9	Medium
Tamil Nadu	3.5	3	4	4	3	4	1.94	21.5	High
Telangana	3.5	1	2.5	2.5			1.01	NA	NA
Tripura	2	2	1	1	2	1	0.69	9	Medium
Uttar Pradesh	1	4	4	4	4	3	2.58	20	High
Uttarakhand	3.5	3	2.5	2.5	2	1	1.47	14.5	Medium

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West Bengal	3.5	4	4	4	4	4	2.88	23.5	High
Andaman and Nicobar Islands	3.5	2					3.09	NA	NA
Chandigarh	3.5	4	1	1	2		2.09	NA	NA
NCT of Delhi	3.5	4					3.03	NA	NA
Puducherry	3.5	2	1	1	3	3	2.15	13.5	Medium

Ranks: Low (0-8), Medium (8-16), High (16-24), NA – No rank assigned

[1]Cases/10,000 that visited NCD clinics.

Figure legends

Fig. 1. Forest plot of case fatality risk of COVID-19 in India, using random- and fixed-effect

models.

Fig. 2. Plot of the first and second dimensions of multiple correspondence analysis of state-

specific case fatality risk and geodemography, social and health indicators in India.

Fig. 3. Estimated risk score of the adjusted case fatality risk (aCFR) for various states of

India.

State	Deaths	Cases	Case Fatality (%)	95% C.I.	Weight (fixed)	Weight (random)
Andhra Pradesh	1490.0	96298	1.55	[1.47; 1.63]	4.0%	3.6%
Arunachal Pradesh	3.0	1158	0.26	[0.08; 0.80]	0.0%	1.5%
Assam	109.5	32228	0.34	[0.28; 0.41]	0.3%	3.5%
Bihar	313.0	39176	0.80	[0.72; 0.89]	0.8%	3.5%
Chhattisgarh	66.0	7450	0.89	[0.70; 1.13]	0.2%	3.4%
Goa	53.5	4861	1.10	[0.84; 1.44]	0.1%	3.3%
Gujarat	2477.0	55822	4.44	[4.27; 4.61]	6.4%	3.6%
Haryana	433.0	31332	1.38	[1.26; 1.52]	1.2%	3.6%
Himachal Pradesh	13.0	2176	0.60	[0.35; 1.03]	0.0%	2.7%
Jammu and Kashmir	392.0	19205	2.04	[1.85; 2.25]	1.0%	3.5%
Jharkhand	120.0	8275	1.45	[1.21; 1.73]	0.3%	3.5%
Karnataka	2484.5	96141	2.58	[2.49; 2.69]	6.6%	3.6%
Kerala	83.5	19025	0.44	[0.35; 0.54]	0.2%	3.4%
Madhya Pradesh	894.0	27800	3.22	[3.01; 3.43]	2.3%	3.6%
Maharashtra	15511.5	375799	4.13	[4.06; 4.19]	40.4%	3.6%
Manipur	5.5	2235	0.25	[0.11; 0.57]	0.0%	2.0%
Meghalaya	5.5	702	0.78	[0.34; 1.79]	0.0%	2.0%
Nagaland	5.5	1339	0.41	[0.18; 0.94]	0.0%	2.0%
Odisha	199.5	25389	0.79	[0.68; 0.90]	0.5%	3.5%
Punjab	434.0	13218	3.28	[2.99; 3.60]	1.1%	3.6%
Rajasthan	699.5	35909	1.95	[1.81; 2.10]	1.9%	3.6%
Sikkim	0.5	545	0.09	[0.01; 1.45]	0.0%	0.4%
Tamilnadu	4151.0	213723	1.94	[1.88; 2.00]	11.0%	3.6%
Telangana	545.0	54059	1.01	[0.93; 1.10]	1.5%	3.6%
Tripura	27.0	3900	0.69	[0.48; 1.01]	0.1%	3.1%
Uttar Pradesh	1727.0	66988	2.58	[2.46; 2.70]	4.6%	3.6%
Uttarakhand	90.0	6104	1.47	[1.20; 1.81]	0.2%	3.4%
West Bengal	1688.5	58718	2.88	[2.74; 3.01]	4.4%	3.6%
Andaman and Nicobar islands	10.0	324	3.09	[1.67; 5.64]	0.0%	2.5%
Chandigarh	18.5	887	2.09	[1.33; 3.27]	0.0%	2.9%
NCT of Delhi	3962.5	130606	3.03	[2.94; 3.13]	10.4%	3.6%
Puducherry	60.0	2786	2.15	[1.68; 2.76]	0.2%	3.3%
Fixed effect model		**1434178**	**2.97**	**[2.94; 3.00]**	**100.0%**	**--**
Random effects model			**1.42**	**[1.19; 1.70]**	**--**	**100.0%**

Heterogeneity: $I^2 = 100\%$, $\tau^2 = 0.2359$, $\chi^2_{31} = 6970.99$ ($p = 0$)

Case Fatality (%)
0 1 2 3 4 5 6 7

Variable categories – MCA