

# What percentage of mortality were medically certified among total registered mortality in 36 States & UTs of India during 2018-2020 and COVID-19 mortality age-sex distribution pattern in India: A cross sectional observational research study

DR PIYUSH KUMAR<sup>1</sup>

<sup>1</sup> B. R. Ambedkar Bihar University

**Funding:** The author(s) received no specific funding for this work.

**Potential competing interests:** The author(s) declared that no potential competing interests exist.

## Abstract

Abstract - The most significant event of birth and death must be certified medically / non-medically to prove or support the evidence of existence of birth and death of a particular person legal existence between the certified date / timings of birth and death. Apart from this legal significance, footage of births and mortality is central basic data required for policy and planning about a population group / country such as provisioning of fundamental requirements like food, cloth, housing, health care, transportation, education etc. The national / state programmes planning, management, implementation can be effectual and triumphant only if this statistical information of birth and death is specific, reliable, timely and correct. Hence, the certification / registration of births and mortality are significant as well as necessity of modern era. We aimed to assess percentage of mortality medically certified among total registered mortality in 36 States & UTs of India during 2018-2020 and COVID-19 mortality age-sex distribution pattern in India during 2020 medically certified due to pandemic in India with available data resources. The mortality data for this cross sectional retrospective observational study were obtained through Civil Registration System of India under the RBD Act, 1969.

The data available were obtained on medically certified cause of deaths from States/UTs has been collected, tabulated, analysed in compliance with the ICD - Tenth Revision (1993). The total registered death during 2018 was 6911197 for 2019 it was 7596849 and in 2020 8062070. The figure increased continuously during successive years but there is a question mark on this data. The total RD increased by 685652 numbers in 2019 compared to 2018 whereas despite the COVID-19 PANDEMIC impact the increase in figures during 2020 was 240148 only which are highly questionable? The researcher found that this controversy is also raised by several global highly accredited international organizations like WHO etc. This research study revealed that Bihar which is second most populous state in India ranked lowest in medical certification of cause of death, 2020 which is amazing. Bihar ranked lowest with only 3.4 percent medically certified deaths during 2020 the COVID-19 pandemic era. Hence a large number of mortality during COVID-19 era remains uncertified till date in states like Bihar. This observational research study revealed that the majority of COVID-19 mortality was found in the age group of 45 years and above accounting for 82.7 per cent of total deaths in the group. The percentage of female mortality aged 34 years and below as well as for 55-64 years age group and 65-69 years age group, to total female deaths are greater in comparison to corresponding age groups mortality for male while in other groups male mortality were more than females. Particularly in poor states like Bihar in India the lower socio-economic strata of population may be more affected by low MCCD which is chiefly due to failure of Public Health Management related largely to corruption, posting and other scams. Bihar ranked lowest with only 3.4 percent medically certified deaths during 2020 the COVID-19 pandemic era. Hence a large number of mortality during COVID-19 era remains uncertified till date in states like Bihar. The researcher has found that in states like Bihar the total registered deaths have increased continuously during study period while MCCD decreased continuously during the study period which is due to failure of public health management and corruption, posting scams etc., by which such states are putting highly incapable / untrained person on state programme officer etc vital posts. These irregularities or ignorance have put India's data credibility in doubt at international level bringing shame to the nation.

Registered Death, COVID-19, Medical Certification, India, Civil registration,

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Dr Piyush Kumar<sup>1</sup>

1 M.B.B.S. E.M.O.C., P.G.D.P.H.M., Senior General Medical Officer, Health Department, Government of Bihar, India, [drpiyush003@gmail.com](mailto:drpiyush003@gmail.com)

Advocate Anupama<sup>2</sup>

2 Senior Lawyer, Bar council, Patna, Bihar

### **MEDICAL CERTIFICATION OF CAUSE OF DEATH**

#### **Public Health / Original Research**

Abstract - The most significant event of birth and death must be certified medically / non-medically to prove or support the evidence of existence of birth and death of a particular person legal existence between the certified date / timings of birth and death. Apart from this legal significance, footage of births and mortality is central basic data required for policy and

planning about a population group / country such as provisioning of fundamental requirements like food, cloth, housing, health care, transportation, education etc. The national / state programmes planning, management, implementation can be effectual and triumphant only if this statistical information of birth and death is specific, reliable, timely and correct. Hence, the certification / registration of births and mortality are significant as well as necessity of modern era. We aimed to assess percentage of mortality medically certified among total registered mortality in 36 States & UTs of India during 2018-2020 and COVID-19 mortality age-sex distribution pattern in India during 2020 medically certified due to pandemic in India with available data resources. The mortality data for this cross sectional retrospective observational study were obtained through Civil Registration System of India under the RBD Act, 1969. The data available were obtained on medically certified cause of deaths from States/UTs has been collected, tabulated, analysed in compliance with the ICD - Tenth Revision (1993). The total registered death during 2018 was 6911197 for 2019 it was 7596849 and in 2020 8062070. The figure increased continuously during successive years but there is a question mark on this data. The total RD increased by 685652 numbers in 2019 compared to 2018 whereas despite the COVID-19 PANDEMIC impact the increase in figures during 2020 was 240148 only which are highly questionable? The researcher found that this controversy is also raised by several global highly accredited international organizations like WHO etc. This research study revealed that Bihar which is second most populous state in India ranked lowest in medical certification of cause of death, 2020 which is amazing. Bihar ranked lowest with only 3.4 percent medically certified deaths during 2020 the COVID-19 pandemic era. Hence a large number of mortality during COVID-19 era remains uncertified till date in states like Bihar. This observational research study revealed that the majority of COVID-19 mortality was found in the age group of 45 years and above accounting for 82.7 per cent of total deaths in the group. The percentage of female mortality aged 34 years and below as well as for 55-64 years age group and 65-69 years age group, to total female deaths are greater in comparison to corresponding age groups mortality for male while in other groups male mortality were more than females. Particularly in poor states like Bihar in India the lower socio-economic strata of population may be more affected by low MCCD which is chiefly due to failure of Public Health Management related largely to corruption, posting and other scams. Bihar ranked lowest with only 3.4 percent medically certified deaths during 2020 the COVID-19 pandemic era. Hence a large number of mortality during COVID-19 era remains uncertified till date in states like Bihar. The researcher has found that in states like Bihar the total registered deaths have increased continuously during study period while MCCD decreased continuously during the study period which is due to failure of public health management and corruption, posting scams etc., by which such states are putting highly incapable / untrained person on state programme officer etc vital posts. These irregularities or ignorance have put India's data credibility in doubt at international level bringing shame to the nation.

Registered Death, COVID-19, Medical Certification, India, Civil registration,

## Introduction

### Background/rationale

The most significant event of birth and death must be certified medically / non-medically to prove or support the evidence of existence of birth and death of a particular person legal existence between the certified date / timings of birth and death. Apart from this legal significance, footage of births and mortality is central basic data required for policy and planning

about a population group / country such as provisioning of fundamental requirements like food, cloth, housing, health care, transportation, education etc as per Universal Declaration of Human Rights (UDHR) [1]. The national / state programmes planning, management, implementation can be effectual and triumphant only if this statistical information of birth and death is specific, reliable, timely and correct. Hence, the certification / registration of births and mortality are significant as well as necessity of modern era [2]. Not only the registration of birth and death, but also its growth and cause are equally significant [2A]. Statistical data analysis of causes of mortality forms an important morbidity & mortality statistics for National Health Policy and Planning. MEDICAL CERTIFICATION OF CAUSE OF DEATH (MCCD) serves dual purpose, firstly legal document of mortality for getting insurance benefits etc. such as in several countries and also in India during coronavirus disease-2019 (COVID-19) the Government of India and state governments are providing compensation for COVID-19 deaths provided the deceased death is certified properly [3,4]. Secondly mortality statistics play an important role in medical research to improve diagnosis and treatment protocols [3]. Registration of Births and Deaths Act ((Act No. 18 of 1969)) in India was passed in the year 1969 making registration of these events mandatory [5]. The Registrar General of India is the highest official who compiles and provides the necessary information about mortality and births arriving in progression from registrars & sub-registrars of district level, Municipal, and Military Cantonments [5]. WHO (World Health Organization), have raised a question mark on the current birth and death registration systems in India, as well as on several global countries, for under reporting of COVID-19 mortality [6,7]. The researchers pre-print is also available on Impact of Civil Authorities Faulty Mortality Registration on COVID-19 Mortality Count and the researcher quest to know more about the real scenario of birth and death have raised the titled mentioned research question elaborated and explained in this paper [8]. A lack of dedicated public health management cadre as well as corruption and posting scams in some states like Bihar may be responsible for such faulty reporting [9]. The Section 10(2) of the Registration of Births and Deaths Act empowers the State Govt. to put into effect the prerequisite relating to medical certification of cause of mortality in specified areas while Section 10(3) of the Act provides for making a certificate of the cause of mortality by the medical practitioner who has treated / attended the deceased at the time of mortality. In India at present, all the hospitals are not part of the scheme [4]. The Medical Certification of Cause of Death (MCCD) is of enormous use to several key stakeholders of health and other sectors like health planners, policy makers / implementers, researchers and epidemiologists for data -based management with regard to resource distribution, monitoring of indicators for performance / output etc., identifying the top priorities for state / national health or other programs such as Ayushman Bharat Yojna and other interrelated activities in the area of research / Public Health / other sectors like insurance. **COVID-19 mortality age-sex distribution pattern in India** are important indicators for evidence-based monitoring of COVID-19 in the population. The Conference on Vital Statistics in 1961 had recommended the scheme of MCCD which evolved in three phases with first phase in the teaching hospitals of the State including field areas attached to them, missionary hospitals etc., second phase extended to District & Sub-division hospitals, specialized hospitals, private hospitals and third phase added private and other public hospitals & Primary Health Units, private physicians practicing modern medicine [5]. Legally RBD is statutory backed under sections 10(2), 10(3), 17(1) (b) and 23(3) of the Registration of Births & Deaths (RBD) Act, 1969. World Health Organization (WHO) at regular intervals reviews the arrangement of International Classification of Diseases (ICD); tenth amendment of the ICD (ICD-10) was certified by the 43<sup>rd</sup> World Health Assembly (WHA) in May 1990 and adopted in the ORGI (Office of the Registrar General & Census

Commissioner, India) for categorization of causes of deaths since 1999 report on MCCD. The latest ICD-11 was adopted by the 72nd WHA in 2019 effective from 1st January 2022 [9]. In the year 2020, as per recommendation of WHO the Indian Council of Medical Research (ICMR), recommended codes for covering Covid 19 related mortality (U07.1 and U07.2) as a separate major cause group. Covid 19 related mortality contributed for 8.9 per cent in total medically certified deaths with shares of 9.8 % and 7.1 % of males and females respectively [5,11].

## Objectives

The States & UTs of India has been harshly affected by the COVID-19 pandemic which has not resolved till date; although the new cases and new mortality is greatly reduced in India as well as on global basis. The certified mortality and mortality associated with COVID-19 is still under controversy as mentioned above in the background. This research study aimed to assess **percentage of (including COVID-19) mortality medically certified among total registered deaths in 36 States & UTs of India for the period 2018-2020 as well as trends of COVID-19 mortality age-sex distribution pattern in India during 2020 which are** medically certified due to COVID-19 pandemic in India with available data resources.

## Methods

### Study design

The mortality figures for this novel cross sectional retrospective observational research study were obtained through CRS (Civil Registration System) of India established under the RBD Act, 1969. The data available were obtained on medically certified cause of deaths from States/UTs has been collected, tabulated, analysed in compliance with the ICD - Tenth Revision (1993). Deaths due to Covid-19 (U07.1 and U07.2) were added as mentioned above. The statistics on percentage of mortality medically certified among total registered mortality in 36 States & UTs of India during 2018-2020 and COVID-19 mortality age-sex distribution pattern in India were derived with the use of Microsoft office and stata software and presented, cross tabulating them by indicators of the deceased. The time series data analysis of MCCD by major cause groups for different years will be added in next version.

### Setting

The necessary data for the title mentioned research question were collected from CRS (civil registration system) for different states and UTs (union territories) for the title mentioned period and analysed for specificity, measurability, credibility, reproducibility, and timeliness –see Table-1, 2, 3,

**Table-1- Percentage of Medical Certification in States/UTs during 2018-2020**

S.No.	STATE / UNION TERRITORY	TOTAL REGISTERED DEATHS			MEDICALLY CERTIFIED DEATHS (TOTAL)			PERCENTAGE OF MEDICALLY CERTIFIED DEATHS TO TOTAL REGISTERED DEATHS		
		2018	2019	2020	2018	2019	2020	2018	2019	2020
1	Andhra Pradesh	375777	401472	455000	55933	51659	101353	14.9	12.9	22.3
2	A & N Islands	2237	2616	2951	1331	1573	1871	59.5	60.1	63.4
3	Arunachal Pradesh	3860	3490	3475	1271	1166	1160	32.9	33.4	33.4
4	Assam	142605	163057	187085	17118	28048	36785	12	17.2	19.7
5	Bihar	213989	359349	425047	29112	18233	14591	13.6	5.1	3.4
6	Chandigarh	23330	23592	18370	16757	17564	12200	71.8	74.4	66.4

7	Chhattisgarh	177549	188211	191938	35149	40208	41358	19.8	21.4	21.5
8	Dadra & Nagar Haveli and Daman & Diu	2174	2705	3414	1175	1255	2269	54	46.4	66.5
	Daman & Diu**	1169	1162	----	1062	629	----	90.8	54.1	----
9	Delhi	145533	145284	142789	90701	89668	80866	62.3	61.7	56.6
10	Goa	13072	13851	14601	13071	13851	14601	100	100	100
11	Gujarat	433256	462284	523892	101166	98563	107983	23.4	21.3	20.6
12	Haryana	185842	188910	212238	37819	36641	29699	20.4	19.4	14
13	Himachal Pradesh	41833	43633	44449	6289	5688	6445	15	13	14.5
14	Jammu & Kashmir *	39410	44227	53070	NA	NA	NA	NA	NA	NA
15	Jharkhand	102729	119374	119037	4709	6911	7313	4.6	5.8	6.1
16	Karnataka	483511	508584	551808	150415	154526	158603	31.1	30.4	28.7
17	Kerala	258530	270567	250983	30894	31511	28192	11.9	11.6	11.2
18	Laddakh	----	----	742	----	----	NA	----	----	----
19	Lakshadweep	314	336	342	298	322	341	94.9	95.8	99.7
20	Madhya Pradesh	424257	493328	524454	44467	44915	35105	10.5	9.1	6.7
21	Maharashtra	667900	693800	808783	232416	265132	345760	34.8	38.2	42.8
22	Manipur	4476	2990	2230	2299	2013	2266	51.4	67.3	100
23	Meghalaya	14779	18298	19191	6370	6023	4566	43.1	32.9	23.8
24	Mizoram	5525	6606	6703	3254	3428	3329	58.9	51.9	49.7
25	Nagaland	828	2266	2509	238	273	191	28.7	12	7.6
26	Odisha	328799	342947	362982	36407	43191	59296	11.1	12.6	16.3
27	Puducherry	12839	13255	12923	9499	9455	10231	74	71.3	79.2
28	Punjab	213234	215045	229846	36448	37607	39621	17.1	17.5	17.2
29	Rajasthan	443173	451315	477151	58145	62782	77626	13.1	13.9	16.3
30	Sikkim	3386	3308	3543	1438	1510	1648	42.5	45.6	46.5
31	Tamil Nadu	574006	633897	687212	258259	278887	295539	45	44	43
32	Telangana	136528	228294	203127	51068	63236	62796	37.4	27.7	30.9
33	Tripura	29080	30419	31645	6481	10258	11160	22.3	33.7	35.3
34	Uttarakhand	47894	66313	62219	5318	5876	7305	11.1	8.9	11.7
35	Uttar Pradesh	906653	944596	873419	46310	61335	109688	5.1	6.5	12.6
36	West Bengal	490530	551695	606714	63336	77603	99931	12.9	14.1	16.5
	Total	6950607	7641076	8115882	...	...	...	...	...	...
	Total MCCD Reporting State/UTs	6911197	7596849	8062070	1456023	1571540	1811688	21.1	20.7	22.5

Note: - NA: Data Not Available,\*Includes figures of Laddakh UT of 2018 & 2019 in Total Registered Deaths

\*\*Daman & Diu data merged with Dadra & Nagar Haveli

Table-2-Age distribution of deaths due to COVID 19 (Codes for Special Purposes) under MCCD-202

S.No.	Age Group (in Years)	COVID Deaths Virus identified -Male	COVID Deaths Virus Identified- Female	COVID Deaths Virus not-identified Male	COVID Deaths Virus not-identified Female	Total Covid Deaths Male	Total Covid Deaths Female	Total
1	<1	145	61	21	14	166	75	241
2	01-04	59	44	59	39	118	83	201
3	05-14	169	122	332	255	501	377	878
4	15-24	810	566	1162	626	1972	1192	3164
5	25-34	2572	1068	1749	860	4321	1928	6249
6	35-44	6630	2383	1832	802	8462	3185	11647
7	45-54	14621	5695	2517	1089	17138	6784	23922
8	55-64	24282	9783	2918	1462	27200	11245	38445
9	65-69	14937	6259	1421	631	16358	6890	23248
10	70 Years or above	31374	12133	2622	1163	33996	13296	47292
11	Age Not Stated	3728	1272	257	74	3985	1346	5331
TOTAL		99327	39386	14890	7015	114217	46401	160618

**Table-3- Age distribution of deaths due to COVID 19 in percentage (Codes for Special Purposes) under MCCD-2020**

S.No.	Age Group (in Years)	Male		Female		Total	
		Number	Percentage	Number	Percentage	Number	Percentage
1	<1	166	0.1	75	0.2	241	0.2
2	01-04	118	0.1	83	0.2	201	0.1
3	05-14	501	0.4	377	0.8	878	0.5
4	15-24	1972	1.7	1192	2.6	3164	2
5	25-34	4321	3.8	1928	4.2	6249	3.9
6	35-44	8462	7.4	3185	6.9	11647	7.3
7	45-54	17138	15	6784	14.6	23922	14.9
8	55-64	27200	23.8	11245	24.2	38445	23.9
9	65-69	16358	14.3	6890	14.8	23248	14.5
10	70 Years or above	33996	29.8	13296	28.7	47292	29.4
11	Age Not Stated	3985	3.5	1346	2.9	5331	3.3
	TOTAL	114217	100	46401	100	160618	100

## Participants

Participants were all states and union territories of India reporting as per above mentioned guidelines. The selections of participants were purely on the basis of available data of MCCD.

## Variables

All the variables are mentioned in table-1, 2,3,4,5.

## Data sources/measurement

Source: CRS Report 2018-2019-2020 available at - <https://crsorgi.gov.in/mccd-reports.html>



## Statistical analysis of COVID-19 mortality

With more data in next version we will discuss statistical analysis and inferences.

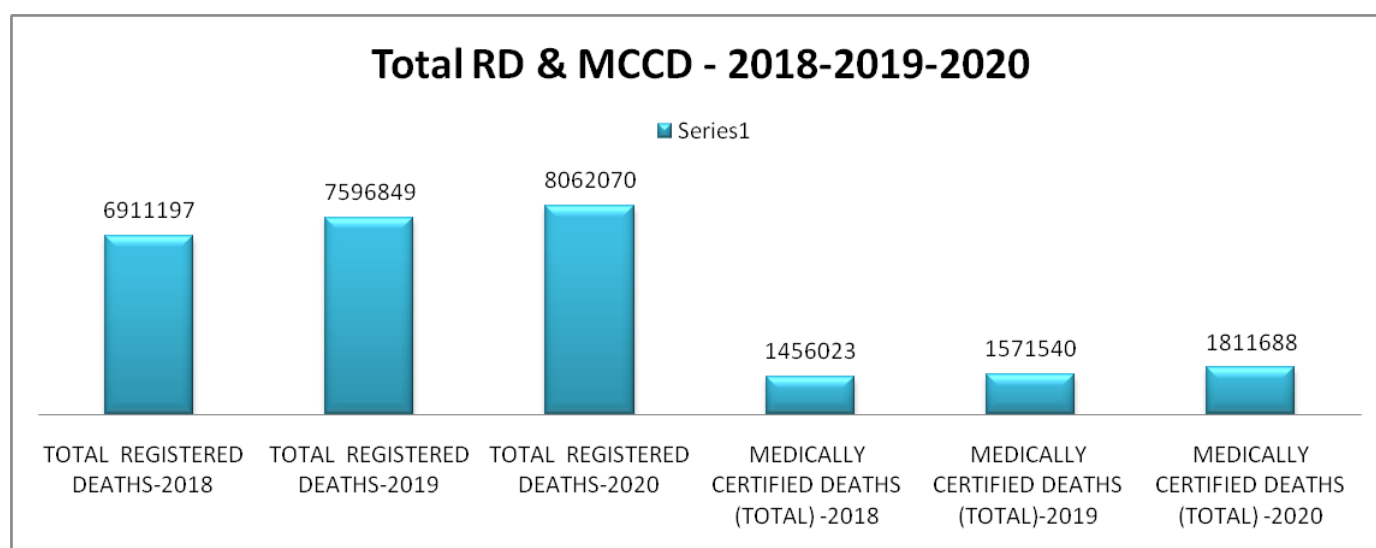
**Table-4- Covid-19 deaths**

	Var-Obs-age groups	Mean	Std. Dev.	Min	Max	Std. Err.	[95% Conf. Interval]
COVID Deaths Virus identified -Male	11	9029.727	10858.7	59	31374	3274.022	1734.751 -16324.7
COVID Deaths Virus Identified- Female	11	3580.545	4269.423	44	12133	1287.279	712.3082 -6448.783
COVID Deaths Virus not-identified- Male	11	1353.636	1073.972	21	2918	323.8147	632.1322 -2075.141
COVID Deaths Virus not-identified- Female	11	637.7273	494.7056	14	1462	149.1593	305.3795 -970.075
Total Covid Deaths Male	11	10383.36	11752.64	118	33996	3543.553	2487.835- 18278.89
Total Covid Deaths-Female	11	4218.273	4671.669	75	13296	1408.561	1079.802 -7356.743

## Results

It is a well established fact that a very few percentage of death in India is registered [8]. Out of this few percentage of mortality registered the MCCD is also only a few percent of mortality registered. Hence for COVID-19 deaths it is evident from this study that only a few percentages were certified as mortality due to Covid-19. This research study revealed that during the year 2020, MCCD to total RD (registered deaths) has increased by 1.8 percent as compared to 2019 (last year).

**Figure – 1- Total RD and MCCD for 2018-2019-2020**



This increase was chiefly due to two reasons; first and most important was COVID-19 and secondly improvement in MCCD by some states leading to gross improvement at national level – see table 1,2,3,4,5 and figures 1,2,3,4,5 for better understanding of the scenario and issues. The total registered death during 2018 was 6911197 for 2019 it was 7596849 and in 2020 8062070. **The figure increased continuously during successive years but there is a question mark on**



**this data.** The total RD increased by 685652 numbers in 2019 compared to 2018 whereas despite the COVID-19 PANDEMIC impact the increase in figures during 2020 was 240148 only which are **highly questionable?** The researcher found that this controversy is also raised by several global highly accredited international organizations like WHO etc [8]. The total MCCD during 2018 was 1456023 for 2019 it was 1571540 and in 2020 1811688, see table-1 and figure-1. **The figure increased continuously during successive years and** The total MCCD increased by 115517 numbers in 2019 compared to 2018 whereas despite the COVID-19 PANDEMIC impact the increase in figures during 2020 was 240148 only which are **highly questionable?** The researcher found that this controversy is also raised by several global highly accredited international organizations like WHO etc [8].

This research study revealed that MCCD declined in 11 States/UTs in 2020 compared to the previous year 2019. These states were Arunachal Pradesh, Bihar, Chandigarh, Delhi, Haryana, Kerala, Madhya Pradesh, Meghalaya, Mizoram, Nagaland and Telangana. **This research study revealed that Bihar which is second most populous state in India ranked lowest in medical certification of cause of death, 2020 which is amazing see- Table – 5 and Figure-5.**

**Table-5- Ranking of States/UTs of India in medical certification of cause of death, 2020**

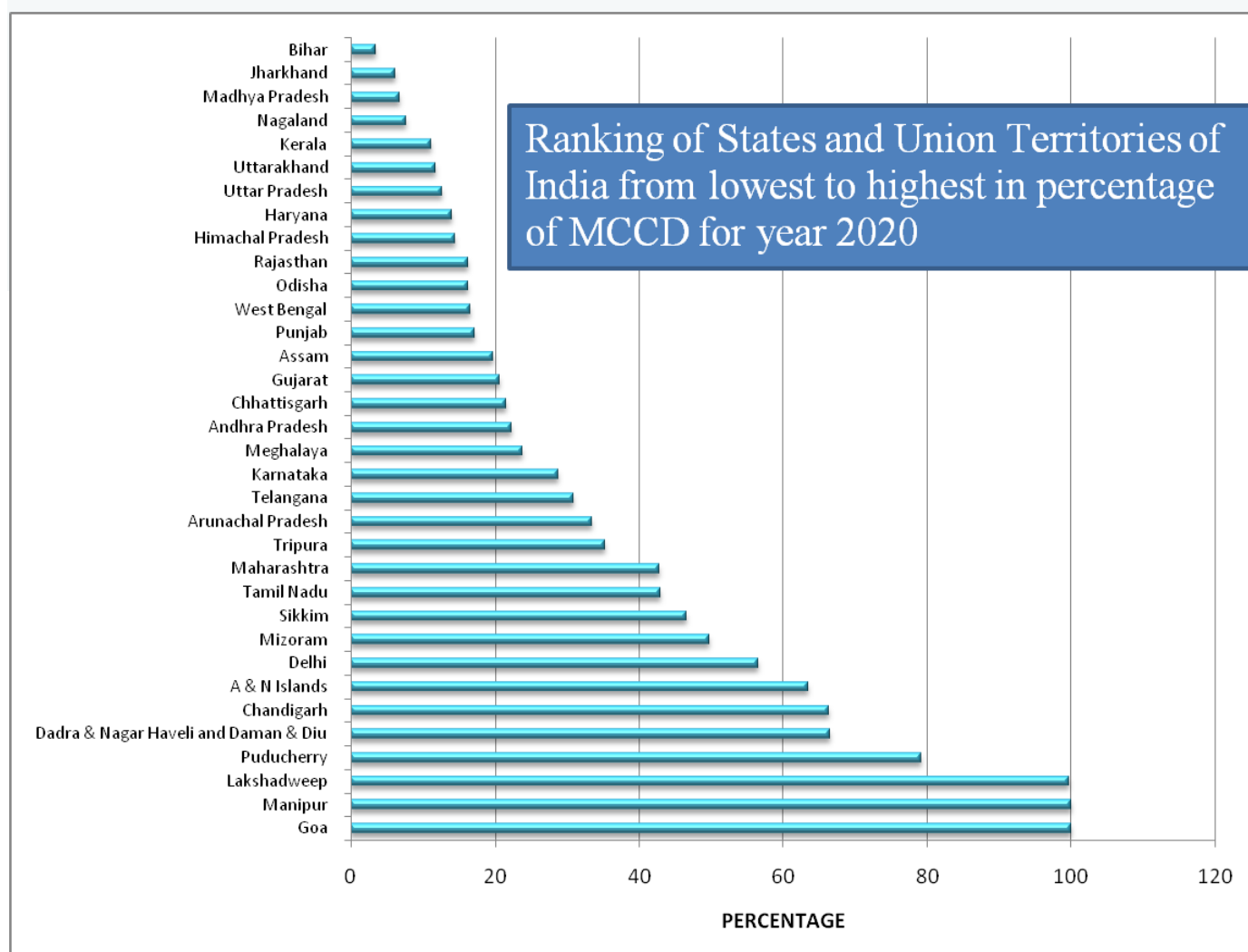
State/Union Territory	Total Registered Deaths	Total Medically Certified Deaths	Percentage of Medically Certified Deaths to Total Registered Deaths	Rank of State/ Union Territory
Goa	14601	14601	100	1
Manipur	2230	2266	100	2
Lakshadweep	342	341	99.7	3
Puducherry	12923	10231	79.2	4
Dadra & Nagar Haveli and Daman & Diu	3414	2269	66.5	5
Chandigarh	18370	12200	66.4	6
A & N Islands	2951	1871	63.4	7
Delhi	142789	80866	56.6	8
Mizoram	6703	3329	49.7	9
Sikkim	3543	1648	46.5	10
Tamil Nadu	687212	295539	43	11
Maharashtra	808783	345760	42.8	12
Tripura	31645	11160	35.3	13
Arunachal Pradesh	3475	1160	33.4	14
Telangana	203127	62796	30.9	15
Karnataka	551808	158603	28.7	16
Meghalaya	19191	4566	23.8	17
Andhra Pradesh	455000	101353	22.3	18
Chhattisgarh	191938	41358	21.5	19
Gujarat	523892	107983	20.6	20
Assam	187085	36785	19.7	21
Punjab	229846	39621	17.2	22
West Bengal	606714	99931	16.5	23
Odisha	362982	59296	16.3	24
Rajasthan	477151	77626	16.3	25
Himachal Pradesh	44449	6445	14.5	26
Haryana	212238	29699	14	27
Uttar Pradesh	873419	109688	12.6	28
Uttarakhand	62219	7305	11.7	29
Kerala	250983	28192	11.2	30
Nagaland	2509	191	7.6	31
Madhya Pradesh	524454	35105	6.7	32
Jharkhand	119037	7313	6.1	33
Bihar	425047	14591	3.4	34
Total	8062070	1811688	22.5	

The MCCD data of UTs of J&K and Laddakh were not available. During the years 2018-2020, Daman & Diu, A & N

Islands, Chandigarh, Dadra & Nagar Haveli and Manipur and Puducherry had issued MCCD for more than 50 percent of registered deaths. The percentage of MCCD increased in Rajasthan, Sikkim, Tripura, Uttar Pradesh, A & N Islands, Assam, Chhattisgarh, Lakshadweep, Maharashtra, Manipur, Odisha, and West Bengal during 2018-2020 periods. Manipur and Goa has 100 percent MCCD during 2020 –SEE TABLE-5-FIGURE-2. Bihar ranked lowest with only 3.4 percent medically certified deaths during 2020 the COVID-19 pandemic era. Hence a large number of mortality during COVID-19 era remains uncertified till date in states like Bihar.

In 2020 there were 18, 11,688, in 2018 it was 1456023 and in 2019 1571540 total medically certified deaths. The actual the number of registered mortality at National level is 81, 15,882 and figure 80, 62,070 comes after excluding the figures of registered deaths from Jammu & Kashmir and Laddakh as per Vital Statistics of India based on CRS (Civil Registration System), 2020. MCCD in the year 2020 accounted for 22.5 per cent of total registered deaths while for the year 2018-21.1% and 20.7% for 2019 at National level (including figures of 34 States/UTs).

**Figure-2 - Percentage of MCCD -2020 to Total Registered Deaths in States and UTs- lowest to highest**



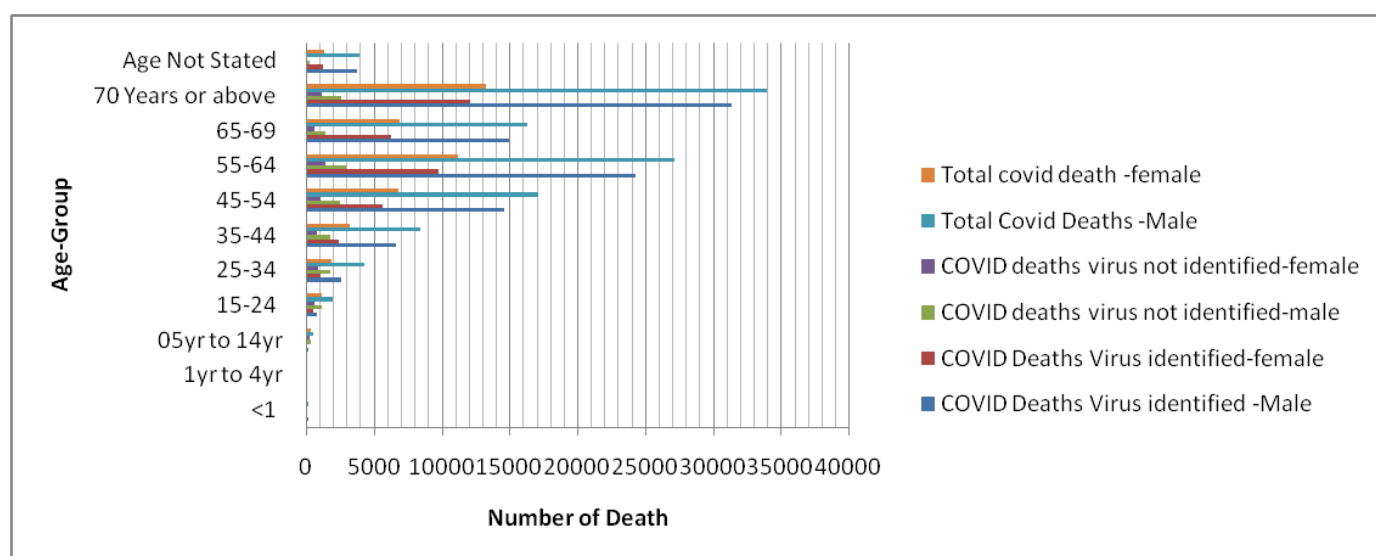
The ranking of States/UTs on the basis of percentage of MCCD to total registered deaths for the year 2020 shows that Manipur & Goa are top rankers with cent per cent registered deaths medically certified, followed by Lakshadweep with

99.7 per cent MCCD, 79.2 per cent in Puducherry, 66.5 per cent in D & N Haveli and Daman & Diu, 66.4 per cent in Chandigarh, 63.4 per cent in A & N Islands, 56.6 per cent in Delhi. Amongst bigger States, Tamil Nadu MCCD were 43.0 per cent followed by Maharashtra 42.8 per cent, Telangana 30.9 per cent, Karnataka 28.7 per cent, Andhra Pradesh 22.3 per cent and Gujarat 20.6 per cent see table-5 and figure-5. **Bihar ranked lowest with only 3.4% MCCD** followed by Jharkhand – 6.1%, Madhya Pradesh-6.7% and Nagaland-7.6%.

### Deaths reported under Covid 19

COVID-19 associated mortality were leading cause group accounting for 8.9 per cent of total medically certified deaths at national level. Gender analysis revealed that 9.8 per cent of male and 7.1 per cent of female were medically certified as COVID-19 mortality at national level. The age distribution and statistical analysis of medically certified deaths due to Covid 19 for the cases of virus identified and not identified i.e. U07.1 & U07.2 were presented in Table 2, 3, 4 and figure 3, 4 and 5. More description and analysis will be discussed in next version with more data. In MCCD, as discussed earlier an urgent situation ICD-10 code of 'U07.1 COVID 19, virus identified' is imparted to diagnosis of COVID-19 which was definite by laboratory testing whereas ICD-10 code of 'U07.2 COVID-19, virus not identified' is imparted to a clinical or epidemiological diagnosis of COVID-19 in the circumstances where laboratory verification is unconvincing or not available. Both these codes U07.1 and U07.2 were used by the States/UTs for COVID-19 mortality coding as the cause of mortality. Table-2 shows that out of total 1,60, 618 COVID-19 associated mortality the virus was acknowledged in 1, 38,713 deceased whereas it was not confirmed in 21,905 cases.

**Figure-3- COVID-19 mortality-2020 (India) in different age group and gender with virus identification status**



**Figure-4- COVID-19 mortality in different age group of males and females during 2020**

## COVID-19 mortality in different age group of males and females during 2020

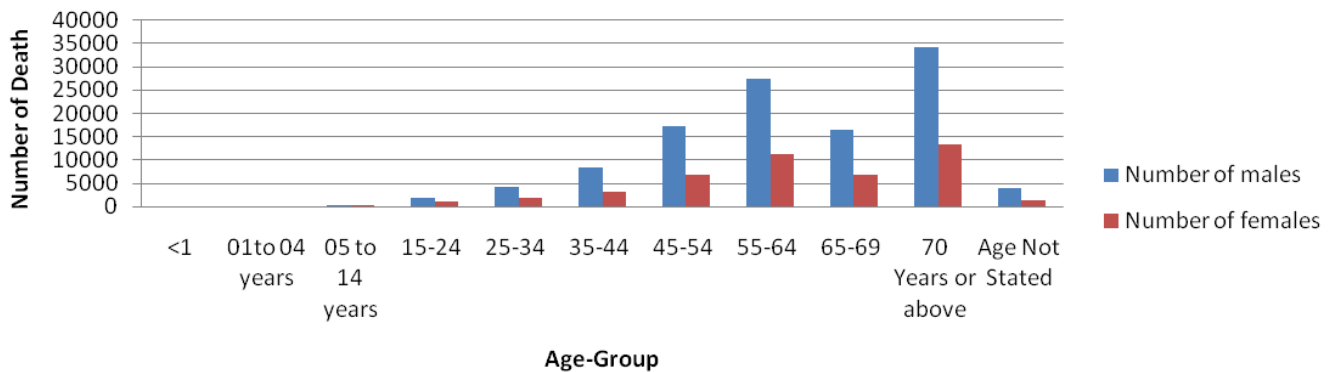
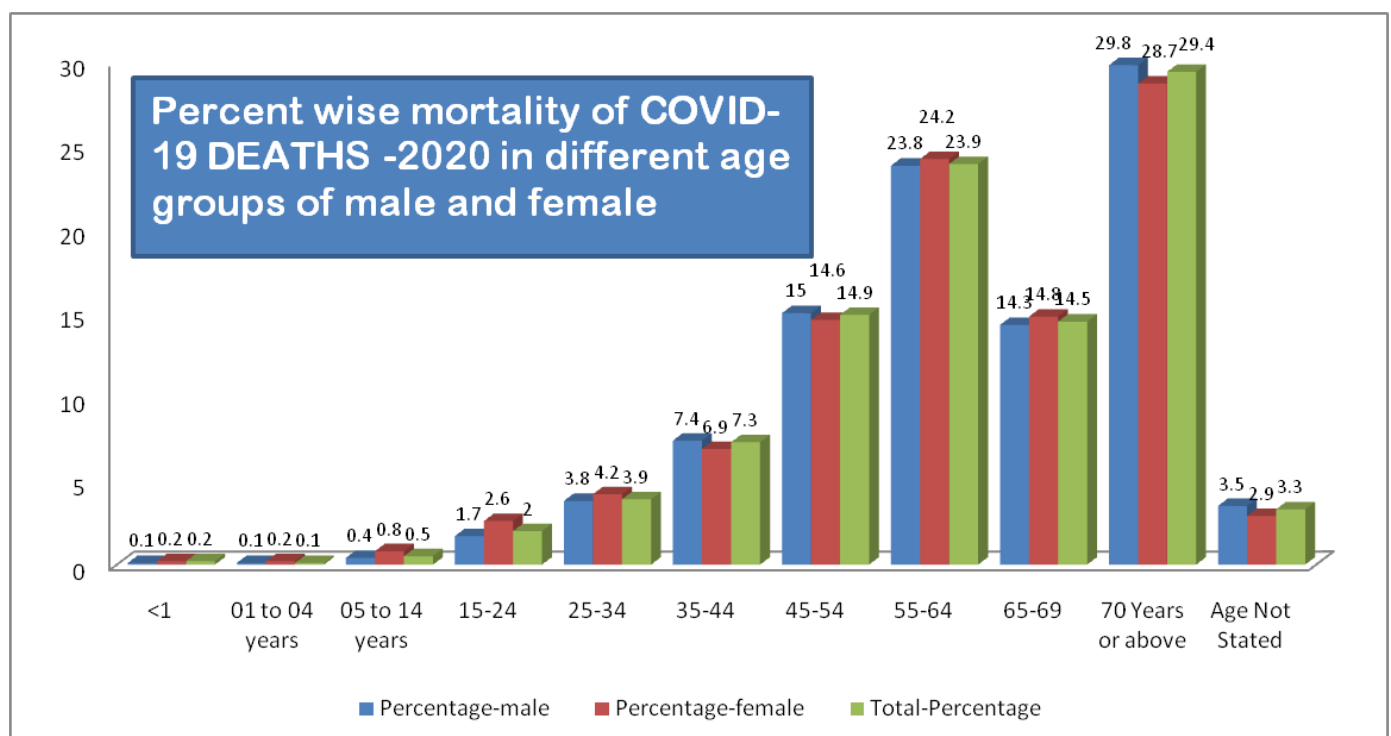


Table-3 and Figure-5 shows that, the maximum percentage of death of 29.4 % was in the age group of 70 years or above followed by 55-64 years age group accounting for 23.9 % while the age group of 65-69, with class interval of only 5 years accounted for significant 14.5 per cent of COVID-19 mortality. This observational research study revealed that the majority of COVID-19 mortality was found in the age group of 45 years and above accounting for 82.7 per cent of total deaths in the group. The percentage of female mortality aged 34 years and below as well as for 55-64 years age group and 65-69 years age group, to total female deaths are greater in comparison to corresponding age groups mortality for male while in other groups male mortality were more than females. Out of the total 1, 60,618 MCCD as COVID-19 deaths; 1, 14,217 male and 46,401 female died due to COVID-19, which indicates that COVID-19 is more detrimental for males. The age and sex wise allocation of COVID-19 mortality is shown in table-2, 3, 4 and figures 3, 4, 5.

**Figure-5- Percent wise COVID-19 mortality -2020 (India) in males and females of different age groups**



## Discussion & Conclusion

The States/UTs of India differs widely in MCCD ranging from 3.4 percent in Bihar to cent per cent registered deaths medically certified in Goa and Manipur. This research study revealed that very few COVID-19 deaths were certified as mortality due to Covid-19. In LMICs (Low and middle income countries) like India where a great majority of people are living below poverty line such low rate of MCCD may affect badly the poor socio-economic strata from receiving compensations and insurances money [4]. **Particularly in poor states like Bihar in India the lower socio-economic strata of population may be more affected by low MCCD which is chiefly due to failure of Public Health Management related largely to corruption, posting and other scams [7, 8]. Bihar ranked lowest with only 3.4 percent medically certified deaths during 2020 the COVID-19 pandemic era. Hence a large number of mortality during COVID-19 era remains uncertified till date in states like Bihar.**

**The researcher has found that in states like Bihar the total registered deaths have increased continuously during study period while MCCD decreased continuously during the study period which is due to failure of public health management and corruption, posting scams etc., by which such states are putting highly incapable / untrained person on state programme officer etc vital posts [9]. These irregularities or ignorance have put India's data credibility in doubt at international level bringing shame to the nation.**

Here it is important to mention that birth rate / numbers and death rate/numbers are vital indicators of well being of a nation as well as it takes a long time to change these parameters through public health management. Abrupt changes can occur due to natural or manmade calamities like war, COVID-19 pandemic etc. Despite COVID-19 situation the trends in RD and MCCD had not shown any big change which has raised questions as elaborated earlier. The states and UTs of India should have a robust framework for more dynamic implementation of the provisions on MCCD in future for providing specific, measurable, accurate, reliable and timely data to reduce the time gap in availability of significant information necessary for enormous use to several key stakeholders of health and other sectors like health planners, policy makers / implementers, researchers and epidemiologists for data -based management with regard to resource distribution, monitoring of indicators for performance / output etc., identifying the top priorities for state / national health or other programs such as Ayushman Bharat Yojna and other interrelated activities in the area of research / Public Health / other sectors like insurance. The coverage of medical certification should include all type of hospitals uniformly across the States/UTs of India. All the States and UTs medical colleges and specialized hospitals, district hospitals and Primary Health Centres (PHCs) should be brought under MCCD scope. In order to implement the scheme of MCCD in the country, the Registrar General, India must enforce upon all the States/UTs to bring all public / private hospitals as well as private medical practitioners under provision of MCCD, both in rural as well as urban areas.

## Strength and Limitations

**This is a novel cross sectional research study with peculiar research question in the context of India. The key limitation is availability of data.**

## Other information

**This is the first version of this work and more versions will evolve in future with more information and analysis.**

## Abbreviation

**Universal Declaration of Human Rights (UDHR); MEDICAL CERTIFICATION OF CAUSE OF DEATH (MCCD); coronavirus disease-2019 (COVID-19); RBD - Registration of Births and Deaths Act; World Health Organization (WHO); International Classification of Diseases (ICD); World Health Assembly (WHA); ORGI (Office of the Registrar General & Census Commissioner, India); Indian Council of Medical Research (ICMR); CRS (Civil Registration System); UTs (union territories); RD (registered deaths);**

## Funding

The author declares that no funds are taken from any individual or agency-institution for this study.

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### **Declarations**

-This version of paper has not been previously published in any peer reviewed journal and is not currently under consideration by any journal. The document is Microsoft word with English (India) language & 3300 words excluding reference and declaration etc. (5327words Total including all).

- **Ethics approval and consent to participate:** Not applicable. This study has not involved any human or animals in real or for experiments. The submitted work does not contain any identifiable patient/participant information.

-**Consent for publication:** The author provides consent for publication.

-**Availability of data and materials:** Electronic records from, Civil Registration System, **National Family Health Survey, India**, HMIS (health management information system) of MoHFW (ministry of health and family welfare), Government of India, NITI Aayog, NHSRC etc.

-**Conflicts of Interest/ Competing Interest:** There are no conflicts / competing of interest

- **Funding-**Self sponsored. No aid taken from individual or agency etc

- **Authors' contributions:** The whole work is done by the Author - Dr Piyush Kumar, M.B.B.S., E.M.O.C., P.G.D.P.H.M., - Senior General Medical Officer- Bihar Health Services- Health Department- Government of Bihar, India and Advocate Anupama-Senior Lawyer, Bar Council, Patna.

- **Acknowledgements-** I am thankful to Advocate Anupama my wife and daughters Aathmika-Atheeva for cooperation.

- **Author information:** The author is currently working as Senior General Medical Officer for the government of Bihar and Advocate Anupama-Senior Lawyer, Bar Council, Patna.

-**Financial Support & sponsorship:** Nil

-**Author contact information**

Department of Health, Government of Bihar, MOBILE - +919955301119/+917677833752, Email [drpiyush003@gmail.com](mailto:drpiyush003@gmail.com)