COVID19

DEATH AUDIT REPORT

June 2020

Department of Health & Family Welfare

Government of Kerala

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Introduction

WHO declared nCORONA disease, now known as COVID19 on the 18th of January 2020 and the very next day, the Department of Health and Family Welfare has set in motion all the activities such as constituting State Rapid Response Team, District level structures, roles and responsibilities of various committees at the district and at the State level. Through these well laid out structures, the activities such as airport surveillance, field surveillance, home quarantine, risk stratification-based testing protocols and treatment protocols were developed and put to practice. As the State identified the first COVID case in the country, all these structures and processes were put in place well in time and also shared with the Ministry of Health and Family Welfare, Government of India for informing to the other States.

The state has kept the objectives to keep the mortality minimum and to ensure that there is no community spread. With these twin objectives, the department of Health and Family Welfare along with other line departments have been doing qualitative interventions to control the epidemic.

While doing the field activities simultaneously, the Department has put in place structures for each of thematic / niche activities such as constituting State and Institutional Medical Board, management units for testing, Laboratories, supply chain management etc.

The department has been practicing scientific methods of death auditing all throughout to understand the underlying causes of death for last many years. The information so collated gives a lot of inputs to the Medical Board and the Clinical Teams regarding the cases and their management. During COVID epidemic , the Committee was constituted involving members of the State Public Health unit, State Medical Board, Institutional Medical Boards and State Prevention of epidemic and infectious disease Cell to study all the deaths. These deaths are provisionally declared as COVID deaths. As we go forward, as per the WHO criteria regarding COVID death declaration, categorization of deaths shall be done appropriately in the consolidated report.

The detailed report gives information regarding the patient and management of these patients.

The Department is publishing all such technical reports periodically in the public domain to facilitate studies by health experts and for seeking expert views and suggestions to strengthen the response to the epidemic.

Background

The first COVID case was reported in Kerala in January 2020. In the COVID epidemic of Kerala, 4442 cases and 24 deaths have been reported by 30th June 2020. The case fatality rate is 0.5%. Kerala's case fatality rate (0.54%) is lower compared to the national average (CFR -3%; 604641 cases and 17834 deaths) and the global CFR(CFR-5%, 10533779 cases, 512842 deaths). In this report an audit of 22 deaths had been conducted. This was based on the information in the death audit reports submitted by the treating physicians and nodal officers of COVID patients and interactions with them. The data was reviewed, analysis done and report prepared jointly by the State Medical Board and State PEID Cell. This report is being presented in the following format

1. Socio-demographic profile
    1. Age
    2. Gender
    3. District
    4. History of travel
2. Clinical Profile
    1. Symptoms
    2. Complications
    3. Co-morbid conditions
3. Type of interventions
4. Summary of observations
5. Policy Implications and recommendations

1. Socio-demographic profile

1.1.Age : The lowest age was 4 months and the highest age was 87 years. Nearly three-fourth of deaths were in the **above 50 year age group (77%).** If the four month old baby who had congenital heart disease is considered as an outlier and excluded in analysis, the ***mean age of those who died is 61.3 years*** (standard deviation 15.7 years). The median age is 67 years (IQR, inter quartile range 55-71years).

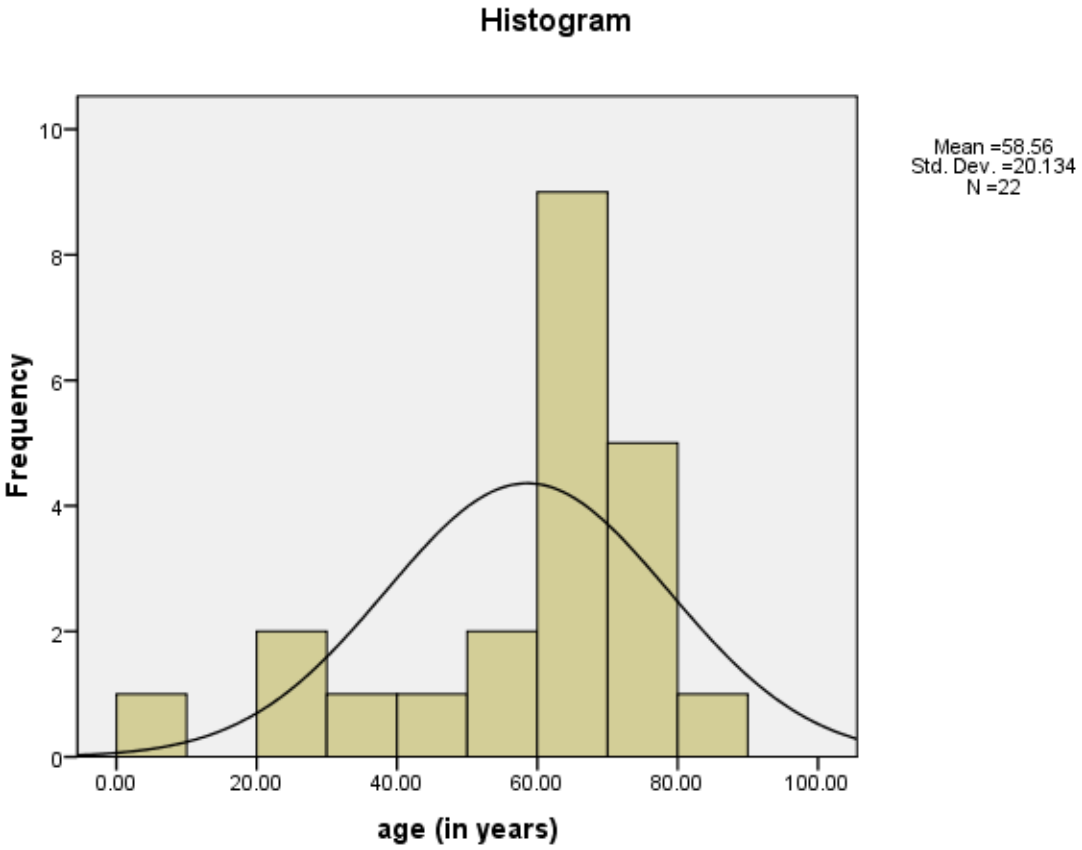
1.1.1. Table 1.1

Age distribution of COVID patients who died in Kerala

Age group	Number of deaths	%
4 months	1	4.5
20-29 years	2	9.0
30-39 years	1	4.5
40-49 years	1	4.5
50-59 years	3	13.5
60-69 years	**8**	**36**
70-79 years	**5**	**22.5**
80-89 years	1	4.5
Total	22	100

Figure 1.

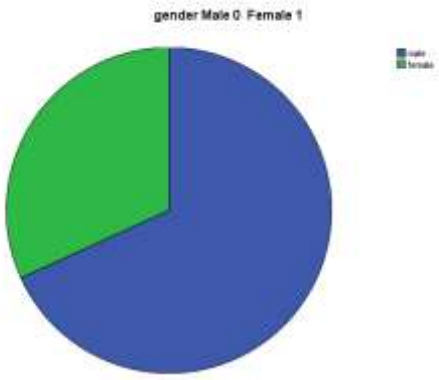
Age distribution of COVID –19 patients who died in Kerala



1.2. Gender

Among the 22 patients who succumbed **to COVID-19, fifteen were males (68%) and seven were females (32%).** Similar pattern is observed among cases in Kerala and in other parts.

Figure 2. Gender



1.3. District wise distribution

Table1.2

District wise distribution of COVID patients who died

District	No: of death	District	No: of death
Ernakulam	1	Pathanamthitta	1
Kannur	3	Kottayam	1
Kozhikode	2	Thrissur	3
Kollam	2	Wayanad	1
Malappuram	3	Thiruvananthapuram	3
Palakkad	1		
TOTAL			**21**

One patient included in this analysis was from Telengana. He reached Trivandrum accidentally, while he was traveling back from Jaipur.

1.4. Travel history

14 patients (64%) had **history of travel** while 8 did not have (36%).

Out of the 14 patients with history of travel, 8 persons had returned from foreign countries while 6 have history of travel to other Indian states.

Table 1.4.1

Distribution of places of travel

Variable		*Number*	*Remarks*
Travel history (n=22)	Yes	14	
	No	8	
	Foreign countries	8	UAE-5, Maldives-1, Oman-1, Saudi -1
	Other Indian states	6	Mumbai-3,Delhi- 1, Chennai-1, Jaipur-1

2.1. Clinical Profile: Three patients were brought dead. We tried to collect data from the available sources and reconstruct history and make the information as complete far as possible.

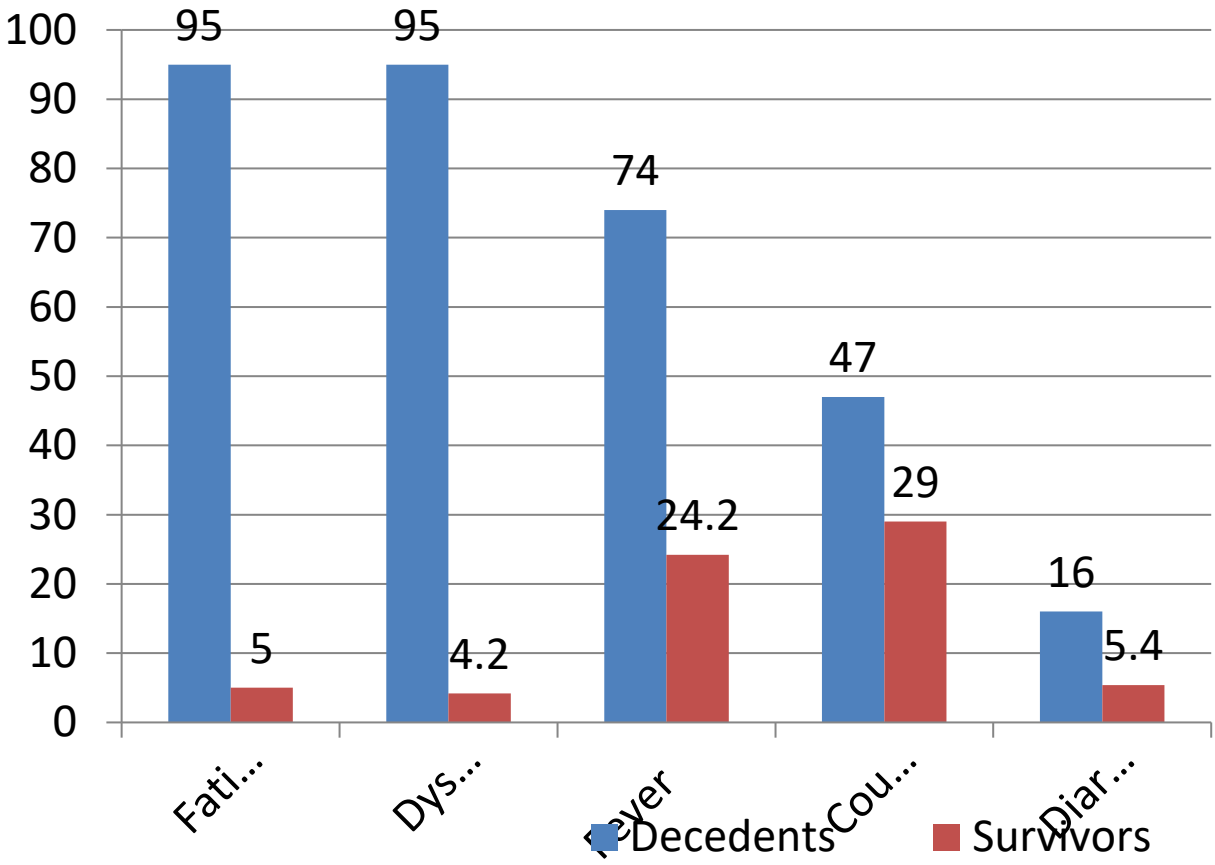
2.2. **Symptoms** : This analysis includes data on 19 patients who were admitted. Fatigability, breathlessness, fever , cough and diarrhoea were the early symptoms in these patients. The most prevalent symptoms were fatigability, breathlessness and fever.

Table 2.1.1.

Symptoms of COVID patients who died

No	Symptom	Number of patients who had the symptom (%)
1	Fatiguability	18(95%)
2	Breathlessness	18(95%)
2	Fever	14(74%)
3	Cough	9(47%)
4.	Diarrhoea	3(16%)

Figure 4.5 COVID 19 symptoms among those who died and those survived in Kerala (in % of total)



2.3. Complications

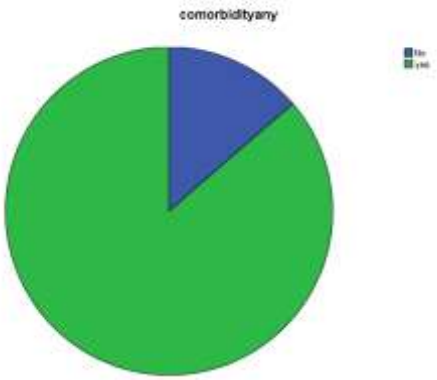
There were three patients who were brought dead. Of the remaining 19 patients, 18 had two or more COVID related complications (95%). One patient who was returnee from Abu Dabi had multiple episodes of severe heamatemesis, prior to the diagnosis of COVID.

Table 2.2.1.

Complications developed in COVID patients who died

No	Complication	Number of patients who had the complication n=19(%)
1	Acute Respiratory Distress Syndrome(ARDS)	17(89%)
2	Pneumonia	16(84%)
2	Cytokine Release Syndrome	12(63%)
3	Acute Kidney Injury (AKI)	8(44%)
4.	Myocarditis	7(37%)
5.	Septic shock	6(32%)
6.	Disseminated Intravascular Coagulation (DIC)	3(16%)
7	Encephalitis	2(11%)

2.3 Co-morbid Conditions in COVID patients who died



Among the 22 patients who died, 19 had pre-existing co-morbid conditions (86%), while 3 did not have any co-morbidity (14%). In the order of frequency, the co-morbid conditions are diabetes (32%), hypertension (23%), cancer (14%), coronary heart disease (14%), congenital heart disease, hypertrophic cardio-myopathy, chronic

kidney disease, intracranial bleeding and chronic liver disease. Ten patients had multiple co-morbidities (45%).

Table 2.3.1

Overview of Co-morbidity

Co-morbidity	Number of patients n=22	%
At least one co-morbidity	19	86%
No co-morbid condition	3	14%
Multi-morbidity (more than one)	10	45%

Table 2.3.2

Details of Co-morbid Conditions in COVID patients who died

No	Co-morbid condition	Number of patients who had the co-morbidity n=22(%)
1	Diabetes	7(32%)
2	Hypertension	5(23%)
2	Cancer	3(14%)
3	Coronary Artery Disease	3(14%)
4	chronic liver disease	1(4.5%)
5	congenital heart disease	1(4.5%)
6	hypertrophic cardio-myopathy	1(4.5%)
7	chronic kidney disease	1(4.5%)
8	intracranial bleeding	1(4.5%)

3. Type of Interventions

This analysis includes data of 19 patients who were admitted in hospitals. 63% of the patients required invasive ventilation, while 42% required non-invasive ventilation. Half of the patients received anticoagulant therapy and steroids. One third of patients received Tocilizumab. One patient had received convalescent plasma therapy.

5. **4. Summary of observations**

- 77% deaths happened in patients above 50 years, predominantly in men. Mean age was 59 years.
- 64% of patients have history of travel. UAE and Mumbai are the high frequency places of travel
- Fatigability, breathlessness and fever were the most common symptoms. Diarrhoea was also present in a few
- Co-morbid conditions were present in 86% of patients and half of them had multiple co-morbidities.
- 95% of patients had two or more complications related to COVID. ARDS, pneumonia, Cytokine Release Syndrome, acute kidney injury and myocarditis were the common complications.
- 63% of the patients required invasive ventilation, while 42% required non-invasive ventilation. Half of the patients received anticoagulant therapy and steroids. One third of patients received Tocilizumab.

6. **Policy Implications and Recommendations**

- Fatigability, breathlessness and fever were the most common symptoms among patients who succumbed to COVID-19. Most of these patients had fatiguability and breathlessness. Tiredness/ fatiguability may be surrogate of breathlessness and hence it is important to include this in the IEC campaign so that we can pick 'at risk' individuals early.

- Ensuring first point of contact with the health system on time, making test results available at the earliest , early identification of at risk individuals, early initiation of treatment, close monitoring for trigger signs, making all treatment modalities available in all districts are the critical nodes in the trajectory of prevention of mortality. At each node, multiple action points need to be worked out in each district.

- Reverse quarantine should be strengthened.
- Ensuring that all modalities of treatment are available in all districts (including convalescent plasma therapy) .In order to shorten the delay in administration of convalescent plasma, regional plasma banks may be set up .
- Acute coronary events and sudden deterioration in some patients during treatment or during period of convalescence need to be addressed. The use of anticoagulants/antiplatelet drugs for specified duration of time in high risk individuals during convalescence need to be looked into and addressed.
- Making pulse oximetry available at hospitals/ the points of swab collection/field/mobile units so that silent hypoxia can be identified at the earliest. Ensure that pulsi- oximetry is performed in all patients seeking care for ILI/SARI/ARI.
- It should be ensured that all high risk individuals with respiratory symptoms [with or without fever] should be tested for SARS-CoV-2 infection. Pulse oximetry to be universally performed in this group.
- All people above 60 have to be proactively monitored for development of respiratory symptoms [with or without fever]. Mobile units to be deployed to collect nasopharyngeal swabs and to perform pulse oximetry.
- ICU /Ward checklists with intervention triggers need to be used in all patient care areas.

Acknowledgement

Throughout the world the COVID19 epidemic has compelled all health and social development functionaries to look at various aspects influencing day to day lives of each and every one and to find out ways to overcome the adversities.

The Department of Health and Family Welfare has been taking all actions based on the scientific evidence. The Committee constituted of members from the State Public Health unit, State Medical Board, Institutional Medical Boards and State Prevention of Epidemic and Infectious Diseases Cell has done a detailed study of deaths occurred during the epidemic till 30th of June 2020 and submitted the death audit report. Their suggestions are of immense value to improve the response to control the epidemic. All the members have invested huge efforts in spite of their busy schedule and submitted a well-studied report. We appreciate their contribution.

We acknowledge the Superintendents of COVID hospitals, treating physicians, COVID Nodal Offers and District Surveillance Officers for their contribution by sending the reports of the cases and for their valuable inputs during the preparation of the final report.

The facilitation done by the heads of the Department of Medical Education and Director Health Services has assisted in completing the study on time.

The collaborative work of doing death audit, analysis and suggested policy prescriptions reflects the strength of Kerala's Health systems. We earnestly acknowledge the efforts of teams working from the grass roots to the State level..

Dr Rajan Khobragade

Principal Secretary

Health and Family Welfare Department

Government of Kerala

Annexure

Comparison of Kerala's key mortality metrics with other countries

Figure A.1

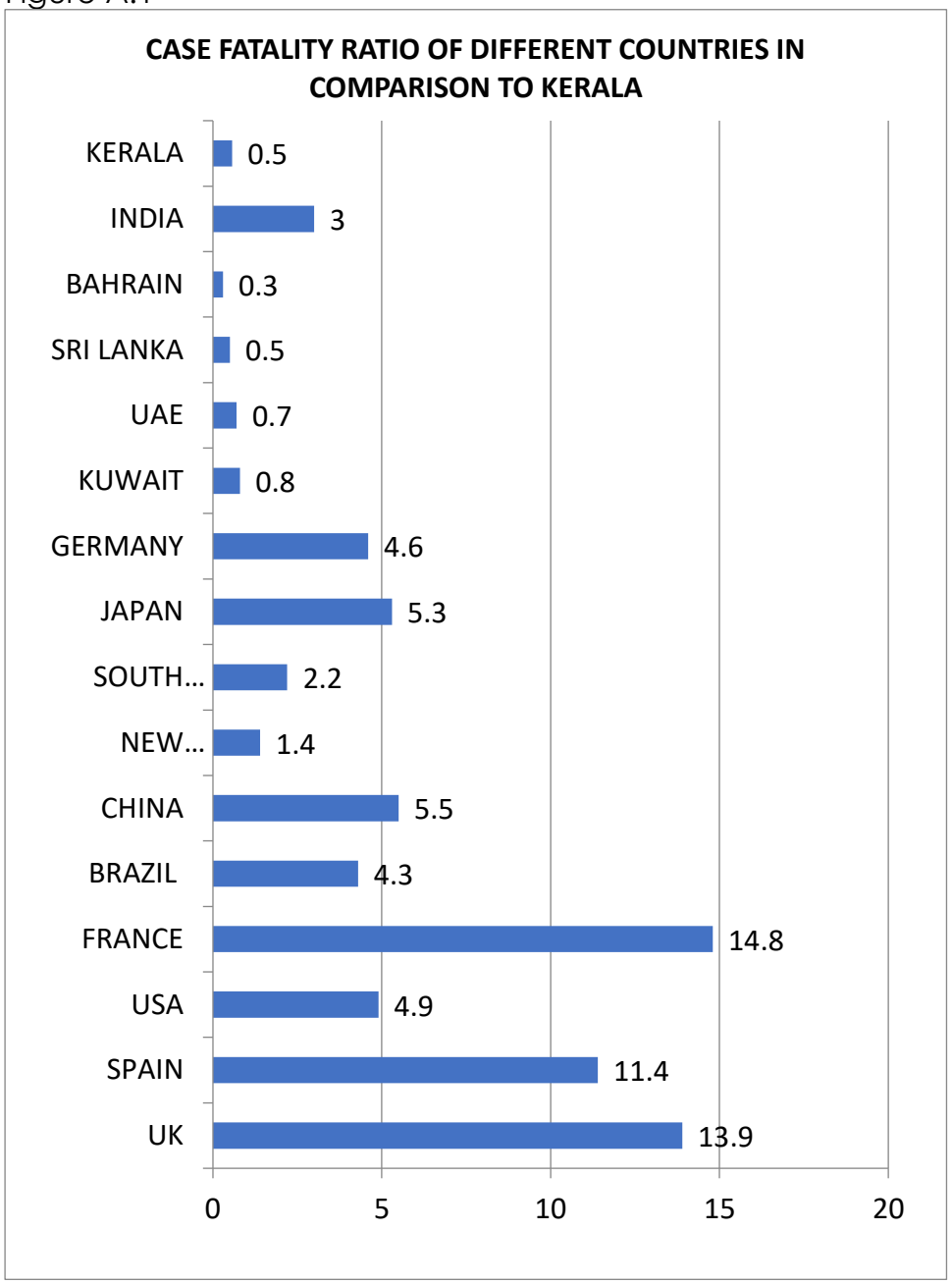


Figure A.2

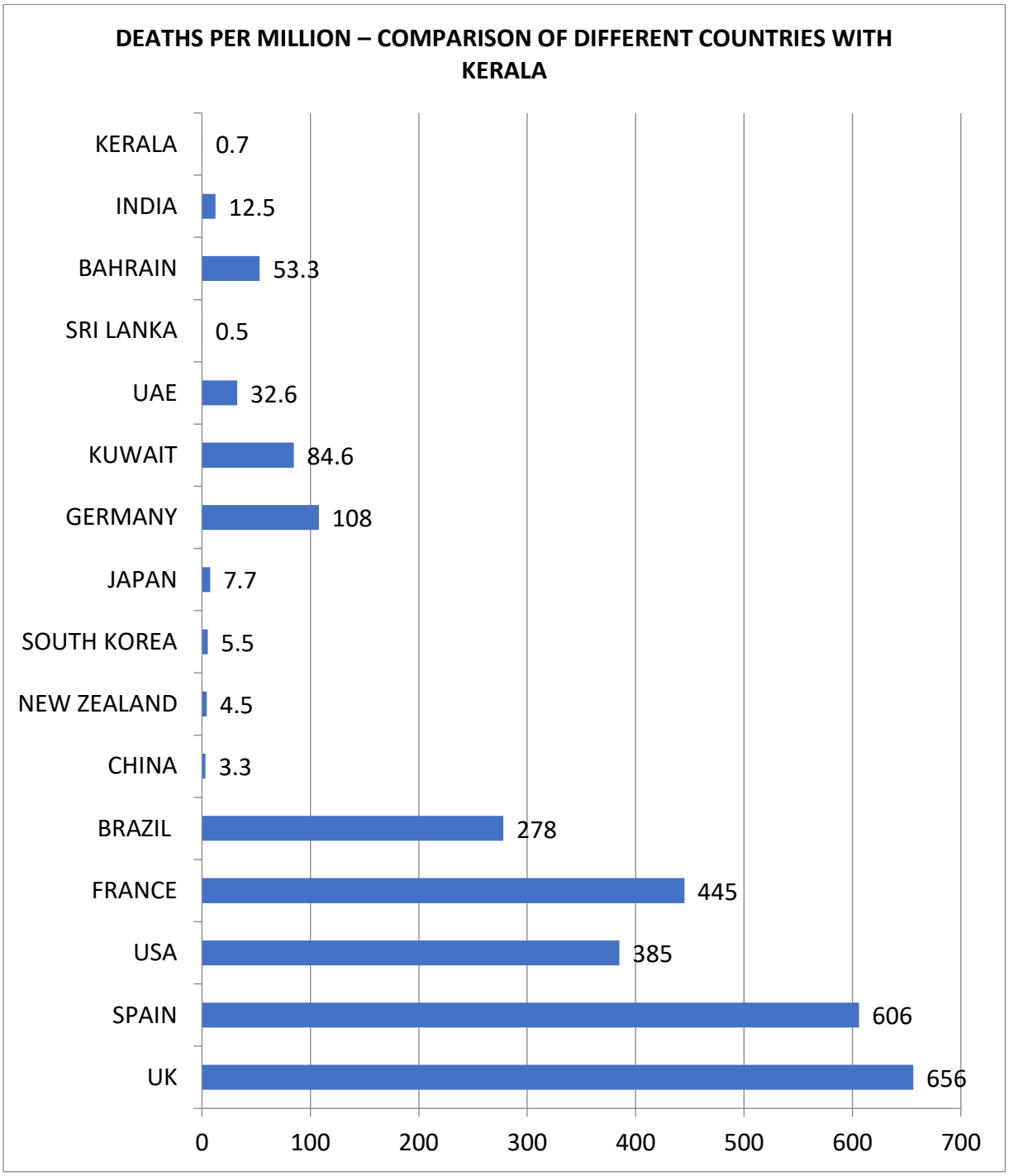

DEATHS PER MILLION – COMPARISON OF DIFFERENT COUNTRIES WITH KERALA
KERALA
0.7
INDIA
12.5
BAHRAIN
53.3
SRI LANKA
0.5
UAE
32.6
KUWAIT
84.6
GERMANY
108
JAPAN
7.7
SOUTH KOREA
5.5
NEW ZEALAND
4.5
CHINA
3.3
BRAZIL
278
FRANCE
445
USA
385
SPAIN
606
UK
656
0
100
200
300
400
500
600
700

Figure A.3

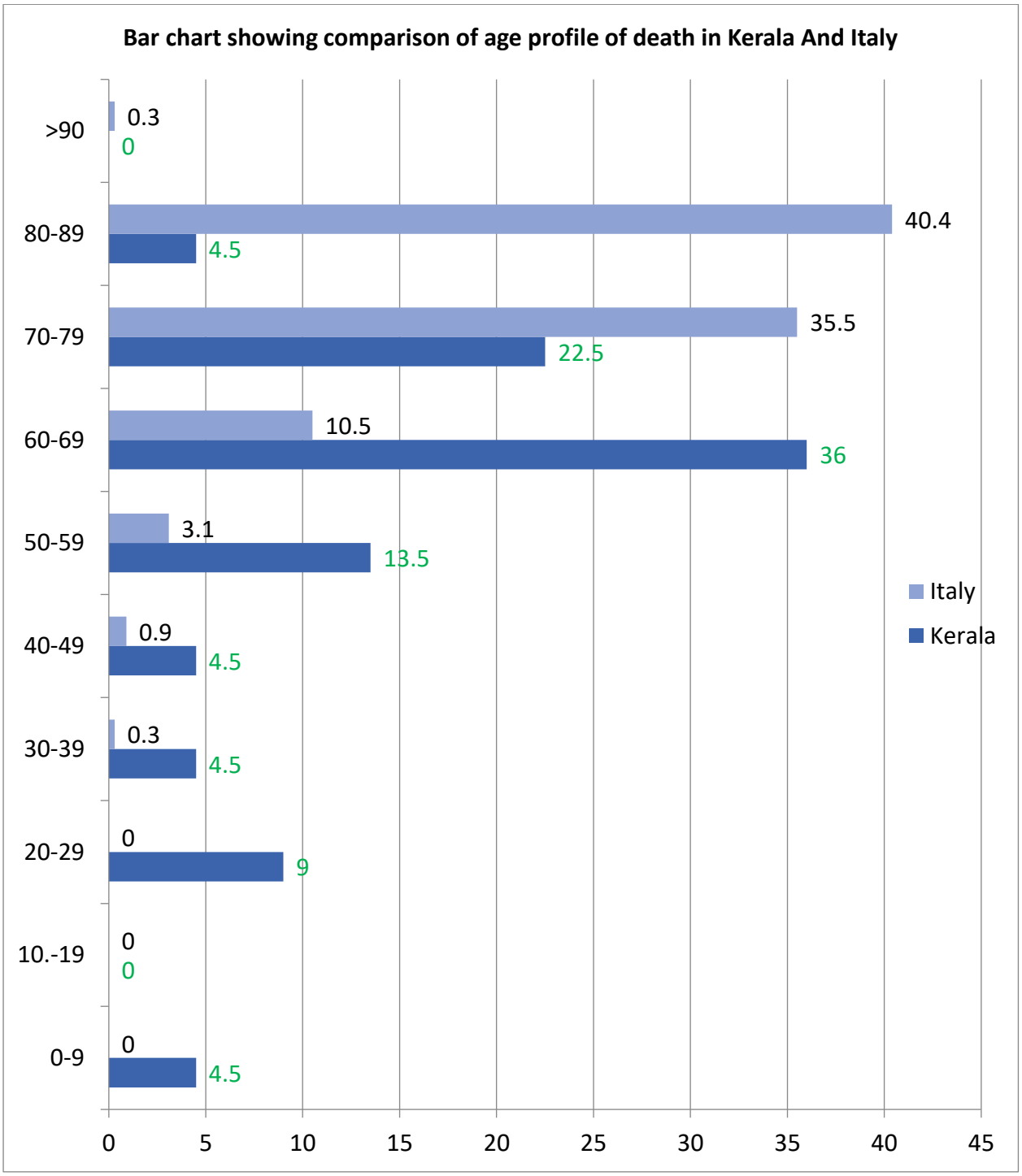
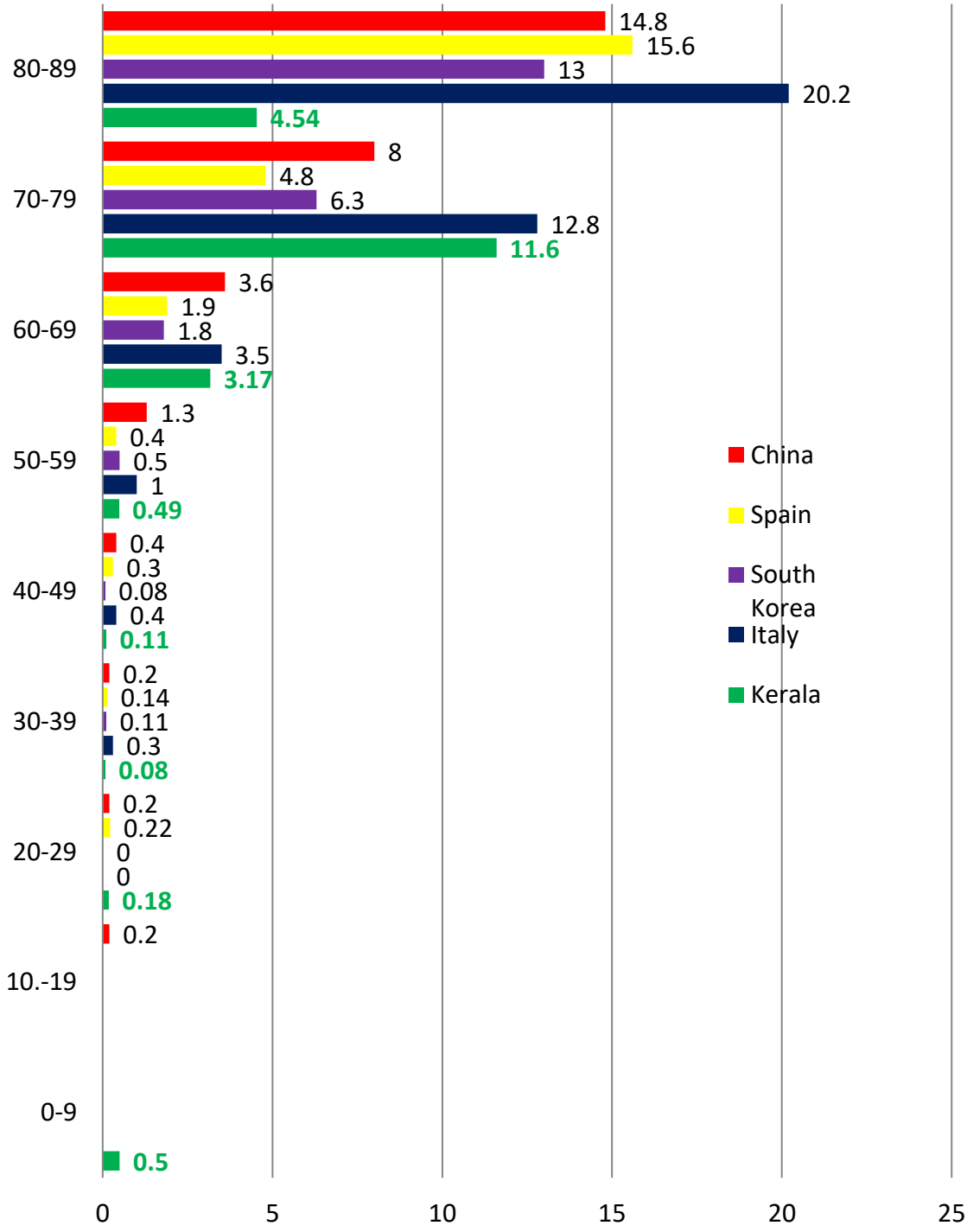

Bar chart showing comparison of age profile of death in Kerala And Italy
>90
80-89
70-79
60-69
50-59
40-49
30-39
20-29
10.-19
0-9
0.3
0
40.4
4.5
35.5
22.5
10.5
36
3.1
13.5
0.9
4.5
0.3
4.5
0
9
0
0
0
4.5
0
5
10
15
20
25
30
35
40
45
Italy
Kerala

Figure A.4 Comparison of Age wise case fatality rate of various countries with Kerala



Annexure B

	State Level Death Audit Team-2020	
Sl. No	Name	Designation
1	Dr.V.Meenakshy	ADHS and State Surveillance Officer
2	Dr. Selvarajan Chettiyar. K.P	Associate Professor, General Medicine, GMC, TVM
3	Dr.Aravind.R	HOD, Infectious Disease Dept, GMC, TVM
4	Dr.Sheeja Sugunan	Assistant Professor, Peadiatrics, GMC, TVM
5	Dr. Jyothi. R	Associate Professor, Microbiology, GMC, TVM
6	Dr. Tony Lawrence	Associate Professor, Community Medicine GMC, TVM
7	Dr. Sheela.S	Assistant Director (PH)
8	Dr. Syam Sundar	Medicine Consultant, General Hospital, TVM
9	Dr. Bennet Xylem	Paediatric Consultant, Coastal Speciality Hospital, Valiyathura, TVM
10	Dr. Renuka	Microbiologist, State PH Lab, TVM
11	DR. Aarathy	State Epidemiologist, IDSP, SSU
12	Dr. Sindhu Sreedhar	JAMO (PH)
	District team	
1	Dr. Jose Dcruz	DSO, Thiruvananthapuram
2	Dr R Sandhya	DSO, Kollam
3	Dr. Nandini C.S	DSO, Pathanamthitta
4	Dr.Sushama P.K.	DSO, Idukki
5	Dr Rajan K.R	DSO, Kottayam
6	Dr. Deepthy	DSO, Alappuzha
7	Dr. Sreedevi S	DSO, Ernakulam
8	Dr.Anoop T.K	DSO, Trissur
9	Dr. K A Nazar	DSO, Palakkad
10	Dr. Nandakumar	DSO, Malappuram
11	Dr. ASHADEVI	DSO, Kozhikkode
12	Dr. Soumya	DSO, Wayanad
13	Dr. Shaj MK	DSO, Kannur
14	Dr.Manoj.AT	DSO, Kasaragode

The analysis and reporting Team

1	Dr.Indu P S	Professor and HoD, Community Medicine, GMC, Tvm & State PEID Cell Co-ordinator
2	Dr.A.Santhosh Kumar	Professor and HoD Paediatrics, GMC TVM, Chairperson State Medical Board
3	Dr Aravind R	HoD Department of Infectious Diseases, GMC, TVM. Member State Medical Board
4	Dr Chandini	Professor of Medicine, GMC Kozhikode, Member State Medical Board

5	Dr Indu D	Associate Professor, Community Medicine, GMC Tvm
6	Dr Gadha Utthaman	Jr Resident, Community Medicine, GMC TVM
7	Dr Pranav Vasisht	Jr Resident, Community Medicine, GMC TVM

Contribution from :

1	Dr Ramla Beevi	Director of Medical Education
2	Dr Thomas Mathew	Joint Director of Medical Education (M)
3	Dr Harikumaran Nair	Special Officer, DME
4	Dr Nazin	Consultant Physician, General Hospital , Pathanamthitta.
5	Dr Latha	Junior Consultant in Medicine, District Hospital, Kannur
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7	Dr Harikrishnan	Associate Professor, Infectious Disease, Kottayam
8	Dr Jayasree	Professor, Community Medicine, Govt Medical College, Kannur
9	Dr Juby John	Assistant Professor, Infectious Diseases, GMC, Alappuzha
10	Dr Habeeb Naseem	Superintendent, GMC Kollam
11	Dr Zinia Nujum	Associate Professor, Community Medicine, GMC Kollam
12	Dr Rajesh	Nodal officer, GMC Thrissur
13	Dr Sheela Mathew	Professor, Infectious Diseases, GMC, Kozhikode
14	Dr Rajendran	Principal, GMC Kozhikode
15	Dr Shinas Babu	Nodal Officer, GMC Manjeri
16	Dr Sundeep	Superintendent, GMC Kannur