Critical care bed capacity of Bangladesh: A Pre and Post COVID-19 pandemic survey
Mohammad Omar Faruq1*, Mohammed Salah Uddin2
DOI: https://doi.org/10.3329/bccj.v10i2.62200

Abstract:
Background: Intensive care unit (ICU) is the backbone of critical care service delivery in a hospital. Bangladesh has been lagging behind in critical care service delivery since first ICU was established in 1978. In 2017-19 an international study reported that Bangladesh had 0.7 Critical care (ICU and HDU) bed per one lac population. This was quite low compared to South Asian countries. Growth of critical care beds across our country has been reported to be heterogeneous. The aim of this survey is to determine current strength and growth of critical care beds before the beginning of recent COVID pandemic and also at the height of pandemic when additional COVID ICUs and HDUs were introduced.

Method: Data on number of ICUs and HDUs and their bed strength were obtained from different web sites of Govt. of Bangladesh as well through personal communication. Number of critical care beds were calculated at national and district level as number per one lac population. Ratio of critical care beds expressed in percentage with number of hospital beds in the hospital were calculated at national level. Data were also obtained on COVID ICU and HDU beds which were introduced temporarily from websites of ministry of Health, Govt. of Bangladesh.

Results: As of now we documented (pre COVID pandemic) 2139 ICU beds (965 in Govt. hospitals) and 717 HDU beds (315 in Govt. hospitals) among 208 hospitals (Govt. hospitals 79+ Private hospitals 129) during our survey. Number of critical care beds per one lac population across the country is found to be 1.70. In hospitals with critical care beds the average ratio of critical care beds (ICU+HDU) beds compared to hospital beds is 4.34% across the country. Thirty eight of total 64 districts have no critical care facility (non COVID/pre COVID) in their local hospitals. During peak of pandemic Govt. of Bangladesh introduced and approved 1186 COVID ICU beds, 695 COVID HDU beds both at Govt. and private level on temporary basis in different hospitals including in some critical care deprived hospitals.

Conclusion: Our survey concludes that growth and distribution of critical care beds (ICUs + HDUs) across Bangladesh is still heterogeneous and very much inadequate compared to the critical care need of the population. There was a temporary surge of new ICUs and HDUs to serve COVID patients at the height of COVID pandemic across the country. Health care planners of the country need to plan for developing adequate critical care man power as well as establish newer critical care facilities among existing hospitals who lack them.

Keywords: Critical care bed, COVID-19 pandemic, Bangladesh.

Introduction:
Critical Care Medicine (otherwise called Intensive care medicine) has been an officially recognized specialty in Bangladesh since 2007. In 1971 no Intensive Care Unit (ICU) existed in Bangladesh at the time of its independence. Critical care services were unknown in Bangladesh until 1978 when first officially recognized ICU was established at National Institute of cardiovascular disease, Dhaka.

Task force of World Federation of Societies of Intensive and Critical care Medicine (WFSICCM) has defined ICU and HDU (High Dependency Unit) as follows1.

An ICU is a defined geographic area of hospital and organized system for provision of care to critically ill patients that provide intensive and specialized medical and nursing care, an enhanced capacity for monitoring and multiple modalities of physiologic organ support to sustain life during a period of acute organ system insufficiency.

HDU otherwise called intermediate care unit in some countries is defined by WFSICCM task force as a dedicated space within the hospital with a higher nurse to patient ratio than a regular ward, equipped to monitor vital signs and oxygen saturation intensively and electrocardiogram continuously and to provide noninvasive ventilation, short term invasive mechanical ventilation or simple mechanical ventilation for stable chronically ventilated patients. Official definition of ICU and HDU in Bangladesh is similar to the above definition. For the purpose of our study we have accepted the above definitions by WFSICCM.

First reported study on critical care bed capacity in Bangladesh was published in 20102. The study was done in
COVID pandemic which started first in China in Dec 2019. ICOUs and HDUs established during the peak of preexisting critical care bed capacity in Bangladesh. As such ill COVID patients during pandemic period over and above critical care bed capacity incurred to accommodate critically pandemic period also involved estimation of additional Our survey of critical care bed capacity in pre and post welfare published data regarding COVID dedicated facilities Director General of Health, Ministry of Health and family During recent COVID pandemic, Directorate of health under in Bangladesh. The report also claimed that that private health care run hospitals and 1000 ICU beds in privately run hospitals in Bangladesh. Islam MT et al reported in 2020 that there were 432 ICU beds under Govt. run hospitals and it included 110 beds outside city of Dhaka. The report also claimed that that private health care sector had additional 737 additional ICU beds for the whole population of the country. Up till now there is no accurate and dependable data regarding critical care services documenting number of ICUs and HDUs in Bangladesh. During recent COVID pandemic, Directorate of health under Director General of Health, Ministry of Health and family welfare published data regarding COVID dedicated facilities including COVID ICUs. Our survey of critical care bed capacity in pre and post pandemic period also involved estimation of additional critical care bed capacity incurred to accommodate critically ill COVID patients during pandemic period over and above preexisting critical care bed capacity in Bangladesh. As such we have aimed in surveying current critical care bed capacity in Bangladesh keeping in mind estimation of temporary COVID ICUs and HDUs established during the peak of COVID pandemic which started first in China in Dec 2019. Methods of Survey We conducted for the first time in Bangladesh an extensive survey on critical care bed capacity of Bangladesh including number of functioning ICUs and HDUs keeping in mind the bed capacity just before the COVID pandemic and extended bed capacity during the peak of pandemic. The survey period was during the month of May 2022 assuming that COVID pandemic in Bangladesh was over at the beginning of 2022. Only adult ICUs and HDUs were surveyed. Coronary care unit (CCU), Surgical, Pediatric ICU and Neonatal ICU were excluded from the survey. First of all we went through different websites of Ministry of health and family welfare Govt. of Bangladesh: www.mohfw.gov.bd, www.hospitaldghs.gov.bd, www.dghealth.gov.bd and obtained information on number of documented ICUs with number of critical care beds in different Govt. hospitals and private hospitals under different districts. During COVID pandemic web sites from ministry of Health, Govt. of Bangladesh published number of COVID ICU beds in addition to number of dedicated COVID general beds in Govt. and privately run hospitals across the country. These data are described separately in our survey. We found on Google search, websites of different private hospitals including some hospitals undocumented in Govt. database and obtained relevant information on critical care facilities. We also used personal contact at different districts and obtained relevant information on phone from different local physicians. Relevant information on number of ICU beds were tabulated under headings of Govt. and private, under different headings of districts which were tabulated under headings of different administrative divisions. Total number of ICU beds and HDU beds, total number of hospitals with critical care facilities and their general bed facilities in the whole country were documented Number of hospital beds and critical care beds per one lac (hundred thousand) population were calculated. Ratio of critical care beds to total hospital beds with critical care facilities expressed as percentage and ratio of critical care beds with total hospital beds in general across the country expressed as percentage were also calculated. Data were obtained from web site of Govt. of Bangladesh (www.dghs.gov.bd) on introduction of new COVID dedicated ICUs and HDUs across the country during the peak of COVID pandemic (2020 - 2021). Last of all number of critical care beds per one lac population in each of 64 districts of Bangladesh were calculated in a separate table. RESULTS OF THE SURVEY: CRITICAL CARE BED CAPACITY FROM DIVISION TO DISTRICT LEVEL JUST BEFORE COVID-19 PANDEMIC Number of Govt. Hospitals, Govt. hospital bed strength and number of Govt. ICU beds & Govt. HDU beds are expressed in bold. Remaining are private hospitals, private ICU beds and private HDU beds. Population of districts and divisions as per population projection by www.citypopulation.de/en/bangladesh/cities were noted. SYLHET Division: Hospitals with ICU/HDU-15-(4+11) in 4 districts ICU beds-137 (48+89), HDU beds-34 (14+20), Total population-12436000. General bed strength in 15 hospitals 4865 (2400+2465)
A) Habiganj district- Hospitals with ICU- 0, Population- 2640000
B) Moulvibazar district - Hospitals with ICU-2 (1+1), ICU beds- 8 (6+2).
Population- 2324000
Govt Hospital:
1) 250 bed Sadar Hospital.
ICU- 6 beds. Hospital beds 250
Private Hospital:
1. Life Line Hospital & Cardiac Center, Srimongol
ICU-2 beds. Hospital beds 40
C) Sunamgonj district-Hospitals with ICU-0, Population- 3091000
D) Sylhet district-Hospitals with ICU- 13 (3+10), ICU beds- 129 (42+87), HDU beds 34 (14+20), Population- 4408000.
See Table 1 for details.
DHAKA Division:
Hospitals with ICU/HDU - 111 (30+81), ICU beds - 1335 (573+762), HDU beds - 483 (206+277) in 13 districts. Total population- 42607000. General bed strength in 111 hospitals 38450 (17335+21115)
A) Dhaka district- Hospitals with ICU/HDU- 96 (22+74), ICU beds- 1201 (487+714), HDU beds – 447 (188+259), Population- 13798000
See Table 2 for details.
B) Faridpur district- Hospitals with ICU/HDU - 2 (2+0), ICU beds- 26 (16+10), HDU beds - 6 (6+0). Population- 2201000
Govt. Hospital:
1. Faridpur Medical College Hospital
ICU-16 beds. Hospital beds 650
2. Bangobandhu Sheikh Mujib Medical College Hospital, Faridpur
ICU-10 beds, HDU-6 beds. Hospital beds 500
Private Hospital: 00
C) Gazipur district- Hospitals with ICU-3 (1+2), ICU beds- 22 (10+12).Population- 4046000
Govt Hospital:
1. Shahid Tazuddin Medical College Hospital.
ICU-10 beds. Hospital beds 250
Private Hospital:
1. Dhaka Imperial Hospital, Tongi
ICU-7 beds. Hospital beds 80.
2. International Medical College Hospital.
ICU- 5 beds, Hospital beds 250
D) Gopalganj district- Hospitals with ICU-1 (1+0), ICU beds- 10 (10+0). Population- 1346000
Govt Hospital:
1. Gopalganj General Hospital
ICU-10 beds. Hospital beds 250
Private Hospital: 00
E) Kishoreganj district. Hospitals with ICU/HDU -2 (1+1), ICU beds- 18 (10+8), HDU beds - 15 (15+0). Population- 3648000
Govt Hospital:
1. Shaheed Sayed Nazrul Islam Medical College Hospital,
ICU-10 beds, HDU -15 beds. Hospital beds 250
Private Hospital:
1. Jahurul Islam Medical College & Hospital
ICU-8 beds. Hospital beds 500
F) Madaripur district. Hospitals with ICU- 0, Population- 1393000
G) Manikganj- Hospitals with ICU-2 (1+1), ICU beds- 7 (4+3). Population- 1640000
Govt Hospital:
1. Manikgonj General Hospital
ICU- 4 beds. Hospital beds 250
Private Hospital:
1. Monno Medical College Hospital.
ICU- 3 beds. Hospital beds 500.
H) Munshigonj district. Hospitals with ICU- 0, Population- 1669000
I) Narayanganj district- Hospitals with ICU-1 (0+1), ICU beds- 10 (0+10), HDU beds 4(0+4) Population- 3490000
Govt Hospital: 00
Private Hospital:
1. Proactive Medical College Hospital
ICU-10 beds, HDU- 4 beds Hospital beds 450
J) Narsingdi district- Hospitals with ICU- 0, Population- 2685000
K) Rajbari district -Hospitals with ICU- 0, Population- 1385000
L) Shariatpur- district. Hospitals with ICU- 0, Population- 4105000
M) Tangail district- Hospitals with ICU/HDU-3 (2+1), ICU beds- 30 (22+8), HDU beds -4 (4+0), Population- 250 Beded General Hospital, Tangail
ICU-10 beds. Hospital beds 250
2. CMH, Ghatail
ICU- 12 beds, HDU -4 beds. Hospital beds 300
Private Hospital
1. Kumudini Womans Medical College Hospital
   ICU-8 beds. Hospital beds 500

CHATTOGRAM Division:
Hospitals with ICU/HDU-35 (10+25), ICU beds-376 (141+235), HDU beds-84 (32+52), in 11 districts. Population-34747000. General bed strength in 35 hospitals 8975 (4100+4875)
A) Bandarban district. Hospitals with ICU- 0, Population-469000
B) Brahmanbaria district. Hospitals with ICU-0, Population-3617000
C) Chandpur district Hospitals with ICU-0, Population-2929000
D) Chattogram district. Hospitals with ICU/HDU-25 (5+20), ICU beds-268 (71+197), HDU beds-67 (20+47), Population- 8990000.
E) Cumilla district- Hospitals with ICU/HDU-7 (2+5), ICU beds-76 (38+38), HDU beds-13 (8+5), Population-6559000

Govt Hospital:
1. Cumilla Medical College Hospital
   ICU- 20 beds. Hospital beds 500
2. CMH, Cumilla
   ICU-18 beds, HDU -8 beds . Hospital beds 300

Private Hospital:
1. Cumilla Moon Hospital:
   ICU- 10 beds. Hospital beds 150
2. Cumilla Trauma Hospital
   ICU-11 beds. Hospital beds 50
3. Cumilla Medical Center
   ICU- 5 beds. Hospital beds 30
4. CD Path Hospital
   ICU-5 beds. Hospital beds 40
5. Central Medical College Hospital
   ICU- 7 beds, HDU-5 beds . Hospital beds 250

F) Cox’s Bazar district. Hospitals with ICU/HDU- 2 (2+0), ICU beds- 22 (22+0), HDU beds - 4 (4+0), Population-2979000

Govt. Hospital:
1. Cox’s Bazar General Hospital: (Cox’s Bazar)
   ICU- 10 beds Hospital beds 250
2. CMH Ramu(Cox’s Bazar)
   ICU-12 beds, HDU-4 beds. Hospital beds 300

Private Hospital: 00

G) Feni district. Hospitals with ICU- 1 (1+0), ICU beds- 10 (10+0), Population- 1754000

Govt Hospital:
1. Feni General Hospital
   ICU- 10 beds. Hospital beds 250

Private Hospital: 00

H) Khagrachari district. Hospitals with ICU- 0, Population-738000
I) Laksmipur district Hospitals with ICU- 0, Population-2223000
J) Noakhali district. Hospitals with ICU- 0, Population-3799000
K) Rangamati district Hospitals with ICU- 0, Population-690000

MYMENSINGH Division:
Hospitals with ICU/HDU 5 (2+3), ICU beds-43 (32+11), HDU beds-24 (18+6), in 4 districts. Population-13457000. General bed strength in 5 hospitals 2500 (1650+850)
A) Jamalapur district- Hospitals with ICU- 0, Population-2713000
B) Mymensingh district- Hospitals with ICU/HDU - 5 (2+3), ICU beds- 43 (32+11), HDU beds - 24 (18+6), Population-6378000

Govt Hospital:
1. Mymensingh Medical College Hospital
   ICU- 20 beds, HDU- 12 beds. Hospital beds 1500
2. CMH, Momenshahi
   ICU- 12 beds, HDU - 4 beds. Hospital beds 150

Private Hospital:
1. Sayeem Clinic & Diagnostic Center
   ICU-4 beds, HDU -6 beds. Hospital beds 100
2. CBMCH
   ICU beds – 5. Hospital beds 650
3. Nexus hospital
   ICU-2 beds. Hospital beds 100

C) Netrokona district Hospitals with ICU-0, Population-2759000
D) Sherpur district -Hospitals with ICU-0, Population-1607000

RAJSHAHI Division:
Hospitals with ICU/HDU-8 (4+4), ICU beds-80 (51+29), HDU beds-26 (6+20), in 8 districts. Population- 21607000. General bed strength in 8 hospitals 3260 (2250+1010)
A) Bogra district. Hospitals with ICU/HDU-4 (2+2), ICU beds-33 (20+13), HDU beds-11 (6+5), Population-3903000

Govt Hospital:
1. Shaheed Ziaur Rahman Medical College Hospital.
   ICU-4 beds . Hospital beds 500
2. CMH, Bogra
   ICU-16 beds, HDU-6 beds. Hospital beds 500
Private Hospital:
1. Tesla General Hospital, Bogra
   ICU- 3 beds Hospital beds 40
2. TMSS Medical College Hospital
   ICU-10 beds, HDU -5 beds. Hospital beds 500
B) Jaipurhat district - Hospitals with ICU- 0, Population-1042000
C) Naogaon district- Hospitals with ICU- 0, Population-2977000
D) Natore district- Hospitals with ICU- 0, Population-1956000
E) Chapai Nawabganj district - Hospitals with ICU- 0, Population-2003000
F) Pabna district - Hospitals with ICU- 1 (1+0), ICU beds- 4 (4+0), Population-3019000
Govt. Hospital:
1. Pabna General Hospital
   ICU- 4 beds. Hospital beds 250
Private Hospital: 00
G) Rajshahi district - Hospitals with ICU/HDU - 2 (1+1), ICU beds- 33 (27+6), HDU beds - 5 (0+5), Population-3000000
Govt Hospital:
1. Rajshahi Medical College Hospital
   ICU- 27 beds. Hospital beds 1500
Private Hospital:
1. CDM Hospital
   ICU-6 beds, HDU-5 beds. Hospital beds 70
H) Sirajgonj district-Hospitals with ICU/HDU-1 (0+1), ICU beds- 10 (0+10), HDU beds - 10 (0+10), Population-3707000
Govt Hospital: 00
Private Hospital:
1. KhajaYunus Ali Medical College Hospital
   ICU- 10 beds, HDU -10 beds. Hospital beds 400
BARISAL Division:
Hospitals with ICU/HDU - 2 (2+0), ICU beds- 22 (22+0), HDU beds- 5 (5+0), in 6 districts. Population- 9713000. General bed strength in 2 hospitals 1300 (1300 + 0)
A) Barguna district- Hospitals with ICU- 0, Population-1013000
B) Barisal district- Hospitals with ICU/HDU-2 (2+0), ICU beds-22 (22+0), HDU beds-5 (5+0), Population-2776000
Govt Hospitals:
1. Sher –e Bangla Medical College Hospital (Barisal)
   ICU-10 beds. Hospital beds 1000
2. CMH, Barisal (Barisal)
   ICU-12 beds , HDU-5 beds. Hospital beds 300
Private Hospital: 00
C) Bhola district- Hospitals with ICU- 0, Population-2057000
D) Jhalokati district- Hospitals with ICU- 0, Population-778000
E) Patuakhali district - Hospitals with ICU- 0, Population-1823000
F) Pirojpur district - Hospitals with ICU- 0, Population-1266000
RANGPUR Division:
Hospitals with ICU/HDU-6 (4+2), ICU beds-62 (44+18), HDU beds-7 (7+0), in 8 districts, Total population- 18868000. General bed strength in 6 hospitals 3450 (2400+1050)
A) Dinajpur district-Hospitals with ICU-1 (1+0), ICU beds-10 (10+0), Population-3430000
Govt Hospital:
1. DinajpurM. Abdur Rahim Medical College Hospital
   ICU- 10 beds. Hospital beds 500
Private Hospital: 00
B) Gaibandha district -Hospitals with ICU- 0, Population-2975000
C) Kurigram district-Hospitals with ICU- 0, Population-2464000
D) Lalmonirhat district-Hospitals with ICU- 0, Population-2150000
E) Nilphamari district- Hospitals with ICU/HDU-1 (1+0), ICU beds-7 (7+0), HDU beds-2 (2+0), Population-2204000
Govt Hospital:
1. CMH, Saidpur
   ICU-7 beds, HDU -2 beds. Hospital beds 150
Private Hospital: 00
F) Panchagarh district -Hospitals with ICU- 0, Population-1188000
G) Rangpur district- Hospitals with ICU/HDU -4 (2+2), ICU beds- 45 (27+18), HDU beds-5 (5+0), Population-3439000
Govt Hospitals:
1. Rangpur Medical College Hospital
   ICU- 10 beds. Hospital beds 150
2. CMH Rangpur
   ICU- 17, HDU – 5 beds. Hospital beds 300
Private Hospital:
1. Prime Medical College Hospital
   ICU-6 beds. Hospital beds 500
2. Community Medical College Hospital
   ICU-12 beds. Hospital beds 500
H) Thakurgaon district - Hospitals with ICU- 0, Population- 1668000

KHULNA Division:
Hospitals with ICU/HDU- 8 (5+3), ICU beds - 75 (54+21), HDU- 37 (27+10), in 10 districts Total population- 18217000. General bed strength in 8 hospitals 2250 (1700+550)

A) Bagerhat district - Hospitals with ICU- 0, Population- 1675000
B) Chuadanga district- Hospitals with ICU- 0, Population- 1299000
C) Jessore district- Hospitals with ICU/HDU -1 (1+0), ICU beds- 20 (20+0), HDU beds 15 (15+0), Population- 3182000

Govt Hospital:
1. CMH, Jessore
   ICU-20 beds, HDU – 15 beds. Hospital beds 500

Private Hospital: 00

D) Jhenaidah district- Hospitals with ICU- 0, Population- 2111000

E) Khulna districts- Hospitals with ICU/HDU -5 (3+2), ICU beds- 42 (26+16), HDU beds -14 (4+10), Population- 2650000

Govt Hospital:
1. Khulna Medical College Hospital
   ICU- 4 beds. Hospital beds 500
2. Shaheed AbuNaser Specialized Hospital
   ICU-10 beds. Hospital beds 250
3. Navy Hospital Upasham
   ICU-12 beds, HDU-4 beds. Hospital beds 100

Private Hospital:
1. Khulna City Medical College Hospital
   ICU-10 beds, HDU -10 beds. Hospital beds 250
2. Gazi Medical College Hospital
   ICU-6 beds. Hospital beds 250

F) Kustia district- Hospitals with ICU- 0, Population- 2318000

G) Magura district- Hospitals with ICU- 0, Population- 1091000

H) Meherpur district- Hospitals with ICU- 0, Population- 750000

I) Narail district- Hospitals with ICU- 0, Population- 856000

J) Satkhira district. Hospitals with ICU/HDU -2 (1+1), ICU beds- 13 (8+5), HDU-8 (8+0), Population- 2285000

Govt Hospital:
1. Satkhira Medical College Hospital
   ICU-8 beds. HDU-8 beds. Hospital beds 350

Private Hospital
1. China Bangla Hospital
   ICU- 5 beds. Hospital beds 50

Table 1

| District: Sylhet | Name of hospital                                    | ICU beds | HDU beds | Total hospital beds |
|------------------|-----------------------------------------------------|----------|----------|---------------------|
| Govt.            |                                                     |          |          |                     |
| 1.               | Sylhet M.A.G Osmani Medical College and Hospital    | 12       | 8        | 1500                |
| 2.               | Shaheed Shamsuddin Ahmed Hospital                    | 16       | -        | 250                 |
| 3.               | CMH Sylhet                                           | 16       | 6        | 300                 |
| Private.         |                                                     |          |          |                     |
| 1.               | Ibn Sina Medical College and Hospital                | 6        | 4        | 50                  |
| 2.               | Al- Haramain Hospital                                | 10       | 8        | 250                 |
| 3.               | Nur- Jahan Hospital                                  | 4        | 0        | 35                  |
| 4.               | Mount Adora Hospital                                 | 8        | 4        | 250                 |
| 5.               | North East Medical College and Hospital              | 14       | 0        | 500                 |
| 6.               | Women’s Medical College and Hospital                 | 10       | 4        | 500                 |
| 7.               | Jalalabad Ragib Rabeya Hospital                      | 16       | 0        | 500                 |
| 8.               | Park View Medical College Hospital                   | 10       | 0        | 250                 |
| 9.               | Al- Rayan Hospital                                   | 4        | 0        | 50                  |
| 10.              | Oasis Hospital                                       | 5        | 0        | 40                  |

Table 2

| District: Dhaka | Name of hospitals                                    | ICU beds | HDU beds | Total hospital beds |
|-----------------|-----------------------------------------------------|----------|----------|---------------------|
| Govt.           |                                                     |          |          |                     |
| 1.              | BSMMU                                               | 21       | 16       | 1500                |
| 2.              | Shaheed Shawardy Medical Hospital                    | 10       | -        | 850                 |
| 3.              | DMCH                                                | 32       | -        | 2500                |
| 4.              | Sir Salimullah Medical College Mitford Hospital      | 10       | -        | 850                 |
| 5.              | NIDCH                                               | 8        | 5        | 685                 |
| 6.              | NINS                                                | 12       | 8        | 500                 |
| 7.              | CMH Dhaka                                            | 111      | 70       | 1650                |
| No. | Hospital Name                                           | Beds | Charges |
|-----|--------------------------------------------------------|------|---------|
| 1.  | United Hospital                                        | 16   | 450     |
| 2.  | Evarcare Hospital                                      | 12   | 425     |
| 3.  | Square Hospital                                         | 28   | 400     |
| 4.  | Lab Aid Hospital                                        | 14   | 250     |
| 5.  | Green Life Hospital                                    | 10   | 550     |
| 6.  | Comfort Hospital                                        | 8    | 80      |
| 7.  | Dhamondi Clinic                                        | 7    | 30      |
| 8.  | SIBL Hospital                                           | 6    | 100     |
| 9.  | Anwar Khan Modern Hospital                             | 10   | 750     |
| 10. | BRB Hospital                                            | 9    | 320     |
| 11. | BIRDEM General Hospital                                | 34   | 800     |
| 12. | SFMMKPJ Specialized Hospital                           | 4    | 250     |
| 13. | Brighton Hospital                                       | 8    | 50      |
| 14. | IBN Sina Hospital                                      | 12   | 312     |
| 15. | Popular Medical College Hospital                        | 26   | 500     |
| 16. | Eden Multicare Hospital                                | 6    | 50      |
| 17. | Euro Bangla Hospital                                   | 6    | 60      |
| 18. | City Hospital                                           | 6    | 100     |
| 19. | Japan Bangladesh Hospital                              | 7    | 4       |
| 20. | Renaissance hospital                                    | 10   | 40      |
| 21. | Super clinic & Diagnostics, Savar                      | 10   | 150     |
| 22. | Sikder Medical College Hospital                        | 14   | 500     |
| 23. | Millenium Hospital                                     | 8    | 4       |
| 24. | Central Hospital                                        | 6    | 4       |
| 25. | Centre for Kidney Disease & Urology Hospital           | 8    | 4       |
| 26. | Impulse Hospital                                        | 15   | 10      |
| 27. | BIHS                                                   | 8    | 8       |
| 28. | Asgar Ali Hospital                                     | 12   | 4       |
| 29. | Monwara Hospital                                       | 4    | 60      |
| 30. | Rushmono Hospital                                      | 8    | 4       |
| 31. | Marks Medical College Hospital                         | 8    | 320     |
| 32. | High Tech Multi Care Hospital                          | 4    | 6       |
| 33. | US Bangla Medical College Hospital                     | 10   | 250     |
| 34. | Samorita Hospital                                      | 6    | 4       |
| 35. | Dhaka Central International Medical College & Hospital | 10   | 300     |
| 36. | Central Police Hospital, Rajarbag                      | 15   | 15      |
| 37. | Abeda Memorial Hospital                                | 6    | 8       |
| 38. | Uttara Crescent Hospital                               | 6    | 11      |
| 39. | Lubana General Hospital                                | 6    | 4       |
| 40. | Cardiocare Hospital                                    | 10   | 100     |
| 41. | Hi Tech Care General Hospital                          | 10   | 40      |
| 42. | Uttara Adhunik Medical College & Hospital              | 13   | 4       |
| 43. | Shaheed Monsur Ali Medical Hospital                    | 10   | 500     |
| 44. | Islami Bank Hospital                                   | 12   | 232     |
| 45. | JahanAra Clinic                                        | 6    | 125     |
| 46. | Metropolitan Hospital, Mohakhali                       | 10   | 100     |
| Private/ Govt. | Name of hospitals | ICU beds | HDU beds | Total hospital beds |
|---------------|-------------------|----------|----------|---------------------|
| Govt.         | CMCH              | 20       | -        | 1500                |
|               | Chattogram General Hospital | 18 | 6 | 250          |
|               | BITI Hospital     | 5        | -        | 100                 |
|               | CMH Chattogram    | 20       | 10       | 500                 |
|               | Navy Hospital, Potenga | 5 | - | 100          |
| Private       | Medical Centre    | 10       | -        | 150                 |
|               | Metropolitan Hospital | 8 | - | 100          |
|               | National Hospital | 10       | -        | 100                 |
|               | Max Hospital      | 5        | 5        | 100                 |
|               | Ma & Shishu Medical College Hospital | 18 | 6 | 500          |
|               | Diabetic Society Hospital | 6 | 4 | 50       |
|               | USTC              | 10       | 4        | 750                 |
|               | Surgiscope Hospital | 6 | 4 | 60       |
|               | Marine City Medical College Hospital | 10 | - | 250          |
|               | CSCR              | 6        | -        | 100                 |
|               | Imperial Hospital Limited | 27 | 11 | 400    |
|               | Evercare Hospital, Chattogram | 16 | 8 | 350          |
|               | Max Hospital Chattogram | 10 | - | 200          |
|               | Ctg International Medical College Hospital | 5 | - | 350          |
|               | Royal Hospital    | 8        | -        | 50                  |
|               | Shevron Hospital  | 5        | -        | 65                  |
|               | CSTC Hospital     | 5        | 5        | 30                  |
|               | Diabetes Hospital, Chattogram | 10 | - | 500          |
|               | Park view Hospital | 14 | - | 200          |
|               | Holy Crescent Hospital, Chattogram | 10 | - | 50          |

COVİD DEDİCATED CRİTİCAL CARE BEDS DURING PEAK OF COVID PANDEMIC (2020-2021)

As per information posted in web site of Director General, Directorate oh Health, Ministry of Health and family welfare (www.dghs.gov.bd) during the peak of COVID-19 pandemic, announced introduction of 1186 ICU beds (749 govt. + 437
private) and 695 HDU beds (582 govt.+113 private) and 13026 general hospital beds dedicated to COVID care across the country on temporary basis. According to unofficial information all or most of these facilities either became function less or ceased to exist after the pandemic was over in early 2022 both at Govt. or private level.

COVID dedicated critical care beds (both ICU and HDU) were established from the following sources.

A) One and only newly established Govt. hospital named Dhaka City Corporation North (DNCC) COVID-19 Hospital with 212 ICU beds, 288 HDU beds and 554 General beds.

B) Two already existing Govt. hospital with critical care facilities totally converted into COVID hospital eg. Kuwait Bangladesh Moitree Hospital, Sheikh Russell Gastro liver hospital, Dhaka.

C) Non COVID ICU/HDU in Govt. Hospital converted into COVID ICU. Examples include Kurmitola General Hospital, Dhaka.

D) New established COVID ICU/HDUs established in Govt. hospitals without prior non COVID ICU/HDU facilities. Eighteen such Govt. hospitals were provided with new COVID critical care services.

E) Newly established COVID ICU/HDUs in Govt. and private hospitals in addition to existing non COVID ICU/HDU. For example: BSMMU, United Hospital, BIRDEM General Hospital, Ever care Hospital, Square Hospital Dhaka etc.

Critical Care Beds (PRE COVID): Division/District Level per One LAC Population (Table 4)

| Division | Districts | Critical Care Beds (ICU+ HDU) | Critical Care bed ratio per 100000 population |
|----------|-----------|-------------------------------|---------------------------------------------|
| Sylhet   |           |                               |                                             |
|          | Habigonj  | 00 (137+34)                   | 1.37                                        |
|          | Moulvibazar | 8 (8+0)                       | 0.34                                        |
|          | Sunamgonj | 00 (129+34)                   | 3.70                                        |
|          | Sylhet    | 163 (342+500)                 | 4.32                                        |
| Dhaka    |           | 1690 (1219+471)               | 12.24                                       |
|          | Faridpur  | 32 (26+6)                     | 1.45                                        |
|          | Gazipur   | 22 (22+0)                     | 0.42                                        |

3) Chattogram 460 (376+84) 1.32

| Districts | Critical Care Beds (ICU+ HDU) | Critical Care bed ratio per 100000 population |
|-----------|-------------------------------|---------------------------------------------|
| Bandarban | 00 (26+4)                     | 0.87                                        |
| Brahmanbaria | 00 (26+4)                  | 0.87                                        |
| Chandpur  | 00 (10+4)                     | 0.87                                        |
| Chattogram | 335 (268+67)                  | 3.72                                        |
| Cumilla   | 89 (76+13)                    | 1.36                                        |
| Cox’s Bazar | 26 (22+4)                   | 0.87                                        |
| Feni      | 10 (10+4)                     | 0.57                                        |
| Khagyrachari | 00 (26+4)                 | 0.87                                        |
| Laksimpur | 00 (26+4)                     | 0.87                                        |
| Noakhali  | 00 (26+4)                     | 0.87                                        |
| Rangamati | 00 (26+4)                     | 0.87                                        |

4) Mymensingh 69 (45+24) 0.50

| Districts | Critical Care Beds (ICU+ HDU) | Critical Care bed ratio per 100000 population |
|-----------|-------------------------------|---------------------------------------------|
| Jamalpur  | 00 (45+24)                    | 0.50                                        |
| Mymensingh| 69 (45+24)                    | 1.05                                        |
| Netrokona | 00 (45+24)                    | 1.05                                        |
| Sherpur   | 00 (45+24)                    | 1.05                                        |

5) Rajshahi 106 (80+26) 0.49

| Districts | Critical Care Beds (ICU+ HDU) | Critical Care bed ratio per 100000 population |
|-----------|-------------------------------|---------------------------------------------|
| Bogra     | 44 (33+11)                    | 1.13                                        |
| Jaipurhat | 00 (26+6)                     | 1.45                                        |
| Naogaon   | 00 (26+6)                     | 1.45                                        |
| Natore    | 00 (26+6)                     | 1.45                                        |
| Chapainawabgonj | 00 (26+6)              | 1.45                                        |
| Pabna     | 4 (4+0)                       | 0.13                                        |
| Rajshahi  | 38 (33+5)                     | 1.27                                        |
| Sirajgonj | 20 (10+10)                    | 0.54                                        |
6) Barisal 27 (22+5) 0.28
1) Barguna 00 00
2) Barisal 27 (22+5) 0.97
3) Bhola 00 00
4) Jhalokhati 00 00
5) Patuakhali 00 00
6) Pirojpur 00 00

7) Rangpur 69 (62+7) 0.36
1) Dinajpur 10 (10+0) 0.29
2) Gaibandha 00 00
3) Kurigram 00 00
4) Lalmonirhat 00 00
5) Nilphamari 9 (7+2) 0.40
6) Panchagarh 00 00
7) Rangpur 50 (45+5) 1.45
8) Thakurgaon 00 00

9) Khulna 112 (75+37) 0.61
1) Bagerhat 00 00
2) Chuadanga 00 00
3) Jessore 35 (20+15) 1.10
4) Jhenaidah 00 00
5) Khulna 56 (42+14) 2.11
6) Kushthia 00 00
7) Magura 00 00
8) Meherpur 00 00
9) Narail 00 00
10) Satkhira 21 (13+8) 0.92

Total no of ICU beds = 2139 (965 +1174)
Total no of HDU beds = 717 (315+402).
Total no of critical care beds (ICU and HDU combined) in Bangladesh = 2856 (1280 +1576).
Total no of hospital beds (including Govt. and private) in 208 study hospitals = 65100 approx.
Total no of hospital beds in Bangladesh including hospitals with or without critical care facilities (as of 2019) = 143394 (includes 65100 beds of study hospitals).

Population of Bangladesh = 167900000(approx.) as per Worldometer 2022

No of hospital beds per 100000 (one lac) population = 85.4
No of critical care beds-non COVID, per 100000 (one lac) population = 1.70
Percentage of critical care beds among total hospital beds in study hospitals = 4.34%
Percentage of critical care beds among total hospital beds across Bangladesh = 1.97%

Discussion
Bangladesh is a south Asian nation with a population of approx.167900000 (167.9 million) as per Worldometer 2022. It is a lower middle income country with per capita income is 2824 US $. Critical Care bed capacity in Bangladesh is reflected in inadequate number of total hospital beds and it is reflected in our general population.

According to our survey we report 2859 non COVID (Pre COVID) critical care beds (ICU + HDU) for the whole population of our country. We have 1.70 non COVID critical care beds per one lac population as opposed to 85.4 general beds per one lac population in the whole country.

The critical care bed distribution across the country is very much heterogeneous. Dhaka district has the highest non COVID critical care bed concentration (12.32 per one lac population). Districts of Chattogram , Sylhet , Khulna, Faridpur/Rangpur, Cumilla, Rajshahi, Bogra, Jessore, Satkhira and Barishal have 3.72, 3.70, 2.11, 1.45, 1.36, 1.27, 1.13, 1.10, 0.97 and 0.92 critical care beds per one lac population respectively. Out of sixty four districts of Bangladesh thirtyeight districts with total population of 70518000 have no critical care beds within the geographic areas of the districts.

Dhaka district with the highest concentration of critical care non COVID beds with a population of 13798000 has 20 Govt. hospital and 74 private hospitals with critical care facilities . Chattogram district with second highest concentration of critical care beds with a population of 8990000 has 5 Govt. hospitals and 20 Private hospitals with critical care facilities. In order to reach a bench mark (not determined yet) critical care bed capacity Bangladesh need to compare itself with other counties especially with lower middle income countries of Asia.
It is generally accepted that the number of ICU beds as percentage of total number of beds in a hospital shall be between 5% and 12% depending on the level of care offered by the hospital. Lack of critical care beds may result in delayed or refused admissions to ICUs for appropriate patients and increased preventable mortality. Our survey found that there are 4.34% critical care beds among total study hospitals with critical care facilities across Bangladesh. The discrepancy in critical care bed numbers across Bangladesh reflects overall health care disparity in different regions. We have observed that there are many districts with limited number of hospital beds also have no critical care facilities in those hospitals. It is also our observation from literature search that Bangladesh suffers from lack of sufficient trained doctors and nurses in critical care delivery.

Until and unless Bangladesh is able to increase critical care bed capacity uniformly across the country we have to rely on stepwise introduction of service improvements in other health care areas of critical care deprived districts, leveraging human resources through training all over the country. We need to let go of developed practices that are currently hindrances including advanced technologies that cannot be readily maintained. We should patronize development of relevant technology that is affordable and maintainable.

Results of our survey is expected to be an eye opener for health care policy makers of our country. Critical care bed concentration need to be decentralized by opening more ICUs in district and upozila (sub district) levels. Instead of closing down COVID critical care facilities that were established temporarily at the height of COVID pandemic, those facilities should be incorporated with the facilities which existed at the pre pandemic period. Our health care policy makers need to pay attention to developing required man power to run the existing ICUs and HDUs efficiently and also before planning to establish newer ICUs both at Govt. and private capacity and at district and upozila level.

We believe that two hundred general hospital beds per one lac population and five critical care beds per one lac population of Bangladesh within next 10 years is an expected and achievable goal considering current progress in per capita income in our country. One significant limitation of our survey is that with the exception of few well known ICUs of big cities like Dhaka, Chattogram, Sylhet etc, we were not able to spot check accuracy of bed strengths of majority of critical care facilities, Govt. or private across the country.

**Conclusion**

Our survey concludes that growth and distribution of critical care beds (ICUs + HDUs) across Bangladesh are still heterogeneous and very much inadequate compared to the critical care need of the population. Health care planners of the country need to plan for developing adequate critical care man power as well as establish more critical care facilities among existing hospitals and establish newer critical care facilities in critical care deprived areas.

**References**

1) Marshall JC, Bosco L, Adhikari NK, Conolly B, Diaz JV, Dormann T et al. What is an Intensive care unit; a report of the task force of the World Federation of Societies of Intensive and Critical care Medicine. J. Crit Care 2017; 37: 270-276.
2) Faruq MO, Ahsan ASMA, Fatema K, Ahmed F, Sultana A, Chowdhury RH et al. An audit of intensive care services in Bangladesh. Ibrahim Med Coll. J 2010; 4(1):13-16.
3) Arabi YM, Phua J, Koh Y, Du B, Al-Dorzi HM, Al-Hameed FM, et al. Structure, organization and delivery of critical care in Asian ICUs. Crit Care Med. 2016. Doi: 10.1097/ccm000000000001854.
4) Faruq MO, Nooruzzaman ARM, Tamanna RJ, Huda AKQ, Sultana A, Mallick UK et al. An analysis of structure, organization and delivery of ICU care in Bangladesh. Bangladesh Crit. Care J. March 2019; 7(1): 3-11.
5) Phua J, Faruq MO, Kulkarni AP, Redjeki IS, Mendasakhan N, Sann KK et al. Critical care bed capacity in Asian countries and regions. Crit, Care Med. May 2020; 48(5). Doi: 10.1097/ccm0000000000004222.
6) Tausia Taznim. Govt. hospitals have increased number of beds but not ICU services. News Report. The daily Banik Barta. Jan 5 2019.
7) Islam MT, Talukdar AK, Siddiqui MN, Islam T. Tackling the Covid pandemic: The Bangladesh perspective. J Public Health Res. 2020, Oct 14, 9(4): 1794. Doi : 10.4081/phr2020.1794.
8) HuangC, WangY, LiX, ZhaoL, HuY, etal.Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet. 2020; 395:497-506.
9) Bangladesh population: https://www.worldometre.info>worldpopulation>Bangladesh population.
10) Bangladesh Bureau of Statistics : http://www.bbs.gov.bd
11) Murthy S, Wunsch H. Clinical Review: International comparisons in critical care- lessons learned. Critical Care 2012; 16: 218.
12) Kennedy P, Pronovost P. Shepherding change: how the market, health care provider and public policy can deliver quality care for the 21st century. Crit. care Med, 2006; 34: s1-6.
13) Dondorp AM, Iyer SS, Schultz MJ. Critical care in resource poor settings. JAMA 2016; 315 : 753-754.
14) Rivello ED, Letchford S, Achieng S, Newton MW. Critical care in resource poor setting: Lessons learned and future direction. Crit Care med, 2011; 39(4): 860- 867.