Chapter-II
Performance Audit

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Performance Audit

Department of Health and Family Welfare/ Department of Medical Education

2.1 Health care facilities in State Sector Hospitals including Autonomous and Teaching Hospitals

Executive Summary

Healthcare facilities in the State are provided through a three tier system *viz*., primary, secondary and tertiary level of healthcare. A performance audit of the 'Healthcare facilities in the State Sector Hospitals including Autonomous and Teaching Hospitals' under the Secondary and Tertiary level of healthcare was conducted covering the period 2010-15. There were inadequacies in creation of infrastructure as well as in providing healthcare services in terms of availability of services as well as quality care which is brought out below:

- Out of 113 taluk hospitals, which were upgraded as 100 bedded hospitals in 2006-07, only 63 were functional with the bed strength of 100 and the remaining 50 continued to function with bed strength less than 100.
- In the 28 test-checked hospitals we observed that most of the hospitals had not obtained statutory compliance from the fire authorities; Atomic Energy Regulation Board for X-ray and CT scan units; State Pollution Control Board for biomedical waste management; excise permit for storing spirit and license for blood bank/authorisation for storage of blood *etc*.
- Seventy five *per cent* of hospitals had less sanctioned strength than that prescribed under the IPHS guidelines with regard to specialists, staff nurses and laboratory technicians which hampered health services.
- While 50 *per cent* of the General/District Hospitals did not have services of General Medicine as well as Ophthalmology; General Surgery, Obstetrics & Gynaecology and Paediatrics services were not available in 35, 21 and 41 *per cent* of the General/District Hospitals respectively.
- In some of the hospitals test-checked, though equipment *viz*., Scanners, X-ray machines, Treadmill, Echocardiogram, *etc*., were available, but due to shortage of technicians, the equipment remained unutilised.
- Sixty eight *per cent* of the hospitals test-checked had not got their laboratory results validated through external laboratories.
- Insufficient equipment in Intensive Care Units and Operation Theatres affected the quality of vital health services.
- There were shortcomings in support services under laundry and disposal of medical waste in terms of providing adequate laundry facilities and regular disposal of biomedical waste.
- Special initiatives taken by Government to create/establish Burns Wards and Trauma care centres were not functioning effectively due to inadequate release of funds as well as lack of manpower.

2.1.1 Introduction

Health care facilities generally consist of curative, preventive, promotive and rehabilitation services. Under the constitution, health is a State subject and Karnataka has developed its own healthcare delivery system based on the guidelines issued by the Government of India (GoI) from time to time.

During 2014-15, the State has expended ₹2,013.70 crore towards health, which as a percentage of total Government expenditure was 5.95 *per cent*.

2.1.2 Organisational Set-up

The State Sector Hospitals work under two departments, the Department of Health and Family Welfare (HFW) and the Department of Medical Education (ME). These two departments are headed by Principal Secretaries. The Commissioner, HFW, and the Director, ME, assist their respective Principal Secretaries and are the overall administrative heads of their Department. There are 20 District Hospitals (DHs) and 122 Taluk or General Hospitals (GHs) in the State which come under the jurisdiction of HFW and 29 Autonomous hospitals which come under the jurisdiction of ME. While Medical Superintendents/District Surgeons are in-charge of the DHs, the Directors are in-charge of Teaching and Autonomous hospitals in the State.

2.1.3 Health care set-up

Health care services in the State are provided through a three tier system *viz*., primary, secondary and tertiary level of health care.

Primary health care services	Provided through Primary Health Centres (PHCs) and Sub-centres (SC). The PHC is the cornerstone of rural health services.
Secondary health care services	Essentially includes Community Health Centres (CHCs), Taluk Hospitals and District Hospitals. The CHCs are designed to provide referral as well as specialist health care to the rural population. The Taluk Hospitals act as First Referral Units for the Taluk /block population in which they are geographically located. They are also referred as General Hospitals (GHs). Specialist Services are provided through these hospitals. They form a link between SC, PHC and CHC on one end and DH on the other end. The District Health care system is the fundamental basis for implementing various health policies, delivery of health care and management of health services for a defined geographic area. It provides curative, preventive and promotive health care services to the people in the district.
Tertiary health care services	It comprises of Teaching and Autonomous hospitals which provide specialised health care services.

Infrastructure facilities available in the State during 2014-15 are as follows.

Healthcare facility	In numbers
Teaching Hospitals and Autonomous hospitals	29
District hospitals	20
Taluk hospitals or General Hospitals	158
Community Health Centres	206
Primary Health Centres	2,353
Sub-centres	8,871

2.1.4 Audit objectives

The performance audit was conducted to analyse:

- Adequacy of existing healthcare facilities in the State Sector Hospitals *ie.,* Taluk and District Hospitals, including Autonomous and Teaching Hospitals.
- Its impact on delivery of quality health care to patients.

2.1.5 Audit criteria

Audit findings were benchmarked against the criteria sourced from the following:

- State Integrated Health Policy
- Indian Public Health Standards (IPHS)-Guidelines for DHs
- Medical Council of India Standards – norms for tertiary health care facilities
- Drugs and Cosmetics Act, 1940, and Rules, 1945
- National Accreditation Board for Hospitals and Healthcare Providers (NABH) Standards
- Biomedical Waste (Management & Handling) Rules, 1998
- Orders, instructions, circulars issued by GoI and State Government from time to time

Since, the State Government has not formulated any norms/standards for infrastructure, service delivery and equipment, Audit has adopted IPHS and MCI guidelines as the benchmark for assessing healthcare facilities in the hospitals. While the IPHS guidelines stipulate the essential and desirable services that are to be provided by the DHs and GHs, the MCI stipulates the services that are to be provided by the Teaching and Autonomous Hospitals.

2.1.6 Audit Scope and Methodology

The performance audit covered healthcare facilities in the State Sector hospitals, *viz*., DHs, Taluk Hospitals also called General Hospitals (GHs), and Teaching and Autonomous Hospitals. The performance audit commenced with an Entry Conference held (April 2015) with the Principal Secretary, HFW and ME in which audit scope and methodology was explained. Audit was conducted during January to July 2015 covering the period 2010-15 through test-check of records of the Secretariat, Commissionerate of HFW, and Directorate of ME. The methodology adopted for audit included scrutiny of files and documents, collection of data through issue of audit enquiries/ questionnaires/proforma and examination of records. Besides, joint inspection along with Medical Superintendent/District Surgeon/Chief Medical Officer was conducted to ascertain working of DHs, GHs, teaching and Autonomous hospitals.

Probability proportional to size sampling without replacement was adopted for selecting ten[5] districts covering four revenue divisions of the State. In addition to 26 hospitals selected for detailed study across ten districts, two super speciality hospitals and one hospital during pilot study were test-checked. List of hospitals selected are detailed in **Appendix-2.1**. Audit findings were discussed with the Principal Secretary, HFW and ME in an Exit Conference held on 20 October 2015.

Audit findings

2.1.7 Karnataka State Integrated Health Policy

The Government of Karnataka formulated (February 2004) the Karnataka State Integrated Health Policy (Policy), which amongst other objectives, aimed to provide improved access to good quality healthcare. It also endeavoured to provide quality healthcare with equity. The health care policy also aimed to ensure adequate availability of personnel with specialisation in public health to discharge public health responsibilities in the state. It also involved providing a credible and sustainable referral system, encouraging greater Public-Private Partnership (PPP) for providing quality healthcare to the underserved areas, strengthening Health Infrastructure *etc*.

The subsequent paragraphs in the report bring out the adequacies or inadequacies of the steps taken by the State Government towards achieving the main objectives of the policy of providing health care services in the State.

2.1.8 Secondary level health care services

Apart from CHCs, secondary level health care services are provided through GHs and DHs. The GHs are placed below the district and above the block level (CHC) hospitals and act as the First Referral Units for the Taluk population in which they are geographically located. The DH covers a defined geographical area, containing a defined population. Its objective is to provide comprehensive secondary health care services to the people in the district at an acceptable level of quality and be responsive and sensitive to the needs of people and referring centres.

2.1.8.1 Non-upgradation of General Hospitals

The State Government upgraded 113 GHs (50 and 63 in January 2006 and January 2007 respectively) from the existing 30/50 beds to 100 beds with additional manpower. We observed that only 63 hospitals were handed over (July 2015) by the Zilla Panchayats to the State sector and functioning with the bed strength of 100 beds. Even after a lapse of eight years, the other 50 hospitals continued to function as 30/50 bed hospitals. We observed that out of the said 50 hospitals, though building was completed in respect of five hospitals, they continued to function as 30/50 bed hospitals. In respect of six

[5] Belagavi, Bidar, Chitradurga, Kalaburagi, Karwar, Madikeri, Mangaluru, Mysuru, Shivamogga and Vijayapura

hospitals, proposal for construction was sent (February 2015) to the Government. While, the status of construction in respect of 17 hospitals was not available with the department, 60 to 90 *per cent* of construction was completed in respect of balance 22 hospitals. Hence, delay in upgradation of 50 hospitals resulted in the hospitals continuing to function with inadequate bed strength thereby failing to provide comprehensive secondary health care services at the district level.

The Government replied (November 2015) that many of the upgraded hospitals were still under the administration of Zilla Panchayats and a proposal to transfer the administration of the said hospitals to the State Sector had been submitted (February 2015) to the Government. The reply is not satisfactory as the Government should have taken timely action to get the hospitals upgraded and transferred the same to the Government.

2.1.8.2 Inadequacies in Physical infrastructure

Development of infrastructure facilities in public health institutions is essential for providing quality medical services. The essential items of infrastructure facilities were mostly provided in the GHs, DHs, Teaching and Autonomous hospitals as per the standardisation norms. However, joint inspection of the 28[6] hospitals test-checked revealed certain deficiencies which are discussed below:

- There was overcrowding of wards and hence patients were accommodated in floor beds and beds in passages in six[7] hospitals (two teaching hospitals, two DHs and two GHs).

(Floor beds in Cheluvamba Hospital, Mysuru)

(Floor beds in maternity ward in GH, Sirsi)

(Beds placed in corridors in Lady Goschen Hospital, Mangaluru)

[6] KR Hospital and Cheluvamba Hospital in Mysuru and Lady Goschen Hospital and Wenlock Hospital in Mangaluru are to be treated as single hospital in each district. For the purpose of adequacy with respect to infrastructure, however, the hospitals are considered as separate hospitals.

[7] KIMS – Hubballi, Cheluvamba-Mysuru, DH-Chitradurga and Lady Goschen, Mangaluru; GH-Sirsi and Puttur

- Wards were unhygienic due to seepage of water and formation of fungus in four[8] hospitals (two teaching hospitals, one DH and one GH).
- There were no separate wards for males and females in DH-Vijayapura, and GH-KR Nagar.
- Overcrowding of ICU was found in almost all the 28 hospitals test-checked.

[Intensive Care Unit (Crowded with attendants) in DH, Kalaburagi]

- There were no proper facilities in Gynaecology Outpatient Department (OPD) of Belagavi Institute of Medical Sciences (BIMS), Belagavi.
- There was also absence of screen facility for privacy of patients, shortage of linen, non-availability of potable water and absence of toilets and seating for attendants.

Audit findings in respect of creation of physical infrastructure in the test-checked hospitals are discussed below:

(a) Idle infrastructure

- Construction of a 500 bedded hospital at DH - Kalaburagi old hospital scheduled to be completed by January 2008 was completed during June 2013 at a total cost of ₹53.23 crore, but it was yet to be handed over to the District Surgeon (July 2015). We observed that out of equipment purchased worth ₹1.28 crore during the period August and November 2014, equipment worth ₹77.49 lakh was utilised in the existing old hospital at Kalaburagi, the balance equipment which were installed in the new hospital were lying idle. Further, the construction of the hospital building was not as per the norms prescribed by IPHS *viz*., the operation theatre (OT) has to be dust and moisture proof. The entry to the OT was open to sky and hence could not be made dust/moisture proof. Also, there was no provision for disposal/dirty zone. Besides, the new building did not have fire safety exit, centralised oxygen facility, centralised AC for OT, radiation safety measures and launderette, all of which are mandatory for the proper functioning of a hospital. The Government replied (November 2015) that action had been initiated to provide all facilities as per IPHS standards.
- The Geriatric ward in DH, Chitradurga, was completed during November 2013 at a cost of ₹45 lakh, it was not put to use.

[8] KR Hospital and Cheluvamba Hospital –Mysuru; DH – Wenlock hospital, Mangaluru; GH-Puttur

(b) Incomplete infrastructure

The construction of Mother and Child hospital in the Karnataka Institute of Medical Sciences (KIMS), Hubballi to accommodate Obstetrics, Gynaecology (OBG) and Pediatric services which was slated to be completed by October 2012 was still under construction (November 2015). Therefore the OBG and Pediatric wards of the existing hospital had become overcrowded, and beds were placed in the corridors of the hospital to accommodate post operative/post delivery cases.

Mother and Child Hospital Building under construction

Beds accommodated in corridors

(c) Non-compliance to statutory requirements

IPHS guidelines stipulated statutory compliances such as no objection certificate from competent fire authority, authorisation from Atomic Energy Regulation Board (AERB), type and site approval from AERB for X-ray, CT Scan unit, *etc*., that should be complied with by the DHs. We observed that none of the 28 test-checked hospitals had clearance from the fire authorities, and only five hospitals had obtained authorisation from AERB for X-ray and CT scan units. Only seven hospitals had obtained the narcotic drug license and nine, twelve and five hospitals did not have authorisation from the State Pollution Control Board for biomedical waste management, excise permit for storing spirit and license for blood bank/authorisation for storage of blood respectively. Thus, non-compliance by DHs is indicative of lack of quality health care facilities.

2.1.9 Services in General, District and Teaching hospitals

GHs are also the First Referral Units for providing emergency obstetrics care and neonatal care. The services to be provided at a GH are grouped as Essential (Minimum Assured Services) and Desirable (which it should aspire to achieve). Besides basic speciality services, due importance is to be given to Newborn Care, Family Planning, Psychiatric services, Physical Medicine, Rehabilitation services, Geriatric Services, Accident and Trauma Services and Integrated Counselling and Testing.

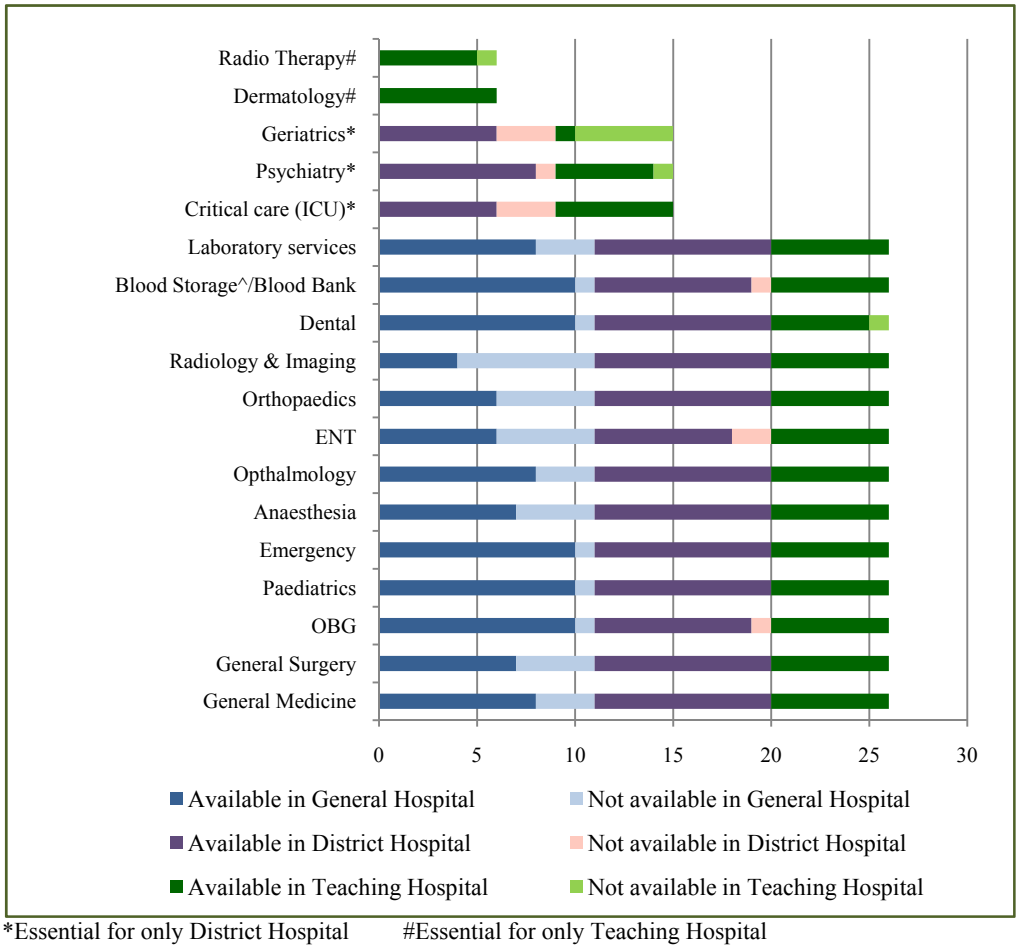
Services that a DH provides are also grouped as 'Essential' and 'Desirable'. Besides, the basic specialty services, due importance is also given to Newborn Care, Psychiatric services, Physical Medicine and Rehabilitation services, Accident and Trauma Services, Dialysis services, Anti-retroviral therapy and Patient Safety and Infection control norms. Hence, a DH should be in a

position not only to provide all basic speciality services but should aim to develop super-specialty services gradually. Further, a DH is also required to be ready to handle epidemics and disaster management at all times. In addition, it should provide facilities for skill based training for different levels of health care workers.

A teaching hospital provides tertiary healthcare services in the state. In addition, it provides clinical education and training to medical students throughout their period of matriculation, and especially during their internship years.

The services available in test-checked hospitals are brought out in **Chart-2.1** below.

Chart-2.1: Services available in the test-checked hospitals



*Essential for only District Hospital #Essential for only Teaching Hospital

Note: Three GHs performing as District level hospitals have been considered as DHs for analysing services provided.

The audit observations on various services in the test-checked hospitals are brought out in the succeeding paragraphs.

Adequate manpower in medical services is a critical component having a direct bearing on patient care. However, we observed that there was no periodic assessment for revision of manpower in the State. The Government of Karnataka had approved norms for staff for various categories of medical institutions in the State in October 1980 which was revised only in July 2014.

The staff pattern prescribed by the State Government for GHs and DHs was compared with the IPHS guidelines and the results of the comparison are indicated in **Table-2.1**.

Table-2.1: Comparison of staff pattern between IPHS and State Government

Cadre	No. of hospitals where sanctioned strength was as per IPHS norms	No. of hospitals where sanctioned strength was less than IPHS norms
Specialists	03	18 (86%)
Staff nurse	02	19 (90%)
Pharmacist	08	13 (62%)
Lab Technician	05	16 (76%)
Radiology Technician	09	12 (57%)

(Source: IPHS norms and details as furnished by the Commissionerate office)

As can be seen from the table, 75 *per cent* of hospitals had less sanctioned strength in terms of IPHS guidelines with regard to Specialists, Staff nurse and Lab technician cadres. While the lack of specialists not only has a direct bearing on the quality of care administered to patients, it also indicates non-availability of services in some cases.

The Government replied (November 2015) that at present the Government had prescribed the requirement of doctors on the basis of bed strength and hence was not following the IPHS norms for sanctioning manpower to hospitals. However, no norms of the Government were made available to audit, and the reply also did not address the issue regarding shortage of doctors.

2.1.9.1 General Specialities Services

The standardisation norms provided by IPHS specify essential general specialisation services such as General Medicine, General Surgery, Obstetrics and Gynaecology, Paediatrics, Ophthalmology *etc.* that should be available in hospitals. We observed that out of 20 DH and 146 GH in the State, more than 50 *per cent* of the hospitals did not have General Medicine as well as Ophthalmology. The much required specialisation services in General Surgery, Obstetrics and Gynaecology and Paediatrics were not available in 35, 21 and 41 *per cent* of the hospitals respectively. Dermatology, a desirable service was not available in 75 *per cent* of the hospitals. The details of lack of other essential general specialisation services are indicated in **Appendix-2.2**.

The lack of essential general services could be attributed to critical vacancies[9] in the hospitals. We observed that only 73 out of 166 hospitals (20-DHs and 146-GHs) had the combination of all the three specialists (OBG, Anaesthesia and Paediatrics). This indicated that 93 hospitals suffered from critical vacancies.

[9] Critical vacancies – One of the norms for defining critical vacancy is absence of one or more Specialists among the team of three Specialists, *viz*., OBG, Pediatrician, Anesthetist who are very essential for providing proper care to mother and child health in a Government Hospital or Government Institution.

Further, in addition to the Specialists, support of other staff is essential for efficient and effective functioning of the hospital. The status of staff nurse and para clinical staff available in the hospitals test-checked are detailed in **Table-2.2.**

Table-2.2 : Status of staff nurse and other para clinical staff available in the hospitals test-checked

Cadre	No. of hospitals where vacancy is in excess of 50 *per cent*
Staff nurse	03
Pharmacist	10
Laboratory Technician	06
Radiology Technician	02

(Source: Details furnished by the Commissionerate office)

Thus, there was acute shortage of staff which hampered functioning of the hospitals. Further, as per IPHS norms, the nurse to bed ratio for DHs was 0.45 and for GHs was 0.35. We observed that the ratio was less than the prescribed norms in all the hospitals test-checked.

The Government replied (November 2015) that action has been initiated to appoint 1,401 doctors in various fields.

The audit observations on general speciality services in the hospitals test-checked are as follows:

- In six hospitals (four GHs, one DH and one Teaching hospital)[10], though Ophthalmology had an operation theatre as well as an Ophthalmic Surgeon, patients were referred to other hospitals or eye camps conducted by private hospitals due to non-availability of equipment/equipment under repair.
- In GH, Anekal, although there was an Ophthalmic Surgeon as well as equipment, patients were referred to other hospitals due to non-availability of operation theatre.
- As per IPHS guidelines, Radiotherapy was a desirable service which should be available in all hospitals. This facility is available only in two hospitals *i.e.,* in Victoria Hospital, Bengaluru and Kidwai Memorial Institute of Oncology (KMIO) which were operational since 1965 and 1986, respectively. Presently, the waiting time for cancer treatment is about two/three months on an average in KMIO. Hence there is need to upgrade the Department of Radiotherapy in Victoria Hospital and open many such hospitals in other districts to reduce the burden on existing hospitals.

Availability/sufficiency issues regarding manpower in the hospitals test-checked which hampered the delivery of health services are brought out below:

- The Radiologist of Sir C.V.Raman GH, Indiranagar, Bengaluru was attached with additional duty in two other GHs.

[10] GH Shikaripura, GH Puttur, GH Bailahongal, GH KR Nagar, DH Karwar and SIMS Shivamogga

- DH, Vijayapura – There was one Gynaecologist who was to attend 360 patients in a month on an average.
- DH, Karwar - During joint inspection, we noticed that the female surgical ward (20 beds) was full and male surgical wards (20 beds) were full with one staff nurse in each who was catering to these patients. On the other hand, we noticed that there were more staff nurses in wards such as Paediatrics *etc*., which had no patients.
- GH, Sirsi - During the night only three staff nurses were being deployed for the entire hospital to take care of patients.
- GH, Nanjanagudu – Against two dentists, one dental chair was available with dental equipment which was corroded. In addition, the hospital had one Anaesthetist who was not qualified for the post but trained for emergency obstetric care.
- GHs, Aland and Chincholi – In the absence of the pharmacist in both the hospitals, the drugs were allowed to expire.
- GH, Hiriyur – In the absence of General physician, snake bite, poison cases *etc*., were referred to DH, Chitradurga even though the medicines were available in the hospital.

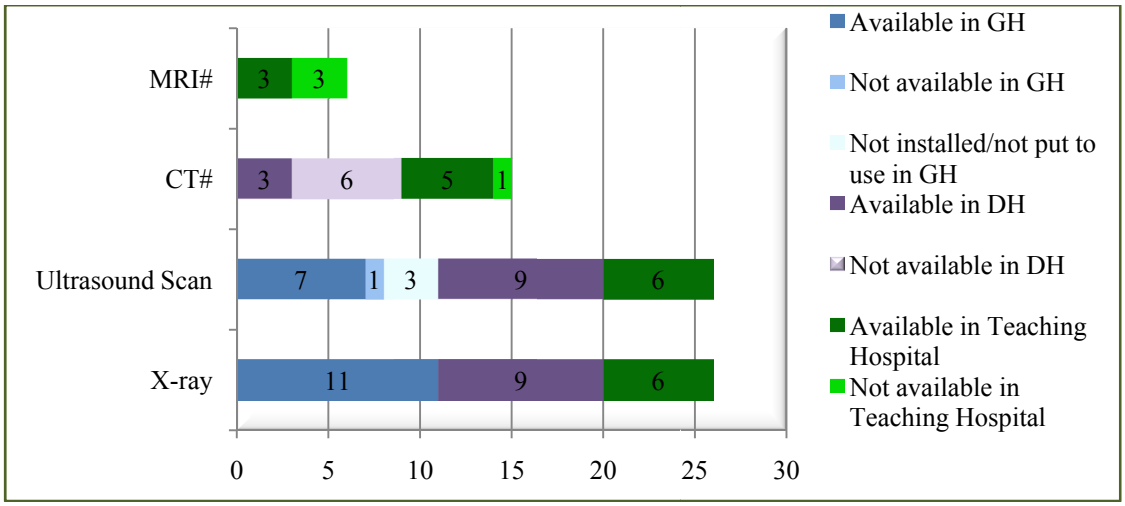
Recommendation-1: Government should ensure adequacy of staff in all hospitals. It should also periodically review the manpower position with regard to requirement, and initiate action for recruitment thereon.

2.1.9.2 Clinical Services

(a) Imaging services

While X-ray and Ultra Sound Scanners are essential diagnostic equipment for providing quality medical care to patients, CT scan is desirable equipment for a DH. The position of availability of X-ray, Ultra Sound Scanner and CT scan in the hospitals test-checked are indicated in **Chart-2.2.**

Chart-2.2: Availability of imaging services in the hospitals test-checked



Essential only for Teaching Hospital.

Note: Three GHs performing as District level hospitals have been considered as DHs for analysing services provided.

While all the hospitals test-checked had X-ray facilities, Ultra sound scanner facility was also available except in one hospital. In 11 hospitals, 18 out of 49 X-ray machines of various specifications were not functional at the time of audit visit. In three[11] hospitals (one DH and two GH) one X-ray machine each was yet to be installed. The Government replied (November 2015) that action has been taken to maintain the equipment in functional status by creating an Equipment Maintenance Cell.

In eight hospitals, nine out of 14 Ultrasound scanners were not functional. This included two scanners which remained uninstalled in GHs, Nanjanagudu and Chincholi and three scanners which were installed in GHs, Hiriyur, Shivamogga Institute of Medical Sciences (SIMS), Shivamogga and KIMS, Hubballi were not put to use. In three[12] hospitals (one DH and two Teaching Hospitals) the ultrasound scanner was kept idle for want of a Radiologist/ technician.

As regards the CT scanner, which was desirable for DH and mandatory for Teaching hospitals, a joint inspection revealed that seven hospitals (six DH and one Teaching Hospital) did not have the same. Spiral CT supplied to BIMS, Belagavi in November 2014 and installed was yet to be put to use for want of AERB Report. CT scanner available at BRIMS, Bidar was also not put to use for want of a technician. In KIMS, Hubballi, the Head of the Department of Radiology stated that the available CT Scan Dual Slice was totally outdated and did not cater to the various investigations, numbers and requirements of the teaching hospital. Further, the MRI Scan required as per MCI standards was available only in three out of seven teaching hospitals. The Government replied (November 2015) that the Department of HFW has initiated Tele-radiology service to bridge the gap of lack of radiologists.

(b) Radiation Safety Measures

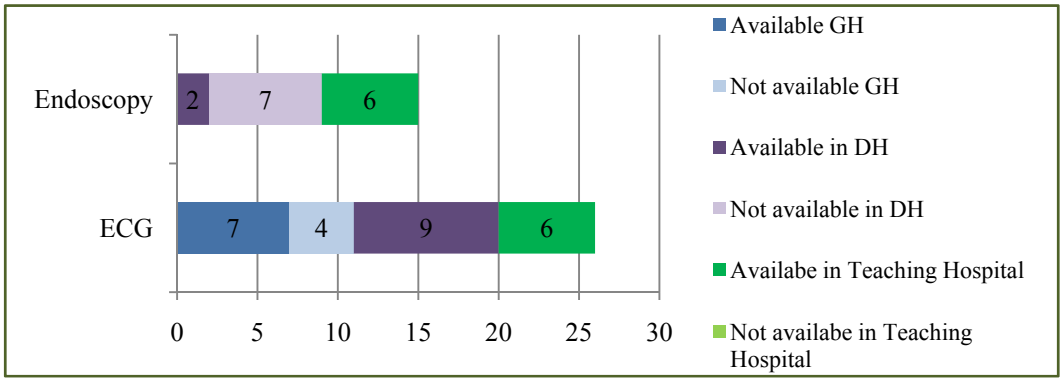
We noticed that the technicians manning the X-ray units in 15 hospitals test-checked were not provided with Thermo Luminescence Dosimeter (TLD) film badges to indicate levels of exposure to radiation. The Government replied (November 2015) that TLD badges would be procured and supplied to all the technicians and supporting staff.

(c) Other Diagnostics services

Besides imaging facilities, diagnostic services, Echocardiogram (ECG) and Endoscopy are essential in a DH. The position of facilities like diagnostic facilities in the hospitals test-checked are indicated in the **Chart-2.3**.

[11] Sir CV Raman GH, Indiranagar; DH Madikeri and GH Humnabad
[12] DH Vijayapura; OBG department of KIMS, Hubballi; SIMS Shivamogga

Chart-2.3: Availability of diagnostic services in the hospitals test-checked



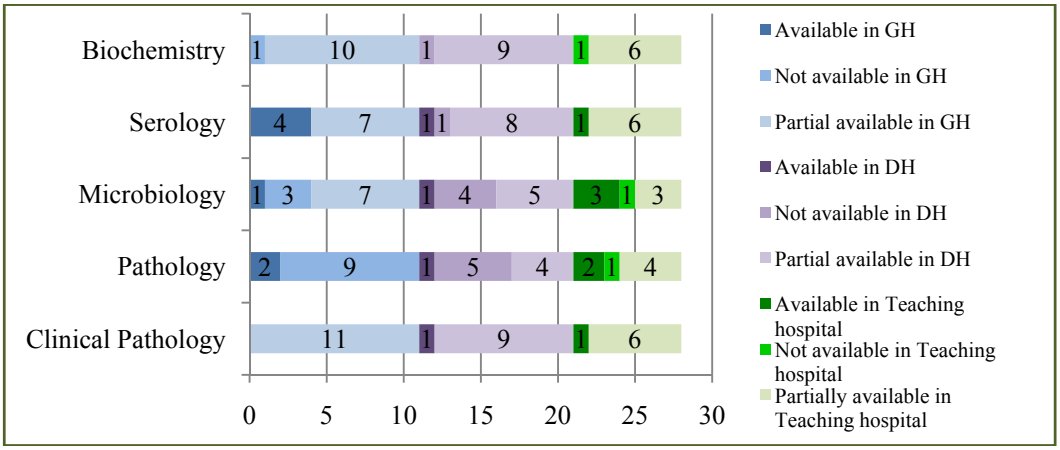
Note: Three GHs performing as District level hospitals have been considered as DHs for analysing services provided.

In four[13] hospitals, equipment such as Treadmill, EMG and Echocardiogram were not utilised on account of non-availability of technicians. In DH – Chitradurga, Endoscopy was not utilised due to lack of technician.

(d) Laboratory services

The IPHS guidelines stipulate that external validation of laboratory reports to be done on a regular basis. We, however, observed that 19 out of the 28 hospitals test-checked had not got their laboratory results validated by external laboratories. Validation of results of laboratory reports is an important requirement to ensure that the patients were given accurate reports on which treatment by Doctors would be based. Thus non-validation weakens the assurance for proper diagnosis of patients. The availability of the laboratory services such as clinical pathology, pathology, microbiology, serology and biochemistry in the hospitals test-checked are indicated in **Chart-2.4**.

Chart-2.4: Availability of laboratory services in the hospitals test-checked



Note: Three GHs performing as District level hospitals have been considered as DHs for analysing services provided.

The joint inspection of the 28 hospitals test-checked revealed that the laboratories were not adequately equipped and some of the existing equipment was not in working condition, thereby depriving the patients of quality laboratory facilities. Some audit observations are discussed below:

[13] GH Shikaripura, DH – Chitradurga, Vijayapura and BRIMS-Bidar

- There was no timely supply of re-agents which hampered usage of analysers in Victoria Hospital, Bengaluru; BRIMS, Bidar; DH Chitradurga and GH – Bailahongal and Nanjanagudu.
- The Flow Cytometer Electro process and PT-APTT machines placed in Pathology Laboratory (Cancer related detection machines) of KR Hospital, Mysuru remained un-utilised. At the time of inspection, it was stated these machines were not in use for more than a decade and that Electro process and PT-APTT could not be used for want of chemicals.
- In KIMS, Hubballi, many equipment were not in working condition.
- In BIMS, Belagavi, one Automatic BOD Incubator and one incubator in the Microbiology laboratory were not functional for the past one year.
- The equipment supplied through Commissionerate, HFW in DH, Madikeri were not put to use.
- The laboratory of DH Vijayapura was in need of equipment *viz*., fully automatic Bio-chemistry analyser, Haemoglobin automated analyser, ESR analyser, HbA1c analyser and Hormonal analyser (Thyroid testing machine).
- In DH Karwar, while one out of three cell counters available in the haematology/pathology laboratory and one semi auto analyser in Biochemistry laboratory were not functioning, one Elisa-5 machine was not put to use.
- In GH, Shikaripura, Automated Analyser Etachi 902 used for carrying out LFT, RFT blood sugar tests as well as Serum Electrolyte Analyser used for testing Potassium, Sodium and Chlorine levels in respect of Dialysis patients was defunct.
- The agency having AMC with GH, Sirsi failed to attend to periodic maintenance as well as breakdown of equipment.

The Government replied (November 2015) that action would be taken to obtain laboratory results validated externally. Further, it was replied that the observations of audit were noted and all necessary equipment would be procured /repaired and made functional.

(e) Blood Bank

Blood banks/storage centres are an essential element in the functioning of hospitals. License issued by the Drugs Controller (DC) is mandatory to run a blood bank. Audit noticed the following in the 28 hospitals:

- In Sir CV Raman GH, Bengaluru, blood bank equipment was not put to use for want of space.
- in KC General Hospital, Bengaluru, the equipment was not installed due to non-completion of civil works.
- In Victoria Hospital, Bengaluru and DH, Karwar, the equipment available in the blood bank were not working.

- In two[14] Teaching Hospitals, two[15] DHs and four[16] GHs, equipment was not put to use due to lack of trained manpower/essential equipment/want of license.
- In three[17] GHs, only storage facilities were available and these were also not put to use.
- The blood bank at GH, Shikaripura required blood bag sealer in order to avoid wastage and contamination of blood.

  Due to non-working of blood banks in the hospitals, in all the above cases patients had to depend on private blood banks for obtaining blood.
- As per National AIDS Control Organisation (NACO) Guidelines and Drugs and Cosmetic Act 1940, for effective utilisation of this scarce resource, blood collected was to be preserved in CPDA solution (Citrate-Phosphate-Dextrose-Adenine solution) at temperatures between 4°C and 6°C and utilised within 35 days of its collection. Further, blood banks have to maintain the details of the blood stock, like collection from donors, issues to the needy and balance in stock along with the details of discarded blood. In addition, availability of blood in stock has to be prominently displayed.

  In all the hospitals test-checked, we observed that during 2010-15 expiry of blood was the major factor for blood to be discarded. In 11 hospitals, the percentage of expired blood ranged between 10 to 82 of the discarded blood during the review period (**Appendix-2.3**). The reasons attributed for expiry were non-availability/non-installation of blood component separator, failure of the refrigerators/storage units and collection of blood in excess of requirement in mega camps.

Thus, due to above inadequacies, the blood which is very scarce, was not used for intended purpose. The Government replied (November 2015) that all the audit observations were noted and were being complied with.

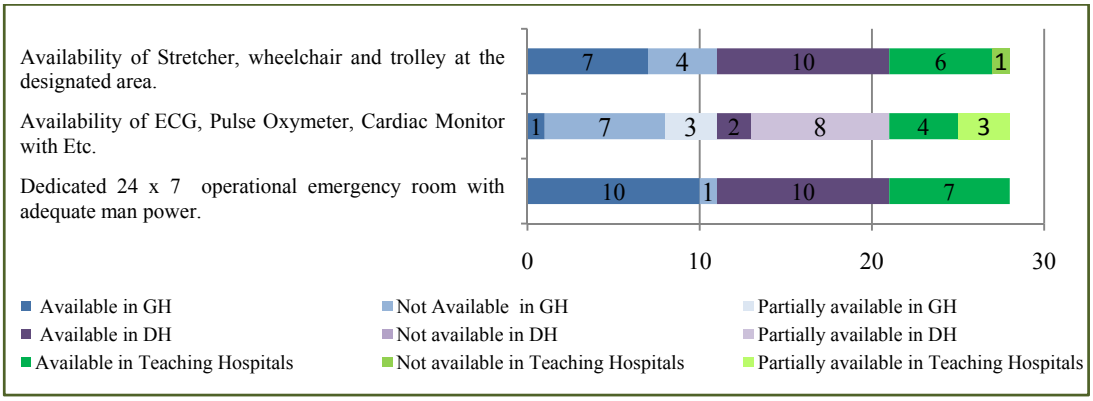
(f) Accident and Emergency services

The IPHS guidelines stipulated 24x7 operational emergency with dedicated emergency room to be available in the hospital with adequate man power. Further, it also stated that the emergency block should have equipment like ECG, Pulse Oxymeter, Cardiac Monitor with Defibrillator, Multi parameter Monitor and also ventilator along with stretcher, wheelchair and trolley at the entrance of the emergency.

The availability of all the required equipment and facilities in the 28 hospitals test-checked is indicated in **Chart-2.5**.

[14] BRIMS, Bidar; KIMS Hubballi
[15] DH Kalaburagi, Vijayapura
[16] GH Puttur, Virajpet, Sirsi, Hiriyur
[17] GH Humnabad, Aland, KR Nagar

Chart-2.5: Availability of facilities in Emergency room of hospitals test-checked



Note: Three GHs performing as District level hospitals have been considered as DHs for analysing services provided. In addition, DH hospital Lady Goshen-Mangaluru and Wenlock Hospital Mangaluru as well as Teaching hospitals K R Hospital Mysuru and Cheluvamba Hospital Mysuru are treated as separate hospitals for the purpose of availability of emergency rooms.

The Government replied (November 2015) that:

- Due to acute vacancies in the post of anaesthetists, high end equipment such as ventilators *etc*., are not installed in all hospitals.
- Multi-parameters and defibrillators have been equipped in ICUs of the DHs.
- Necessary steps would be taken to provide basic facilities such as wheel chair, trolleys, stretcher *etc*., in the casualty and emergency wards.

(g) Intensive Care Unit

Intensive Care Unit (ICU) is an essential requirement that should be available in all DHs. This unit looks after critically ill patients requiring highly skilled life saving medical and nursing care. As per IPHS norms, an ICU should not have less than 4 beds or more than 12 beds. The number of beds, however, may be restricted to five *per cent* of the total bed strength initially and that could be expanded to 10 *per cent* gradually. Further, an ICU should be located in close proximity to the OT and other essential departments, such as, X-ray and pathology so that the staff and ancillaries could be shared. This unit also needs all the specialised services, such as, piped suction and medical gases, uninterrupted electric supply, heating, ventilation, central air conditioning and efficient life services. In addition each ICU bed is required to have equipment such as high end monitor, ventilator, infusion pumps *etc*.

We observed that out of 20 DHs and five district level hospitals[18] in the State, three DHs[19] and three GHs (District level hospitals)[20] did not have an ICU facility. We, however, observed that between November 2012 and October 2014 equipment worth ₹65.22 lakh that was supplied for establishing the ICUs

[18] These are General Hospitals providing services of DH
[19] DH Gadag, Ramanagara and Yadgir
[20] Sir C V Raman GH, Indiranagar; GH, Shikaripura; GH, Virajpet

remained idle. Generally, we observed that in almost all the hospitals, the ICU was crowded and lacked sufficient ventilators, air conditioners as well as warmers in the Pediatric ICU. Due to less number of warmers in the hospitals, multiple new born children were being accommodated in a single warmer. Due to non-conformity with IPHS norms, these children would be exposed to a higher degree of risk/infection *etc.,* thereby endangering their health.

The joint inspections of 28 hospitals test-checked revealed that while many intensive care units required equipment, equipment already existing needed to be made functional. The individual observations are detailed below:

Victoria Hospital, Bengaluru	:	Out of the 24 Ventilators provided to ICU, while four Ventilators were found to be defunct, six were under repair and only the balance 14 Ventilators were working.
SIMS, Shivamogga	:	Hospital did not have SICU[21]. Of the five Cardiac Monitors in ICCU, two were non-functional. Further, one out of the four ventilators available in MICU was not working. We also noticed seepage of water in the walls of NICU.
KR Hospital, Mysuru	:	In the MICU of the hospital, while the Cardiac monitors were not functioning properly, four out of 15 ventilators were not functioning.
Cheluvamba Hospital, Mysuru	:	Although NICU-1 had 12 warmers, it required additional warmers as more than one new born were being accommodated in a single warmer.
KIMS, Hubballi	:	The OICU, NICU, PICU and SNCU of the hospital did not have air conditioning facility. The ICU, as well as GICU and PICU required additional equipment. Some of the warmers in PICU were not working.
DH, Karwar	:	Two out of seven warmers in SNCU were not functioning resulting in accommodating two newborns in one warmer. In addition, two ventilators costing ₹27 lakh received by the hospital during November 2014 were not put to use for want of Anaesthesia personnel.
DH, Kodagu	:	Incubators supplied to SNCU were not functioning. The unit was not supported by a ventilator and did not have a Central Oxygen Suction facility. The unit was not supported by a proper power backup facility. Staff Nurse stated that in case of power failure, newborns kept in the warmers were put to hardship.
DH, Chitradurga	:	While two ventilators were not put to use for want of required staff, compressors supplied for central oxygen and suction were also not installed**.**
GH, Sirsi	:	Two out of four warmers in NICU were not functioning.

[21] GICU-Gynaecology Intensive care unit; ICU- Intensive care unit ; ICCU – Intensive Coronary care unit; MICU-Medical Intensive care unit; NICU - Neonatal Intensive care unit; OICU – Obstetric Intensive care unit; PICU-Pediatric Intensive care unit; SICU-Surgical Intensive care unit; SNCU – Sick newborn care unit

Sir C V Raman GH, Bengaluru	:	Three ventilators supplied between November 2012 and October 2014 and costing ₹37.17 lakh were yet to be installed and made operational.
GH, Shikaripura	:	ICU equipment such as Ventilators and CCU beds were lying idle since July 2013.

The Government replied (November 2015) that steps have been taken during 2015-16 to strengthen 17 DHs with additional equipment and that it would take action to appoint additional manpower to utilise the equipment installed. In addition, it also replied that action has been taken to get the warmers.

Recommendation-2: Government should put in place a review mechanism to ensure physical infrastructure as well as equipment is fully utilised by posting qualified staff/technicians/nurse/doctors/specialists *etc.,* in order to provide required quality healthcare facilities.

(h) Operation Theatres

Operation Theatres (OT) are an essential component of any major hospital. IPHS Guidelines read with Standards prescribed for the operation theatre complex require hospitals to have appropriate zoning to keep the theatres free from micro organisms. Zoning was defined on varying degree of cleanliness/asepsis, namely, Protective Zone, Clean Zone, Aseptic or Sterile Zone, and Disposal Zone. The guidelines/standards further prescribed that the OT be dustproof and moisture proof and have equipment such as shadow-less light and Boyle's apparatus in working condition. Also, Infection Control Practices had to be followed in high risk areas like OT, ICU *etc*.

We, however, observed during joint inspection that none of the test-checked hospitals had these well-defined zones. We further observed the following:

- Lack of anesthetists/technicians or shortage of staff nurse and attenders in two[22] teaching hospitals.
- Equipment such as shadow-less lights/colonoscopy and operative microscope/endoscopy equipment/Boyle's apparatus/ventilators/electro cautery machine/ophthalmic microscope *etc*., were not available in five[23] hospitals (three Teaching Hospitals and two GHs).
- Air conditioners were not available in six[24] (two GHs, two DHs and two Teaching Hospitals).
- OT tables were not available in three[25] hospitals (one GH, one DH and one Teaching).
- There were leakages in OT or sterile zone of OT like pre-operative area, OT corridor and doctor's room in GH, Nanjanagudu and K R Hospital, Mysuru[26], which require immediate attention.

[22] Victoria Hospital, Bengaluru; KIMS, Hubballi
[23] KIMS Hubballi; GH Nanjanagudu; Cheluvamba Hospital, Mysuru; SIMS Shivamogga; GH Bailahongal
[24] GH-Nanjanagudu, Cheluvamba Hospital-Mysuru, Wenlock Hospital-Mangaluru, GH-Shikaripura, DH Madikeri, BRIMS-Bidar
[25] KIMS Hubballi; GH Nanjanagudu; DH Kalaburagi
[26] GH Nanjanagudu; KR Hospital Mysuru

Un-hygienic conditions in corridors of OT in KR Hospital, Mysuru

Un-hygienic conditions in Sterile area of OT in KR Hospital, Mysuru

The above deficiencies affected the quality of OT services in terms of cleanliness, efficiency and controlling of infections.

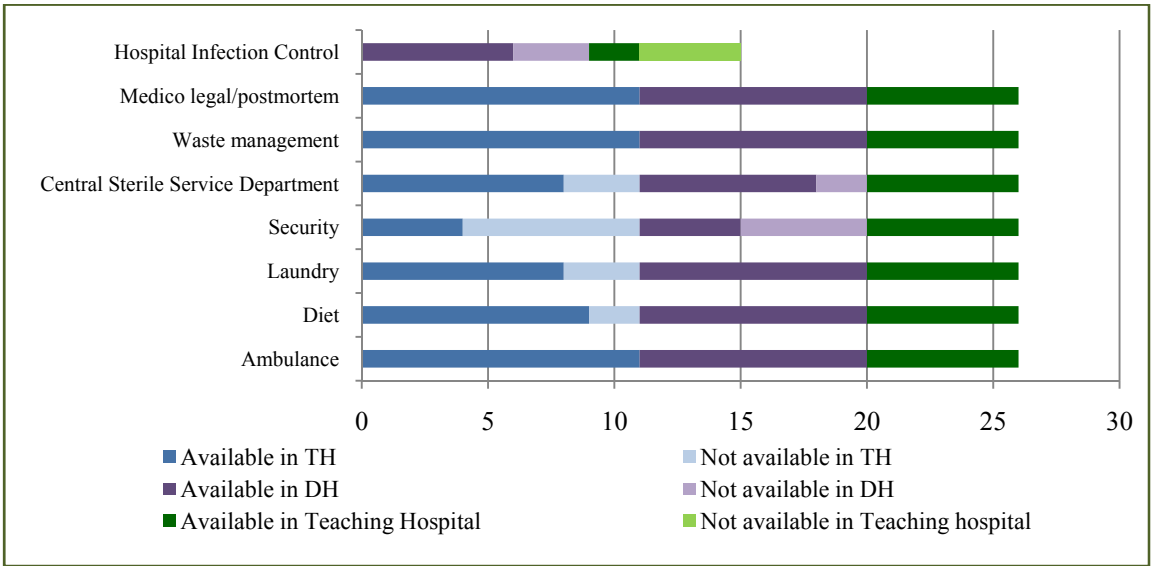
The Government replied (November 2015) that action is being initiated for upliftment of all 20 DHs under 'Kayakalpa' programme of GoI. Further, it has been stated that action has been taken to fill up the posts of Specialists, Dentist, Staff Nurse, Lab technicians and also Group D.

Recommendation-3: Government should review the availability of equipment as well as maintenance of existing equipment in all hospitals and take immediate action to fill the gaps which are substantial.

2.1.9.3 Support Services

IPHS guidelines stipulate requirement of support services *viz*., Hospital Transport, Dietary, Hospital Laundry, Mortuary, Waste Disposal System *etc*., for effective functioning of a hospital. The availability of support services in the hospitals test-checked is indicated in **Chart-2.6** and audit observations on some of the important services are discussed in the subsequent paragraphs.

Chart-2.6: Availability of support services in hospitals test-checked



Note: Three GHs performing as District level hospitals have been considered as DHs for analysing services provided.

(a) Ambulance Services

IPHS guidelines stipulated that hospitals have well equipped Basic Life Support and desirably one Advanced Life Support ambulance which should have a communication system.

Out of the available 90 ambulances in 28 hospitals test-checked, 24 ambulances were off road due to repairs, lack of drivers and non-registration of vehicle. Further, we observed that none of the ambulances had a communication system.

In addition, the State Government had initiated 'Arogya Kavacha'–108 Emergency Services (November 2008) under Public Private Partnership with Emergency Management Research Institute, Secunderabad to provide Comprehensive Emergency Response Services to the people of Karnataka. The project has completed six years of its operation and at present has 711 ambulances spread across different locations of the State catering to emergencies. The ambulances are manned by a trained Emergency Medical Technician (EMT) and a trained driver (Pilot).The average number of trips per ambulance per day is 2.8 as of June 2015. The number of emergency calls attended to increased from 3,147 (November 2008) to 70,035 calls (June 2015) and medical emergencies attended to increased from 2,080 (November 2008) to 58,163 (June 2015). The 108 Emergency services have so far catered to 39.67 lakh medical emergencies since the inception of the service.

While the Arogya Kavacha–108 Emergency Services are doing good job, but the 24 ambulances being off road is a matter of concern.

(b) Laundry Services

IPHS Guidelines stipulate hospital laundry to be provided with necessary facilities for drying, pressing and storage of soiled and cleaned linens. Laundering of hospital linen has to satisfy two basic considerations, namely, cleanliness and disinfection.

In the 28 hospitals test-checked we observed the following:

- Five hospitals[27] (three GHs and two DHs) did not have power laundry and hence washing of linen was done manually in an unclean environment.
- Two hospitals, BRIMS, Bidar, and DH, Kalaburagi, had shortage of linen.
- In most of the hospitals, linen was dried in the open and in some in un-hygienic atmosphere.

[27] Sir C V Raman GH, Indiranagar; DH Karwar; DH Madikeri; GH Puttur; GH KR Nagar

Drying of linen in open in DH, Madikeri

Drying of linen on the floor of laundry in Victoria Hospital

- Though facilities for washing, drying and pressing were provided for in six[28] hospitals (one GH and five Teaching Hospital), on account of non-functioning equipment, laundry was done manually.

Lack of adequate facilities deprived the patients of clean and disinfected linen, thereby increasing the risk of infection.

The Government replied (November 2015) that based on the availability of funds, it was in the process of establishing high-end electric laundry in a phased manner in all hospitals.

(c) Management of Biomedical Waste

As per Biomedical Waste (Management and Handling) Rules, 1998, it is the duty of every occupier of an institution[29] generating biomedical waste to take all steps to ensure that such waste is handled without any adverse effect to human health and the environment. Further, no untreated biomedical waste should be stored beyond a period of 48 hours.

Audit observations on the management of biomedical waste in the 28 hospitals test-checked are detailed below:

- All the hospitals test-checked except for GH Aland and GH Chincholi were disposing biomedical waste through an authorised agency and had a Memorandum of Understanding with the same.
- While there was no segregation of the biomedical waste in three[30] hospitals (two GHs and one DH), it was partial in seven[31] hospitals (four DHs and three Teaching Hospitals). In DH Kalaburagi, the biomedical waste was stored in passages, handled without proper safety precautions like gloves/mask/shoes and some of the wastes such as gloves, cotton, used syringes *etc*., were burnt on the hospital premises along with other general waste.

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[28] KIMS Hubballi; Cheluvamba Hospital, Mysuru; KR Hospital, Mysuru; SIMS Shivamogga; Victoria Hospital, Bengaluru; GH Sirsi

[29] Includes a hospital, nursing home, clinic, dispensary, veterinary institution, animal house, pathological laboratory and blood bank

[30] GH-Puttur, DH-Madikeri& GH-KR Nagar

[31] BRIMS-Bidar, Victoria Hospital-Bengaluru, DH-Kalaburagi, DH-Chitradurga, DH-Vijayapura, DH-Karwar and KIMS-Hubballi

Burning of Biomedical waste in DH, Kalaburagi Premises

Disposal of biomedical waste in GH, Chincholi

- There was no central storage facility within the hospital premises in 19 hospitals.

Biomedical storage in DH, Madikeri

Biomedical storage in DH, Karwar

- The disposal of biomedical waste was daily in respect of 17 hospitals, alternate in four GHs[32], once in three days in one hospital (General Hospital-Shikaripura), weekly twice in four hospitals, once a week in one hospital (District Hospital-Madikeri) and not consistent in one hospital (KR Hospital-Mysuru). Further, in GH Hiriyur, the placenta was not removed for the last one month.
- Immunisation was partial in eleven[33] hospitals (four GHs, five DHs and two Teaching hospitals) and not provided in six[34] hospitals (three GHs, one DH and two Teaching hospitals). Similarly, awareness and training for staff was not conducted in three hospitals (GH-Anekal, GH-Aland, GH-Chincholi) and was partial in three hospitals (DH-Karwar, KIMS-Hubballi, DH-Vijayapura).
- In contravention to the Biomedical Waste (Management and Handling) Rules, 1998, Wenlock Hospital, Mangaluru sold the used syringes, IV bottles to an external agency by calling tenders. On the day of joint inspection, we observed that huge quantities of used syringes and IV bottles were stored in the hospital premises.

[32] GH-Bailahongal, GH-Gokak, GH-Sirsi, GH-Karwar

[33] GH-Anekal, DH-Kalaburagi, SIMS-Shivamogga, GH-Shikaripura, Wenlock Hospital-Mangaluru, GH-Puttur, DH-Madikeri, DH-Karwar, DH-Chitradurga, GH Hiriyur, KIMS-Hubballi

[34] CV Raman GH-Bengaluru, BRIMS-Bidar, Lady Goschen-Mangaluru, GH-KR Nagara, GH-Nanjanagudu and Cheluvamba Hospital-Mysuru

Un-disposed used syringes in the hospital premises

Un-disposed used IV bottles in the hospital premises

From the above, it is evident that biomedical waste was not managed properly. Besides, affecting the environment, this would also affect the persons who handled the waste as well as the people in and around the hospital.

The Government in its reply (November 2015) stated that:

- The two hospitals which earlier did not have a contract agreement with any authorised agency, had now entered into an agreement for disposal of biomedical waste.
- Training for segregation of waste has been conducted during October 2015. It further stated that segregation would be ensured by the nodal officers of the district.
- General circular regarding burning of waste would be issued.
- Action to procure personal protective equipment for the personnel handling biomedical waste has been initiated and training to use the same would be conducted.
- Action would be taken to construct central storage facility for waste in the premises of hospitals.
- In case of non-lifting of biomedical waste for more than 48 hours, the said waste was to be disposed of in deep burial pits which were provided in all hospitals.

The action taken by the State Government towards management of biomedical waste is well appreciated. However, though it has been stated that deep burial pits are provided, it was observed that they were not being used even though biomedical waste was not disposed for more than 48 hours.

Recommendation-4: Regular monitoring of the disposal of biomedical waste as per the contract entered into with external agencies needs to be ensured. In addition, stringent penal action should be taken for non-adherence to the conditions given in the contract.

(d) Hospital Infection Control

Each hospital is required to develop a well-designed, comprehensive and coordinated Hospital Infection Prevention and Control programme aimed at reducing/eliminating risks to patients, visitors and providers of care. In this direction, each organisation has to constitute an Infection Control Committee (ICC).

We observed that two of the seven DHs had not constituted an ICC (DHs, Karwar and Kodagu). Wenlock Hospital, Mangaluru and BRIMS, Bidar constituted an ICC subsequent to our joint inspection. Further, we observed that though BIMS, Belagavi, had constituted an ICC during February 2015, it remained nonfunctional till date (August 2015). Moreover, none of the hospitals test-checked had assessed the rate of Hospital Associated Infections. Besides, we observed that except for Lady Goschen Hospital, Mangaluru, none of the other hospitals had provided training to the staff associated with infection control.

The Government replied (November 2015) that a manual on Hospital Infection Control (HIC) Committee has been prepared and the activities of HIC are covered under the Kayakalp Programme.

Recommendation-5: Training to staff in respect of Hospital Infection Control should be extended to all hospitals.

(e) Sewage/Effluent Treatment Plant

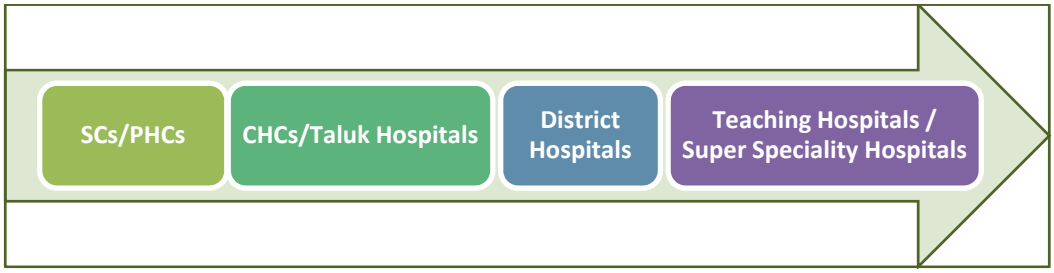
Sewage Treatment Plant (STP) is essential to manage the amount of sewerage generated in a hospital so that it does not pollute the neighbouring areas of the hospital. In the hospitals test-checked we observed the following:

- In DH, Kalaburagi we observed that though it had STP, no provision was made for its upkeep and operation.
- In Cheluvamba hospital, Mysuru, we observed the STP was under repair, consequently, the sewage waste was let out in an open drain.
- We also observed the same in GH, Shikaripura and GH, Gokak, which did not have STP.

2.1.10 Referral Services

One of the health policy goals envisaged was to establish a credible and sustainable referral system. The State Government, however, had not developed any policy regarding a system of referrals even after a decade since adopting the State Health Policy. The State has a three tier system of public health care–Primary Health Care (SCs, PHCs,), Secondary Health Care (CHCs, GHs, DHs), and Tertiary Health Care (Teaching Hospitals, Super Speciality Hospitals) and the system of referrals should be as indicated in **Chart-2.7** considering the fact that the majority of the patients who visit the Government hospitals are either poor or economically weaker.

Chart-2.7: Ideal referral system



We observed from the scrutiny of the records that the GHs invariably referred the patients only to DHs/Teaching Hospitals. However, a test-check of a few cases of referrals from GHs referred to DHs revealed the following:

- Only four cases out of 15 test-checked cases referred from GH, Aland to DH, Kalaburagi had actually visited the DH.
- 10 out of 24 test-checked cases referred from GH, K.R.Nagar to KR Hospital, Mysuru had actually visited the hospital. Similarly 11 out of 17 test-checked cases referred to Cheluvamba Hospital, Mysuru actually visited the hospital.
- In respect of cases referred from GH, Nanjanagudu to Cheluvamba Hospital, Mysuru, only 12 out of 22 test-checked cases had visited the hospital.
- None of the 29 test-checked cases referred from GH, Nanjanagudu to KR Hospital, Mysuru had visited the hospital as per the records of KR Hospital.
- Only 20 out of 105 test-checked cases referred from GH, Bailahongal to BIMS, Belagavi had actually visited the hospital.

From the above, we noticed that the percentage of referred patients actually visiting the Referral hospital was on the lower side which indicated the patients preferred private hospitals over Government Hospitals.

Further, we also observed that the secondary healthcare institutions were referring patients to other hospitals *viz*., Government hospitals, private hospitals, Government higher centre or higher centre. However, the reference letters did not indicate the name of the institution to which the patients were being referred to, but only mentioned as 'referred to higher centre/major hospital'. In the absence of the details of the institution to which the patients were referred to, it was not possible to ascertain whether the patients were provided with healthcare facilities in the Government hospitals.

Similarly in a teaching hospital (BRIMS, Bidar) we observed that the patients were being referred to Government hospitals in Karnataka, as well as Telangana and private hospitals of Karnataka, Telangana and Maharashtra. However, due to non-maintenance of referral details, the number of patients who availed healthcare facilities through Government hospitals could not be ascertained.

Hence, the goal of establishing a credible and sustainable referral system in the State health policy was not achieved.

The Government admitted (November 2015) that due to shortage of specialists and equipment, people preferred private hospitals other than referred Government hospitals.

2.1.11 Special Services initiated by GoI/State Government

2.1.11.1 Burns Ward

The main purpose of a burns unit in a Hospital is to minimise the incidence of infection among burn patients and to provide comprehensive burn care. Hence, the State Government along with dialysis unit had ordered (October 2008 and September 2009) the establishment of 12 burns wards and had also created 10 posts for the burns ward in each hospital.

We observed that except for DH, Vijayapura, none of the other hospitals test-checked had dedicated staff for burns ward. The details of the number of beds in the burns wards, exclusive manpower available and number of patients admitted, discharged and died in the sanctioned hospitals are indicated in **Appendix-2.4**[35].

The observations of the joint inspections of the burns ward in the hospitals test-checked are detailed below:

- Victoria Hospital, Bengaluru – There were 50 beds in the burns ward of the hospital located in a separate building. The hospital had a separate Burns OT. The Head of the Department (HoD) stated that the Staff Nurses working in the burns ward were not trained to handle the ventilator provided in the ward. He also stated that in the absence of a dedicated Medical Officer to attend to Medico Legal Cases, regular surgeons were over burdened to that extent.
- KIMS, Hubballi - No separate burns ward existed in the hospital though it was a tertiary care centre. Temporary arrangements, however, were being made for patients with burns, by accommodating them in General Surgery wards or the Ortho ward. The HoD stated that dedicated manpower was essential for taking care of these burns patients. We further observed that the construction of the burns ward taken up by the Institution during October 2011 at a tendered cost of ₹3.79 crore was still under progress.
- KR Hospital, Mysuru - Burns ward had five bedded ICU facility. Burns OT, however, available at the first floor of the Burns ward was not utilised since 10 years. Further, Boyle's Apparatus available in Burns OT was also kept Idle.
- DH, Karwar - As on the date of inspection, there were no patients in the burns ward. The District Surgeon stated that the burns ward was not functioning effectively in the absence of a Plastic Surgeon. He further stated that patients with only minor burns were being attended to by the General Surgeons and all other burn cases were being referred to other hospitals.

Recommendation-6: For effective functioning of the burns wards, Government should ensure availability of qualified and dedicated staff for these wards.

[35] Apart from 12 hospitals where Government order has been issued, teaching hospitals have been test-checked where burns wards exist.

2.1.11.2 Telemedicine

The Government of Karnataka introduced (2004) a telemedicine programme with the basic intention to make available specialist/super specialist services to rural poor patients at their door step *i.e.,* at DH/GH through satellite connectivity. The programme was implemented in the State in three phases covering 27 hospitals as detailed in **Table-2.3** below:

Table-2.3: Details of telemedicine programme implemented in the State

Phase	Number of DHs	No. of GHs	Total
I (2004)	07*	3	10
II (2008-09)	12	2	14
III (2014-15)	03	0	03
Total	**22**	**5**	**27**

*Two DHs, Belagavi and Mandya have been converted into Teaching Hospitals
(Source: Details provided by the Commissionerate Office)

The programme was initially started under ISRO Telemedicine programme through V-SAT connectivity and on its connectivity failure (September 2010) it was re-operationalised through KEONICS (KSWAN connectivity) during November 2014.

For effective implementation and monitoring of the telemedicine system, a Karnataka Telemedicine Trust was formed in April 2006. However, we observed that the trust was yet to be established physically (August 2015). Scrutiny of the files/statement of expenditure made available to audit revealed that an amount of ₹163.77 lakh including interest continue to remain invested in Fixed Deposits since 2009-10 out of an amount of ₹331.70 lakh released by the State Government for the programme during the period 2008-09 to 2014-15. We also observed that an amount of ₹1.25 crore was paid to KEONICS for purchase of equipment. The management of Telemedicine system was dependent on data available in Server, maintained by KEONICS.

The Principal Secretary, observing the poor utilisation of the telemedicine facility, issued (September 2014) certain instructions which were yet to be complied with by the Department. The Department had set a monthly target of 200 tele-consultations for each telemedicine centre. From the data of the number of telemedicine patients treated each month, we observed that as at the end of March 2015, the telemedicine programme was functioning effectively in eight hospitals, partly effective in four hospitals and not effective in 14 hospitals.

The Government replied (November 2015) that action would be taken to improve the functioning of the telemedicine programme by fixing targets, conducting video conferences and motivating the serving doctors.

2.1.11.3 Trauma Care

An accepted strategy of Trauma care is basic life support, first aid and replacement of fluids that could be arranged within first hour of the injury. In this regard, the Ministry of Health and Family Welfare, GoI initiated the first definitive step towards building an inclusive Trauma Care System across the

country by launching a scheme Developing Trauma Care Centres (TCCs) in GHs in and around National and State highways. In the State, eight[36] hospitals (which covered three hospitals test-checked) were selected for upgradation of TCCs for which GoI released (between 2008 and 2011) an amount of ₹19.38 crore against ₹48.10 crore sanctioned.

On scrutiny of records, we observed that seven out of the eight TCCs were not fully operational as on August 2015 on account of non-completion of civil works or non-procurement of equipment or required man power not put in place.

- The scheme had envisaged renovation of the existing hospital building for Trauma Care. Audit observed that an expenditure of ₹32.83 lakh was spent in GH, Sira on repair and renovation of hospital building instead of on TCC.

  The Government replied (November 2015) that the amount was utilised based on the decision of Arogya Raksha Samithi and permission of the Department of HFW. The reply, however, is not acceptable, as the GoI guidelines specifically states that the grants should be utilised only towards construction of TCC.
- The DH Chitradurga utilised ₹80 lakh towards construction of a TCC in 2010-11. However the constructed TCC was utilised as an orthopaedic ward and OT.
- Audit scrutiny revealed that the equipment purchased was not installed in the TCCs as the same were not constructed as per norms stipulated by GoI. As such, equipment were being used in ICUs and OTs. The Government replied that due to lack of space in the TCC, some of the equipment was being utilised in ICU and OT. The reply is not acceptable since the TCCs are constructed as per the norms stipulated by GoI wherein space for all equipment is taken into consideration for placing the equipment procured for TCCs.
- GoI had released ₹two lakh for each TCC for establishing communication linkage between mobile units, highway location and designated TCCs. We observed that in six[37] out of eight hospitals, the required communication linkages had not been established.
- As per the scheme guidelines, GoI had to meet the expenditure on manpower of TCCs during the first five years of its existence. Accordingly, GoI had released ₹3.62 crore during 2010-13. Though the State Government had to finalise the required manpower within the stipulated period of 30 days from the date of sanction of the grant, it took action in respect of five TCCs only in July 2012. In respect of three TCCs, though GoI sanction was received in 2008, the State Government was yet to sanction staff. In BIMS, Belagavi due to non-sanction of posts by the State, no staff was exclusively posted to the TCC. Further, we observed that six out of eight hospitals did not have a General Surgeon (trained in Neuro Surgery), three hospitals did not have an Orthopedic Surgeon, four

[36] KIMS-Hubballi, DH-Chitradurga, BIMS-Belagavi, DH-Chikkaballapur, DH-Davanagere, DH-Haveri, DH-Tumakuru and GH-Sira

[37] KIMS-Hubballi, DH-Chitradurga, BIMS-Belagavi, DH-Chikkaballapur, DH-Davanagere and DH-Tumakuru

hospitals did not have an Anesthetist, seven hospitals did not have a Casualty Medical Officer, three hospitals did not have staff nurse, five hospitals did not have OT technicians, and five hospitals did not have Radiographers. Besides, we observed that none of the eight hospitals had deployed staff nurses who had undergone one year programme of trauma care. The details of staff sanctioned are detailed in **Appendix-2.5**.

Thus, Government's failure in planning, sanction of manpower and monitoring not only resulted in under utilisation of the grants released, but also non-compliance to stipulations under the scheme guidelines. This resulted in non-release of balance grant of ₹28.72 crore and also non-achievement of the objective of the scheme.

Recommendation-7: Government needs to fully operationalise the already launched TCCs by completing civil works, procuring necessary equipment and providing the required manpower.

2.1.12 Super Speciality Hospitals

The Super Speciality Hospitals form part of tertiary health care services and provide specialisation services in a particular field *viz*., cardiology, nephro-urology, ophthalmology, orthopedic *etc*. Audit test-checked the Institute of Nephro-Urology and Pradhan Mantri Swastha Suraksha Yojana Super Speciality Hospital in Bengaluru and the audit observations are discussed in the following paragraphs.

2.1.12.1 Institute of Nephro-Urology

The Institute of Nephro-Urology an exclusive autonomous institute located in the campus of Victoria Hospital, Bengaluru, provides health care services in the field of nephrology and urology. The Institute was established with theobjective ofproviding relief from Nephro-Urology diseases; providing advanced treatment and comprehensive care to Nephro-Urology patients; promoting, supporting and encouraging study, research and training programmes relating to prevention, diagnosis and treatment in the field of Nephro-Urology diseases and providing treatment for the diseases related to Kidney Failure & Renal Transplant.

The audit observations on the functioning of the institute are discussed below:

- The institute which had procured (September 2012) 25 Haemodialysis Machines at a total cost of ₹1.64 crore had installed 19 units during September – November 2012. Balance six machines were not installed due to non-availability of space.
- Presently, around 200 tests were being carried out by the Institute's Biochemistry/Microbiology section. It used Open Channel system of testing, wherein the turnaround time[38] is usually 2-3 days. In order to reduce the turnaround time and for timely submission of reports to the patients, the department needed a Fully Automatic "Chemiluminescence" Analyser.

[38] Turnaround time is the total time taken between the submission of a programme/ process for execution (sample collection) and the return of the complete output to the customer/user (delivery of reports).

In compliance with the observations of the joint inspection, the Institute stated (August 2015) that the remaining Haemodialysis units have now been installed, process for purchase of ChemiluminescenceAnalyser has been initiated.

2.1.12.2 Pradhana Mantri Swastha Suraksha Yojana Super Speciality Hospital

The State has a Government Super Speciality Hospital established (2012) under the Pradhana Mantri Swastha Suraksha Yojana. The Hospital has speciality services *viz*., Neurology, Neurosurgery, Plastic Surgery, Cardiology, Pediatric Surgery, Anaesthesia, Surgical Gastroenterology & Liver Transplant to cater to the needs of the patients and reduce the burden on National Institute of Mental Health and Neuro Sciences (NIMHANS) and Jayadeva Institute of Cardiology and Cardiovascular Sciences.

Audit observed that patients were not being referred to this hospital by other Government hospitals as the hospital is working to about 56 *per cent* of occupancy during 2014-15. In this regard, Government replied (November 2015) that action would be taken to conduct awareness camps and issue Government circulars.

Recommendation-8: Government needs to create awareness among public about the Pradhana Mantri Swastha Suraksha Yojana in order to provide quality healthcare to the common people.

2.1.13 Conclusion

The Health care services suffered in Karnataka due to inadequacy of requisite health, human resources and infrastructure. Super speciality services, where provided, had state-of-the-art equipment, highly qualified professionals and maintained a very high quality of services. The taluk level hospitals, however, were unable to deliver quality services as envisaged due to various reasons.

Seventy five *per cent* of the hospitals had less sanctioned strength than those prescribed under IPHS guidelines with regard to specialists, staff nurses and laboratory technicians which hampered healthcare services in terms of patient care as well as availability of services. In many hospitals, available equipment remained unutilised due to shortage of technical manpower. Most of the clinical laboratories in the hospitals were not fully equipped and in many instances, the existing equipment was not in working condition, thereby depriving patients of quality laboratory facilities. Patients had to depend on private blood banks for obtaining blood due to non-working of its blood banks. All the 28 hospitals test-checked did not follow required zoning as per IPHS guidelines, thereby affecting its efficacy with regard to cleanliness and controlling of infections.

The Special Services initiated by the State/GoI *viz*., establishment of Burns Ward and Trauma Care Centres did not take off as envisaged.

Department of Higher Education

2.2 Engineering Education in Karnataka

Executive summary

Engineering Education in the State is available in 216 Engineering Colleges affiliated to Visvesvaraya Technological University (VTU)/Bangalore University which included National Institute of Technology, Suratkal and colleges under deemed universities. It is under the administrative control of the Department of Higher Education and a range of other organisations also play a role in engineering education. A performance audit of 'Engineering Education in Karnataka' during 2010-15 showed the following:

- Majority of engineering colleges opened in the State were mainly concentrated in Bengaluru which led to regional disparity and there was no engineering college in Koppal district though approved by Government in 2011. Thus, expansion of engineering colleges continued without addressing the issues of regional imbalance.
- There was a declining trend in the enrolment of SC/ST students, differently-abled students, students from kannada medium and rural area to the engineering stream.
- Affiliation procedure was not completed prior to the commencement of admission of students to the college seeking affiliation, which ranged between 26 and 155 colleges during the period 2011-15.
- Since permanent affiliation was not mandatory, only 48 out of 162 colleges had permanent affiliation for their courses.
- Recommendations of VTU with respect to intake capacity were overruled by Government, resulting in large scale vacant seats which rendered the affiliation process a mere formality.
- Though accreditation was mandatory, VTU as well as many of its affiliated colleges were yet to secure accreditation from National Assessment and Accreditation Council as well as National Board of Accreditation. This indicated that the quality of education being imparted by VTU as well as engineering colleges was not of requisite standards required for the above accreditations.
- Marks were changed in over 90 *per cent* of answer papers for which re-evaluation was sought, which was indicative of poor quality of evaluation.
- VTU did not ensure continuous support to e-Vidya, EDUSAT in the e-learning projects initiated by it which rendered the projects unproductive.
- VTU had failed to ensure minimum standards prescribed by AICTE in respect of colleges affiliated to it as the colleges had deficiencies in teaching faculty, library, laboratory facilities, *etc*., which indicated poor monitoring by the VTU.
- VTU had failed to receive recognition from UGC even after 17 years of its existence as it had not met minimum standards required for recognition. Hence, it did not act as a good role model for the institutions affiliated to it.

2.2.1 Introduction

Higher education is crucial for the economic and social development of any State and is a concurrent responsibility of the Central and the State Governments. The Technical Education sector in the State is governed by the policies of the State Government as well as the All India Council of Technical Education (AICTE).

Engineering Education in the State is available in the colleges that are affiliated to the Visvesvaraya Technological University (VTU), University Visvesvaraya College of Engineering (UVCE) of Bangalore University and the National Institute of Technology, Karnataka (NITK) Suratkal. It is co-financed by the Central as well as the State Government. As of 2015, Karnataka has a total of 216[39] Engineering Colleges which includes 11 Government colleges, 12 Government aided private colleges, 177 un-aided private colleges and 14 deemed colleges. Apart from the Central and State Government, a range of other organisations play a role in engineering education as shown in **Appendix-2.6.**

2.2.2 Organisational setup

Engineering education is under the administrative jurisdiction of the Department of Higher Education headed by the Principal Secretary. The Universities of Technical Education function in accordance with the acts and statutes framed thereunder. Directorate of Technical Education assists the Department of Higher Education with regard to the management of government colleges and the regulation of grant-in-aid to the private aided engineering colleges. The Project Director, State Project Facilitation Unit, assists the State Government in the implementation of the World Bank aided Technology Education Quality Improvement Project (TEQIP). The Karnataka Examination Authority (KEA) is responsible for conducting the examinations for the enrolment of students to the engineering institutions.

2.2.3 Audit objectives

This Performance Audit was conducted with the objective of

- Assessing the extent to which government achieved the goals of expansion, equitable participation and excellence in engineering education.
- Assessing the adequacy of infrastructure for teaching and learning in engineering institutions and their bearing on student progression and achievement.

[39] Includes one NITK, Suratkal and one engineering college under Bengaluru University – UVCE and six colleges providing only post graduation courses.

2.2.4 Audit criteria

The criteria for this performance audit were based on the following sources:

- VTU Act, 1994, and Statutes /Regulations issued from time to time
- AICTE Approval Process Handbook
- VTU Vision 2020 document
- UGC Regulations
- Second Expenditure Reforms Commission Report of Karnataka

2.2.5 Audit scope and methodology

The performance audit covered engineering colleges coming under VTU and UVCE, Bengaluru. The audit commenced with an Entry Conference held on 23 April 2015 with the Principal Secretary, Higher Education Department. Audit was conducted during March 2015 to August 2015, covering the period 2010-15 through a test-check of records of the Higher Education Secretariat and VTU and an analysis of data in respect of two government colleges, two aided colleges and 29 unaided colleges. We selected the colleges on the basis of simple random sampling covering two revenue divisions, *viz*., Bengaluru and Kalaburagi for detailed examination. Additionally, five colleges having the highest admissions and five colleges having the lowest admission were also examined (**Appendix-2.7**).

Audit findings were discussed with the Principal Secretary, Higher Education, in an Exit Conference held on 18 November 2015.

Audit findings

2.2.6 Planning for expansion, equitable participation and excellence in engineering education

In order to promote planned and sustainable development of technical education, consistent with the state and national policies, VTU was established (1998) by the Government of Karnataka. The mission statement of VTU included encouraging engineering and technical education among women and the differently-abled and introducing new programmes in engineering areas consistent with the needs of the industry and society. Further, the Higher Education Vision 2020 document has identified certain focus areas which include establishment of Institutes of Higher Education, especially in rural and backward areas. In addition to the above objective and vision, the principal objectives, goals and strategies of the University Grants Commission (UGC) during the 12th Five year plan include providing equal opportunities for quality higher education, correcting regional, sectoral and social imbalances, and achieving international benchmarks of excellence and extending the frontiers of knowledge.

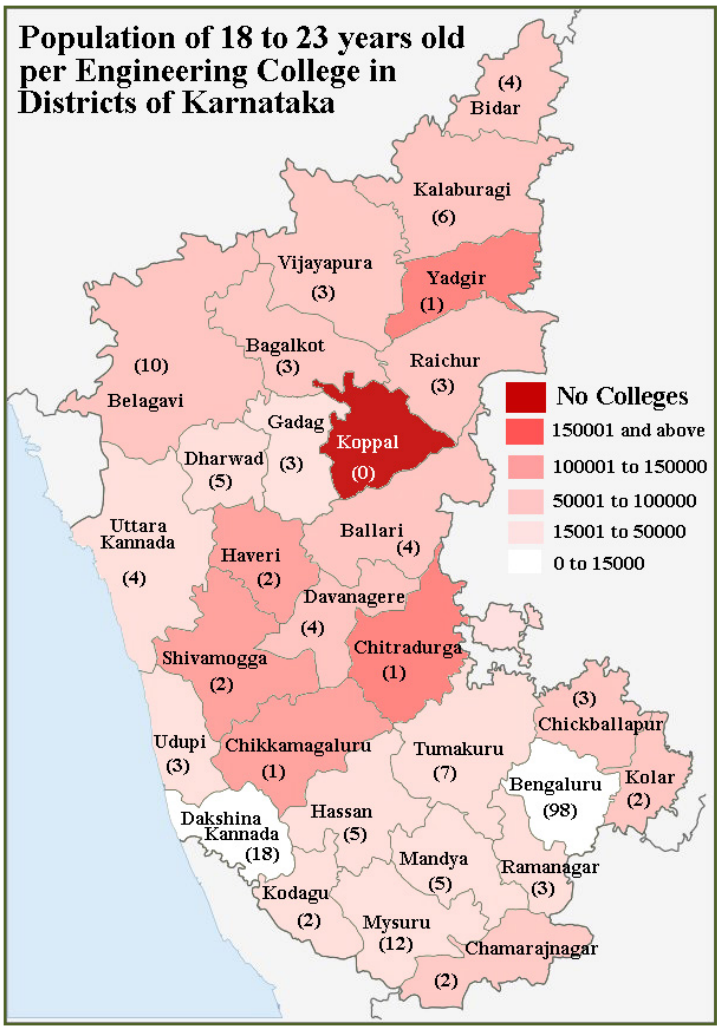
2.2.6.1 Expansion of Engineering Education

(a) Expansion leading to regional imbalances

The challenge of keeping pace with the ever growing number of students and the demand for higher education results in the expansion of intake capacity and new institutions. The expansion is not just about making room for ever-higher numbers; it is also about directing these numbers in the right stream and sectors. Much of this expansion should also cover marginalised sections of society, backward regions and villages. This would mean that the creation of new institutions should also be focused in regions and districts where student enrolment and institutional density is low.

We observed that though there has been three fold expansion since 1998, the State Government did not have a documented strategy for facilitating orderly and equitable expansion of engineering education. We also observed that VTU did not have an institutional mechanism to analyse regional demand as well as requirements of various sectors of the economy. The density of population of 18 to 23 years old per college in each district of the State is shown in **Chart-2.8**.

Chart-2.8: Density of population per college



From the chart we observed that out of the 30 districts, while one district (Koppal) with 1.92 lakh population (of 18 to 23 years old) did not have any college for engineering education, seven[40] districts with population less than that of Koppal had colleges in the range of two to five per district. In two districts (Bengaluru and Dakshina Kannada), we, however, observed that the density of population of 18 to 23 year old per college was less than 15,000. This indicated that the State Government concentrated expansion in few districts only.

To address the regional imbalance, the Expenditure Reforms Commission in its second report (February 2011) had also recommended that new private technical colleges that can provide for adequate faculty and infrastructure could be permitted, with required clearance from AICTE, particularly in districts where there were no or very few colleges for technical education. We, however, observed that during 2010-11, 78 *per cent* of the institutions having 79 *per cent* of the total undergraduate (UG) intake capacity were established in Bengaluru and Mysuru region. These regions continued to add more number of colleges in comparison to the Belagavi and Kalaburagi regions during 2010-15.

In four colleges test-checked on the basis of lowest percentage for admissions (established after 2010), we observed that the vacant seats ranged between 50 and 92 *per cent*. This indicated that the colleges were established in these regions without adequate demand.

The Government replied (December 2015) that the expansion of colleges in Bengaluru and Mysuru regions was on account of the Trusts/Societies preferring to establish new engineering colleges in already developed regions, students preferring to enroll themselves in these regions, majority of industries were located around Bengaluru and Mysuru and hence increase in opportunity of placements. The reply, however, is not acceptable despite the reasons given, there were substantial vacancies in the new colleges established in Bengaluru and Mysuru. In the absence of any policy/guidelines issued by the State Government was not able to control the mushrooming of majority of such colleges at Bengaluru and Mysuru only.

Recommendation-1: In accordance with the recommendations of the Expenditure Reforms Commission, the Government may consider giving permission for opening of new engineering colleges after due consideration to the requirements of deficit regions/districts.

(b) Engineering colleges yet to be established

The Government approved (November 2011) the establishment of two engineering colleges - one for Koppal district which did not have any engineering college, and one for Chikkamagalur district which had one engineering college. These districts had high demand from the year 2012-13 and 2013-14 respectively. However, we observed that as of July 2015, the colleges were yet to be established. The Government replied (December 2015)

[40] Chamrajanagar (1.19 lakh), Chikkaballapur (1.58 lakh), Gadag (1.36 lakh), Kodagu (0.58 lakh), Ramanagara (1.28 lakh), Udupi (1.25 lakh) and Uttara Kannada (1.58 lakh)

that due to paucity of funds, the work was yet to commence. Since the government itself had approved the establishment of these two colleges in 2011, adequate provision of funds should have been made.

(c) Seats remaining vacant on the increasing trend

Data on students who had passed out of Pre-University in the science stream in Karnataka, and had selected engineering is provided in **Table-2.4**. The intake capacity of engineering colleges and the vacant seats (all through CET) during 2010-14 is also depicted in **Table-2.4**.

Table-2.4: Data on students passed in PUC Science, intake capacity and vacant seats in engineering colleges during 2010-14

	2010-11	2011-12	2012-13	2013-14
Students passed in PUC science	94,097	1,06,915	1,25,288	1,28,387
Students who selected engineering through CET (*per cent*)	40,378 (43)	42,690 (40)	47,922 (38)	49,886 (39)
Intake capacity of engineering college	54,937	57,769	62,764	65,679
Vacant CET seats in engineering colleges	14,559	15,079	14,842	15,793

(Source: Information furnished by the Pre-university Board & VTU)

From the table, it is clear that there was an overall decreasing trend in percentage terms of the number of students opting for technical education through CET[41]. It was further observed that though the students opting for engineering was less than 50,000 in any of the years during 2010-14, increasing intake capacity of engineering colleges/establishing more engineering colleges than required resulted in seats remaining vacant in 63 to 81 *per cent* of colleges during 2010-14.

Further analysis of the above data, division-wise, for the year 2014-15 **(Appendix-2.8)** revealed that the demand in Belagavi and Kalaburagi divisions did not match with the Government's intake capacity.

This indicates that there are no clear parameters put in place by the State Government for opening of new colleges. Thus, due to lack of any control mechanism with the Government, there has been unbridled expansion of colleges in Bengaluru and Mysuru resulting in many seats remaining vacant. Similarly, due to lack of active role by the Government, the existing colleges in Belagavi and Kalaburagi divisions could not meet the growing demand for engineering education. The Government replied (December 2015) that due to relaxation in policy of AICTE with regard to ceiling on intake capacity, many colleges applied for increase in its intake, which resulted in creation of vacant seats. The reply, however, is not acceptable as the VTU was responsible for recommending the number of students for intake and the Government was the final authority for approving the same. Hence, increase in intake without actual demand created more vacancies. Thus, the State Government failed to perform its assigned task in this regard.

[41] The intake capacity and actual admission in the performance audit confines only to the CET admission process. In the State, admission to Engineering is mainly through three methods *viz*., Common Entrance Test (CET) only for students of Karnataka, where the Government reserves 100 *per cent* seat in Government colleges, 95 *per cent* seats in Government aided colleges and 45 *per cent* in private colleges; COMED-K conducted by consortium of private colleges for students from all over the country and lastly through management quota.

(d) Expansion without adequate analysis of needs of industry/society

The objective and vision of VTU included supply of manpower of appropriate kind and quality to meet the needs of society as well as national development plans and to contribute to the smooth and effective transfer of technology to the agencies that require them in the community.

Further, the report of the Karnataka Manufacturing Taskforce formed by the Government to study the manufacturing sector in Karnataka suggested (November 2013) interventions to drive growth in the sector in a sustainable and holistic manner. It highlighted defence, aerospace, textile and garments, food processing, biotech and pharmaceuticals, automotive and engineering, machine tools *etc*., as some of the emerging areas.

We, however, observed that though the State already had courses in some of the areas such as textile and garments, biotech, aerospace *etc*., it required to create more awareness of the availability of these courses. Also, we observed that VTU did not have any institutional mechanism to analyse the requirements of various sectors of the economy and was yet to determine the gaps in supply of manpower in the above mentioned emerging areas.

The Government replied (December 2015) that VTU had sent circular to all the engineering colleges to conduct survey and study the requirement of the society and suggest new courses to be introduced. The reply is not acceptable as the decision to introduce new courses was the responsibility of both VTU and the Government and not of individual colleges.

Recommendation-2: VTU may consider setting up an institutional mechanism to analyse requirements of various sectors of the economy to address the needs of industry and society.

2.2.6.2 Equitable participation

The mission statement of VTU included encouraging engineering and technical education among women and the physically impaired. Further, in order to achieve the goals of equity and inclusion, during the 12th five year plan, the UGC also envisaged building of capacity and improvement of infrastructure to attract and facilitate the retention of students from rural and backward areas as well as women and the differently-abled. It also envisaged pro-active measures such as proper implementation of the reservation policy for students belonging to SC/ST/OBC and the disadvantaged and increasing the incentives offered to differently-abled students as well as those from the marginalised sections so that they can participate in higher education.

Data of KEA regarding intake capacity and actual intake for the years 2010-15 is given in **Table-2.5**.

Table-2.5: Intake capacity and actual intake of engineering seats with regard to SC/ST/differently-abled, women *etc*.

Year	Intake capacity					Admissions					
	SC	ST	Differently abled	Kannada Medium	Rural Area	SC	ST	Differently abled	Kannada Medium	Rural Area	Women
2010-11	6,039	1,213	120	2,035	6,085	3,888	1,015	117	1,508	4,403	NA
2011-12	5,976	1,190	73	2,047	6,111	3,459	874	72	1,333	3,895	NA
2012-13	6,306	1,256	1,319	2,114	6,303	3,848	871	63	1,401	4,107	17,795
2013-14	6,681	1,336	1,395	2,256	6,680	3,969	804	57	1,338	3,868	20,130
2014-15	6,122	1,218	1,465	2,062	6,125	3,841	756	56	1,201	3,444	23,167

(Source: Information furnished by Karnataka Examination Authority)

From the above table it may be seen that though the participation of women in technical education had increased moderately, there was stagnancy/decline in the admission of SC/ST during 2010-15. It was also observed that the admission of students who were differently-abled, had studied in Kannada medium, and who were from rural areas, showed a declining trend.

Though UGC had envisaged providing appropriate infrastructure and other support facilities, such as development of suitable technologies and textual material for differently-abled students, we observed that the State Government had not made adequate efforts in this regard. In addition, UGC in XII Plan Guidelines for its developmental assistance has allocated separate grants for schemes meant for equal opportunities, *viz*., Equal Opportunity Cell, Remedial coaching for SC/ST/OBC/Other Minorities, Schemes for Persons with Disabilities *etc*., for the Universities/Institutions recognised by them. The VTU as well as its affiliated institutions are not eligible for the said grants since they are not recognised by UGC. Further, any additional efforts made towards providing equitable participation were not evident from the records of VTU as well as Government.

The Government replied (December 2015) that in line with the UGC guidelines, the VTU had established a cell during 2014-15 in the University not only to look into the implementation of reservation policy at VTU but also to undertake all possible measures to increase enrolment of SC/ST students in engineering stream. However, since there was a declining trend not only in enrolment of SC/ST, but also in differently-abled students, students from Kannada medium and also from rural area, action in these area was also required.

Recommendation-3: Government needs to address the declining trend in admissions of students from SC/ST category, differently-abled students, students from Kannada medium and also from rural area through a policy intervention.

2.2.6.3 Excellence in Engineering Education

Increased access to higher education is not sufficient unless quality education is provided. In order to provide quality education, the standard of the colleges needs to be increased. In this regard, the measures taken by the State Government and the audit observations are mentioned below.

(a) Affiliation of colleges

The affiliation process offers an opportunity for VTU to evaluate and monitor the institutions. An institute proposing to offer technical education has to first seek affiliation from the university before starting academic activities. In the first instance, the programmes under the newly established institutions are given temporary affiliations on an annual basis. On completion of five years, these institutions become eligible for permanent affiliation, which is granted for a period of six years at a time. Further, VTU has to ensure mandatory accreditation of the technical colleges by National Assessment and Accreditation Council (NAAC) and their programmes by National Board of Accreditation (NBA) as per relevant regulations of UGC as amended from time to time. On scrutiny of the data, we observed as under:

- ***Delay in completion of the temporary affiliation process***

The process for affiliation of institutes to VTU involves various procedures which are required to be completed prior to the commencement of the admission process every year. The procedures involve:

- colleges applying for affiliation submitting their application to VTU.
- appointing Local Inquiry Committee (LIC) by the Executive council for making inquiry and recording the results of such inquiry.
- submission of application along with proceedings of the Academic Senate and the Executive Council to the State Government by the Registrar.
- State Government recommending for the grant of the affiliation based on such inquiry as may appear to be necessary.
- issue of affiliation orders by VTU based on the recommendations of the State Government.

Though the entire affiliation process is time bound, we observed that during 2011-15, VTU had not completed the affiliation procedure prior to the commencement of the admission of students to the college seeking affiliation. We also observed that inspite of the local inspection team pointing out non-compliance to the AICTE norms by the colleges who had applied for affiliation with regard to infrastructure, teaching, learning facilities *etc*., every year, the admission process was completed even before the colleges complied with the observations and received affiliation. The number of colleges which received affiliation after commencement of the academic year is given in **Table-2.6** below**:**

Table-2.6: Number of colleges where admissions took place prior to affiliation

Year	Number of colleges	Delay in receipt of affiliation[42]				
		1 month	2-5 months	6 -11 months	1 year	>1 year
2011-12	26	4	7	12	0	3
2012-13	148	71	39	35	1	2
2013-14	155	122	31	2	0	0
2014-15	37	29	6	2	0	0

(Source: Information furnished by VTU)

[42] Delay has been calculated from the re-opening of the academic year i.e., from August onwards.

Due to this delay in affiliation process, it could not be ruled out that the admission of students was done in colleges without affiliation or to courses without affiliation. The Government replied (December 2015) that the VTU had started the process of granting affiliation for the academic year 2016-17 and would complete the process by January 2016. The reply is not acceptable, as Government/VTU has yet to put in place a permanent mechanism for granting temporary affiliation before admissions. Thus, Government/VTU allowed engineering colleges to carry on their activities, though they were not fulfilling minimum benchmarks for their continuation.

- ***Recommendations of VTU overruled by the Government***

After noticing deviations from the prescribed norms by the colleges, the Executive Council of VTU had recommended closure of programmes/ reduction of intake. We, however, observed that the Government disregarding the recommendations had approved higher intake and also continuation of programmes. Further, it was also observed that before overruling the recommendations of VTU, the Government had not conducted any additional enquiries on its own. During 2010-15, the intake recommended by VTU and the Government is given in **Table-2.7.**

Table-2.7: Comparison of intake recommended by VTU and State Government during 2010-15

Year	No. of Colleges	Intake recommended	
		By VTU	By State Government
2010-11	52	1,926	5,218
2011-12	48	2,397	5,458
2012-13	45	1,782	4,546
2013-14	31	1,446	3,384
2014-15	82	5,200	11,856

(Source: Information furnished by VTU)

VTU had recommended a reduction of intake based on the local inspection committee report which reported deficiencies in the colleges, mainly regarding infrastructure and teacher-student ratio. However, the Government took a divergent view without any recorded reasons and increased the intake capacity in spite of the issues with student-teacher ratio and inadequacy of infrastructure, thereby impacting the standard of education. This reduced affiliation to a mere formality rather than a monitoring mechanism for enhancing quality in education. Thus, Government is responsible for large number of engineering seats remaining vacant.

- ***Withdrawal of affiliation***

As per VTU Act, the Executive Council of VTU inspects colleges based on the returns/reports submitted to the Registrar by the colleges in order to judge the efficiency of the college/institution. VTU can withdraw or modify the rights conferred on a college as a constituent college of VTU, if any college fails to comply with the provisions made or failed to observe any of the conditions of affiliation.

We, however, observed that though the local inspection committee had observed non-compliance to the prescribed norms during granting of

temporary affiliation in respect of colleges, there was no follow up action by VTU for ensuring the compliance during the course of the academic year. Hence, non-compliance to the norms persisted year after year, resulting in poor quality education in the colleges which were given temporary affiliation. Also, VTU took no action to withdraw affiliation of such colleges except in the case of seven colleges during 2014-15. Also, we observed that there was no criterion fixed for granting/withdrawing of affiliation.

- ***Non-recognition under Section 2(f) and 12(B) of UGC Act, 1956***

In order to ensure base level quality across institutions of higher education, the UGC had mandated universities and colleges to be recognised under Section 2(f) and 12(B) of the UGC Act, 1956, in order to receive development grants. The minimum norms and standards prescribed under the said sections were in the areas of physical facilities, infrastructure, human resources, particularly teachers, and financial viability.

We observed that VTU's request (September 2011) for its inclusion under Section 12(B) of the UGC Act, 1956 was rejected by UGC because VTU did not meet minimum standards under teaching as it had shortage of faculty. Thus, VTU has not been recognised by the UGC even after 17 years of its existence. Hence, VTU was unable to get developmental grant meant to improve its infrastructure and basic facilities in the VTU along with enhancement of quality in education. In addition, it also lost grants to promote equity, which has already been discussed in earlier paragraphs. Thus, the Government needs to address the issue on priority as the VTU as a University is yet to be recognised by UGC even after its existence of 17 years.

Further, we also observed that out of 200 engineering colleges affiliated to VTU, only 14 private colleges were recognised under Section 2(f) and 12(B) of the UGC Act, 1956, which is a matter of concern from the view point of quality education.

From the above, it has been observed that the university as well as its affiliated colleges did not provide the minimum standards as per UGC requirements in respect of infrastructure, human resources, *etc*., thereby not ensuring quality education and also not qualifying for UGC grants.

- ***Shortfall in permanent affiliation***

UG and post graduate (PG) Programmes at colleges are eligible for permanent affiliation provided they have been temporarily affiliated by the University for a minimum continuous period of five years and have satisfied all additional requirements specified in the VTU Statutes on Permanent Affiliation of colleges, 2011. We, however, observed that out of 162 colleges that were eligible to apply for permanent affiliation, only 48 colleges had permanent affiliation for its courses. Since acquiring permanent affiliation was not made mandatory in the VTU Act, all the affiliated colleges continued to have temporary affiliation for long periods. In addition, the affiliated colleges failed to achieve and impart high standard education.

- ***Permanent affiliation granted without ensuring eligibility***

The VTU statutes on Permanent Affiliation of Colleges, 2011, stipulate various eligibility criteria which include recognition of the colleges under Section 2(f) of UGC Act, 1956, for granting permanent affiliation. Scrutiny of the 48 institutions whose courses were granted permanent affiliation revealed that 32 colleges did not have recognition under Section 2(f) of the UGC Act, 1956. Thus, VTU had granted permanent affiliation without ensuring the eligibility of those colleges, which indicated lapses in the affiliation process. The Government replied (December 2015) that VTU had taken measures to verify the status under 2(f) under UGC Act, 1956 before granting permanent affiliation. The reply is not satisfactory, as Government as well as VTU needs to encourage the engineering colleges to apply for recognition under 2(f) and 12(b) under UGC Act, 1956 as well as for permanent affiliation.

Recommendation-4: VTU should have a relook into its practice of granting temporary affiliation for an indefinite period without making it mandatory to get permanent affiliation.

- ***Operation of Extension Centres in affiliated colleges and private companies***

The UGC guidelines on university courses being run by private agencies state that a university can conduct courses through its own department, its constituent colleges or through its affiliated colleges. In addition, the AICTE Act stipulates that institutions should not have a collaborative arrangement with any University for conducting any non-technical/technical course other than those approved by the AICTE. We, however, observed that VTU, disregarding the provisions, was operating eight extension centres and 13 Quality Improvement Programmes Extension Centres through affiliated colleges and seven extension centres in private companies which was irregular. Further, none of the affiliated colleges had obtained approval of the AICTE in this regard.

The Government replied (December 2015) that at present VTU has not started any new extension centres in its affiliated colleges as well as in companies.

(b) Granting of autonomy

Academic autonomy refers to the freedom granted by VTU to a college in all aspects of conducting its academic programme for promoting excellence. In this regard, VTU has brought out the VTU Autonomous College Statute, 2006, with the objective of meeting the twenty first century challenges faced by the technical education system in the country.

We observed that as at the end of March 2015, VTU had granted autonomy to its 21 affiliated engineering colleges out of which two[43] have been declared as Deemed Universities. In this regard, we observed the following:

[43] Sri Siddhartha Institute of Technology, Tumakuru and BVB College of Engineering and Technology, Hubballi

- The UGC guidelines as well as the VTU Statutes on Autonomous Colleges (Amended), 2011, stipulate that the autonomous status should be at the institutional level, covering all programmes offered by the colleges at the time of conferment of autonomous status. We, however, observed that in seven colleges, while autonomy was granted in respect of UG courses, PG courses continued to be non-autonomous, which was not in conformity with the UGC guidelines as well as provisions under the VTU Autonomous College Statute.
- According to the VTU Statutes on Autonomous Colleges (Amended), 2011, the autonomous colleges were to get their programmes accredited by the NBA within a period of two years from the date of conferment or extension of autonomous status. We observed that out of 19 autonomous colleges, 15 colleges with 204 programmes were eligible to obtain NBA accreditation. Out of this, while only 29 programmes in six colleges were NBA accredited as at the end of March 2015, 84 programmes accredited earlier failed to renew their accreditation after expiry and 91 eligible programmes had never secured accreditation (**Appendix-2.9**).
- In order to promote excellence in technical education VTU granted autonomous status to 19 of its affiliated colleges. In order to maintain and improve the standard of education, two external evaluations were to be conducted at the end of the 4th and 6th year. The later evaluation would determine the continuance or revocation of the autonomous status of the institution. We, however, observed that no external evaluations had been done at the end of the 4th year, as required. Further, we observed that though reports of the review conducted (2015) by VTU with respect to these autonomous colleges showed deficiencies in some areas, *viz*., design of curriculum, learner centric initiatives, examination practices *etc*., which suggests that none of the colleges granted autonomous status was meeting the high specified standard for autonomous colleges, they were recommended for extension of autonomy. The details of colleges are given in **Appendix-2.10**. Action taken by VTU to enhance the level of performance of these autonomous colleges was not forthcoming from the records.

The Government replied (December 2015) that VTU would take all possible measures to implement the UGC guidelines while granting autonomous status to its affiliated colleges. It further replied that VTU would instruct all autonomous colleges to renew their NBA accreditation and also enhance their level of performance. The reply is not acceptable, as VTU in addition to issuing instructions, had to ensure that its statutes were implemented by the colleges affiliated in order to monitor the performance level of the autonomous colleges.

(c) Accreditation of courses

Accreditation is a process of quality assurance whereby an institution or course in an institution is critically appraised to verify whether they continue to meet or exceed the norms and standards prescribed. There are two central bodies empowered to grant accreditation *viz*., NAAC and NBA in India. While NAAC has been set up by the UGC for institutional accreditation, NBA has

been set up by the AICTE for accreditation of technical programmes. On scrutiny of records, we observed the following:

- NAAC accredits all institutions of higher education and grades them on the basis of their academics, governance, physical facilities and infrastructure. Further, UGC (Mandatory Assessment and Accreditation of Higher Educational Institutions) Regulations, 2012, stipulate that all higher educational institutions which have completed six years of existence obtain accreditation mandatorily by June 2013. We, however, observed that VTU was yet to obtain NAAC accreditation.
- In addition, all higher educational institutions, having a record of at least two batches of students graduated or have been in existence for six years, were eligible to apply for NAAC accreditation *i.e.,* all institutions offering BE/B.Tech and having completed five years and institutions offering ME/M.Tech and having completed three years as of 2013-14 were eligible for NAAC accreditation. We, however, observed that till date, out of 162 institutions eligible for NAAC accreditation, only six institutions had obtained accreditation. This indicated low commitment by these institutions towards quality and excellence.
- NBA operates a two-tier system of accreditation to programmes, *viz*., Tier-I and Tier-II. While Tier-I accreditation is for the engineering programmes offered by autonomous institutions, Tier-II accreditation is for non-autonomous institutions affiliated to a university. The parameters adopted by NBA for accreditation of programmes are based on initial capabilities, competence, skill *etc*. We, however, observed that VTU had not made any efforts to obtain NBA accreditation for any of its programmes, which indicated lack of commitment towards quality and excellence in delivery of technical education. The accreditation status of its affiliated institutions as at the end of March 2015 is detailed in **Table-2.8** below.

Table-2.8: Status of NBA accreditation of VTU affiliated institutions

Type of accreditation	No. of colleges eligible	Total no. of programmes	No. of colleges received accreditation	Total no. of programmes	Percentage of programmes which received accreditation
Tier I	15	298	2	15	5.03
Tier II	162	1,164	8	37	3.18

(Source: Information furnished by VTU & collected from NBA website)

- Further analysis of Tier II accreditation revealed that against 111 eligible institutions for Tier II accreditation during 2010-11, 44 institutions had Tier II accreditation. Though the eligible colleges for accreditation increased steadily and was 162 during 2014-15, the colleges which received accreditation was inversely proportional and decreased to eight in 2014-15, which is brought out in **Table-2.9**. This indicated that the institutes were not according due priority to improvement of their programmes.

Table-2.9: Status of Tier II accreditation during 2010-15

Year	No of colleges eligible for accreditation	Total No. of courses	No. of colleges having accreditation	No. of courses	Percentage of courses with accreditation
2010-11	111	761	44	234	30.75
2011-12	115	804	18	76	9.45
2012-13	132	897	9	40	4.46
2013-14	147	1,007	8	40	3.97
2014-15	162	1,164	8	37	3.18

(Source: Information furnished by VTU & collected from NBA website)

The colleges with Tier-II accreditation sharply decreased from 30.75 *per cent* (2010-11) to 3.18 *per cent* (2014-15). This indicates that the colleges could not provide the requisite facilities, *viz*., infrastructure supporting teaching-learning process like library, laboratories *etc*., thereby indicating lowering of standards in higher education.

Recommendation-5: VTU needs to devise an institutional mechanism to monitor the basic infrastructural facilities at regular intervals and forecast minimum investment needs to upgrade the facilities. This would go a long way in enabling the State to realise its vision for 100 *per cent* NAAC and NBA accreditation for all its engineering colleges by 2020.

The Government replied (December 2015) that the fourth and fifth recommendations would be implemented.

2.2.6.4 Inadequate student support services

The purpose of the student support services is to retain and graduate students from diverse and disadvantaged backgrounds at the highest possible rate and to foster an academically focused climate supportive of the success of students.

(a) Graduation completion rate

The programme for UG engineering courses is for a period of four years and, according to the University rules, the maximum period allowed for completing the course is eight years. The completion rate indicates the performance of the college as well as the support extended by the management to the students. Analysis of seven batches of students who completed the course during 2008-14 revealed the following.

- Out of 3.00 lakh students enrolled (2004-2010) under 24 programmes, only 2.07 lakh students (69 *per cent*) had completed the course within the prescribed course period of four years. We also observed that the percentage of students who completed the course within the period of four years was on an average around 73 *per cent* during 2010-14 as indicated in **Table-2.10.**

Table-2.10: Data regarding students who completed the course within the prescribed period

Year in which student enrolled	No. of students enrolled	No. of students completed course within prescribed period of four years	Percentage of students passed
2007-08	40,703	29,267	72
2008-09	44,243	32,773	74
2009-10	44,177	32,689	74
2010-11	50,091	36,061	72

(Source: Information furnished by VTU)

- During 2011-14, the number of students who had passed the course after the prescribed period of four years but within the maximum period of eight years constituted 8 *per cent* of the total students enrolled during that period. Also, only 31 *per cent* of the students who were to complete the course within eight years had completed the course as on 31 March 2015. Detailed information regarding this is given in **Table-2.11** below.

Table-2.11: Data on students who passed after the prescribed period

Year in which students enrolled	No. of students passed within				
	prescribed period of four years	>4 years <=5 years	>5 years <= 6 years	>6 years <=7 Years	>7 years <=8 years
2007-08	29,267	4,096	1,645	778	Data being compiled by VTU
2008-09	32,773	3,828	1,426	Data Not Available	Not Applicable
2009-10	32,689	3,395	1	Not Applicable	
2010-11	36,061	Data being compiled by VTU	Not Applicable		

(Source: Information furnished by VTU)

The Government while (December 2015) citing various reasons for students not completing the engineering education in the extended period of eight years, also stated that lack of infrastructure facilities as well as non-availability of qualified faculty in few colleges was the other two main reasons for the same.

- During 2004-08, a total of 26,866 students had enrolled under lateral entry[44]. Out of this, we observed that while only 46 *per cent* of the students had completed the course within the prescribed period of three years, 34 *per cent* of the total students enrolled completed the course within the maximum limit of seven years. Hence, 20 *per cent* of the lateral entry students did not complete the course even within the seven-year period.

Further analysis revealed that the high failure rate among the lateral entry students was in two additional mathematics subjects which were mandatory for them. During 2010-15, we observed that the failure rate in the third semester mathematics subject and fourth semester mathematics subject ranged between 69 to 96 *per cent* and 59 to 83 *per cent* respectively, which indicates that the lateral entry students required additional support in these subjects.

[44]A lateral entry student is one who directly enters into the second year of engineering after completing the diploma or equivalent qualification as recognised by the university in the respective branch.

Further, absenteeism in examination ranged between 24 to 41 *per cent* and 27 to 37 *per cent* in the third and fourth semesters respectively. We observed that out of 55 colleges (which included 43 test-checked), only 30 colleges had the necessary faculty strength in the said subject.

The Government replied (December 2015) that the colleges concerned would be instructed to conduct additional classes in the said subject. Though this would partly address the problem, action to recruit faculty in the said subject was required as only 30 of the 55 colleges had the necessary faculty strength in the said subject.

Recommendation-6: Faculty strength in mathematics needs to be increased in order to give additional support to the students enrolled under lateral entry.

(b) Examination

The UGC guidelines on student entitlements specify various rights of the students with respect to admission, quality of teaching, fees and financial aid *etc*. The right to quality of teaching and learning includes conducting timely examinations and declaration of results.

In this regard, VTU had entrusted examination related workflows, including delivery of question papers, scanning and indexing of answer sheets, evaluation, tabulation, encoding and decoding answer scripts *etc*., to a service provider. The service provider had to implement an end-to-end software solution for the said examination management and provide infrastructure[45], set up examination data centres in all colleges, connect the data centres to the nodal centre, set up digitisation centres *etc*.

In this regard, audit observed the following:

- Preparatory works such as system requirement study, feasibility study, cost benefit analysis *etc*., were not carried out before inviting tenders.
- A detailed project report as well as cost estimate was not prepared prior to entrustment of the project.
- The complete cost component of the project was fully loaded on a single item of work, namely processing of answer sheets.
- Highly sensitive data such as online examination application, online generation of admission tickets, online submission of internal marks, delivery and printing of question papers, digital scanning of answer sheets, digital valuation, online re-evaluation *etc*., were being processed by the service provider in an infrastructure environment not accessible to VTU. Hence audit could not ascertain the security of the data processed.
- Ownership of the IT infrastructure provided was not taken over by VTU.
- VTU had not obtained details of software modules implemented, third party software in use, back-up and security infrastructure in place, and acceptance test reports on implementation of project by the service provider.

[45]Software, hardware, network connectivity, backup and its maintenance

- VTU had not conducted any inspection of the premises where the infrastructure was provided, including the data centres.

Thus, in the absence of acceptance of the project by VTU and due to all the above lapses, the quality of the examination procedure could not be ascertained by audit. The Government replied (December 2015) that from the next examination process, Examination Management System would be shifted to Government sourcing Examination Management.

(c) Evaluation and Re-evaluation

The Registrar (Evaluation) oversees examinations of all engineering colleges affiliated to VTU through a network of five regional centres[46]. The candidates are permitted to apply for a copy of their answer scripts, re-evaluation and review of re-evaluation on payment of specified fees. The details of answer scripts submitted for re-evaluation by the candidates during 2011-15 and their outcome is detailed in **Table-2.12.**

Table-2.12: Details of outcome of answer scripts submitted for re-evaluation during 2011-15

Particulars of answer sheets	Year of Examination							
	2011-12		2012-13		2013-14		2014-15	
	Jan-11	Jul-11	Jan-12	Jul-12	Jan-13	Jul-13	Jan-14	Jul-14
Total number of answer sheets originally evaluated for the examination	1273270	1219104	1362333	1311757	1459330	1393368	1587376	1523161
Number of answer sheets revaluated	146027	141606	142943	151389	153662	162340	181729	218720
Total Number of answer sheets where marks increased on re-evaluation	74097	75053	72777	77347	78334	85714	90875	111916
Number of answer sheets where there was no change in marks on re-valuation	9300	8443	7994	8821	8424	8808	10112	12840
Number of answer-sheets where marks decreased on re-evaluation	62630	58110	62172	65221	66904	67818	80742	93964

From the details, we observed that

- Re-evaluation requests were received in respect of 10-14 *per cent* of papers evaluated. The trend was the same throughout the review period in all the examinations.
- While the percentage of papers where the marks increased upon re-evaluation ranged between 50 to 53 *per cent*, the percentage of papers where the marks decreased upon re-evaluation ranged between 41 to 44 *per cent*. This indicated that over 90 *per cent* of the papers which were re-evaluated had the marks increased/decreased on re-evaluation. Thus, quality of evaluation was not of appropriate standard.
- On an average, 31 *per cent* of the answer sheets applied for re-evaluation and where marks was increased, had passed the examination (originally failed).
- Further, on improvement of marks by more than 15 which results in a student passing the subject, an amount of ₹250 (part of fee for

[46] Belagavi, Bengaluru, Kalaburagi, Mysuru and Mangaluru

re-evaluation) is required to be refunded to the student. We, however, observed that there was a delay in refund of the amount to the students. Scrutiny of details of re-evaluation for the year 2014 revealed that though 13,451 students were eligible for refund, the refund amount, which worked out to ₹44.38 lakh, was yet to be refunded to the students. Also, we observed that VTU had not maintained any data for tracking the disbursement of the refund amount to the students and hence audit could not ascertain the actual undisbursed amount for the review period.

The Government replied (December 2015) that action would be taken to refund the re-evaluation fee immediately.

(d) Disbursement of scholarship

The cost of engineering education is recovered mainly through various types of fees from the students. This has a bearing on the issue of equity of access to engineering education, especially for the newly emerging beneficiaries from the economically weaker sections of society. The Government has implemented various schemes for providing financial assistance to students from different categories pursuing engineering education in the State as detailed in **Table-2.13**.

Table-2.13: Scholarships implemented during 2010-15

(₹ in lakh)

Name of the scholarship scheme	Administered by	Particulars	2010-11	2011-12	2012-13	2013-14	2014-15
Scholarship to SC/ST students	Director of Technical Education	Number of beneficiaries	9,545	1,109	2,979	10,472	5,304
		Amount disbursed	2,299.96	239.97	659.83	3,064.20	1,795.97
Scholarships for the children of defence personnel	Director of Technical Education	Number of beneficiaries	1,877	1702	705	238	246
		Amount disbursed	461.80	470.43	200.90	74.95	78.10

(Source: Information furnished by Directorate of Technical Education)

Timely disbursement of the scholarship amount is important for supporting students in an effective manner. However, it was observed that there was delay in disbursement of over 76 *per cent* of SC/ST Scholarships and over 59 *per cent* Defence Scholarships. These delays ranged from one to over four years as shown in **Table-2.14.**

Table-2.14: Delay in disbursement of scholarships

Name of the scholarship scheme	Total beneficiaries during 2010-15	Number of beneficiaries who received the scholarships				
		within the academic year	with delay of one year	with delay of two years	with delay of three years	delay of more than four years
Scholarship to SC/ST students	29,409	6,891	7,656	9,903	4,959	0
Defence Scholarships	4,768	1,964	1,320	1,072	305	107

(Source: Information furnished by Directorate of Technical Education)

It was also observed that though the Government had a system of scholarships to financially support students from SC/ST/OBC/Minority category, most of

the scholarships were not disbursed in a timely manner. This resulted in hardships to beneficiaries who did not receive their scholarship in time.

Recommendation-7: In order to reduce delay at various levels, Government needs to minimise the levels in transfer of funds as also should explore possibility of transfer of scholarships directly to the beneficiary.

2.2.6.5 Non-implementation of University Grants Commission (UGC) guidelines

The UGC, with a view to discouraging the forced retention of students in the higher educational institutions, issued (April 2007) instructions directing higher educational institutions not to retain the original certificates of the students in the colleges. Hence, after verification, the institutions were required to return the original certificates to the students. We, however, observed that in violation of the above instructions, the VTU PG centres and affiliated colleges had retained the original certificates of the students.

Further, though UGC had issued guidelines for prevention of discrimination based on caste, gender, creed, colour, race, religion *etc*. for protecting students from sexual harassment/ragging, we observed that VTU was yet to implement the above guidelines. Also, measures for ensuring prevention of ragging which was to be monitored closely by VTU as well State Government was deficient, as there was no monitoring mechanism put in place to check ragging.

The Government replied (December 2015) that VTU had issued circular to all the college affiliated to return the original certificate on verification. It also stated that a mechanism to monitor sexual harassment/ ragging would be put in force.

2.2.7 Research Activities

Research and development activities constitute critical components of an academic institution. The Vision 2020 document as well as objectives of the VTU Act highlight the importance of research activities in the development of engineering education. Since VTU could not attract any sponsored research funding either from the Central or State Government or industries, it instituted its own 'Research Grants Scheme' out of its own funds in order to harness and nurture research talent available in its affiliated institutions. The expenditure incurred against research activities undertaken during 2010-15 is detailed in **Table-2.15.**

Table-2.15: Funding towards research activities during 2010-15

(₹ in crore)

Year	Expenditure incurred	No of projects taken up during the year
2010-11	2.31	70
2011-12	3.33	35
2012-13	2.99	01
2013-14	1.00	00
2014-15	0.03	00

(Source: Information furnished by VTU)

From the table, it is evident that there was decline in expenditure and projects taken up during 2010-15. The other observations in respect of grants allotted are detailed below.

- The research projects were undertaken with probable date of completion ranging from one to four years. We observed that VTU had no mechanism to monitor the progress of projects, and that it had not maintained project-wise data manually or electronically such as name of project, scheduled date of completion, progress of project, actual date of completion, extension of time granted *etc*.
- We also observed that there were no institutional visits by the experts of VTU, no monitors were appointed by the research panel of the VTU for each project, and no half yearly progress report was received for each project as mandated in the guidelines of the scheme.
- Since the projects were reviewed only annually for the release of grants, the projects with slow progress were further delayed due to delay in release of grants. Out of the 21 projects test-checked, we observed that only 10 projects were completed and none of the projects were completed on schedule. The slow progress was attributed to delay in release of funds in many cases.
- The scheme guidelines had provided for release of funds in instalments during the project period. We observed that in respect of 65 projects, after releasing ₹4.12 crore, VTU had not released subsequent instalments. It had also discontinued follow-up on these projects. Thus, the amount already invested was rendered unfruitful.
- The equipment/surplus stores procured during the project period as per the guidelines of the scheme, were the property of VTU. We observed, however, that VTU had not maintained any inventory of equipment procured under the scheme and had also not made any efforts to ascertain its continued productive utilisation. Test-check of nine projects out of 74 completed projects revealed that out of total expenditure of ₹58.67 lakh, ₹41.27 lakh was towards equipment, remaining without any specified purpose.
- Further, we observed that VTU had not maintained any data on the publications of the research, citations received on these publications, *etc*. We also observed that no patents were generated out of the research.

Enhancing research publication, research outputs and patents from all the Universities in the State was set as a target in the Vision 2020 document. We, however, as brought out in the previous paragraph, observed that the research activities of VTU were neither completed nor coordinated.

Recommendation-8: VTU may consider increasing funding towards research activities and ensure effective monitoring of progress of projects/research *etc*., in order to achieve the target of increase of 60 *per cent* in research publications, research outputs and patents.

The Government agreed (December 2015) to implement above recommendations.

2.2.8 Information and Communication Technology Activities

2.2.8.1 EDUSAT

VTU initiated the 'EDUSAT' programme to be implemented in several phases as part of its e-governance initiatives to supplement the conventional mode of education, through satellite based teaching and learning with the technical support of the Indian Space Research Organisation (ISRO) in the initial phases. VTU provided Satellite Interactive Terminals (SIT) to 189 affiliated colleges and 04 VTU Post Graduation Centres for imparting training through EDUSAT.

We, however, observed that out of 83 colleges supplied with EDUSAT terminals by VTU, the terminals in 42 colleges were not functional. We also observed that VTU except for conducting survey (April 2015) of the working status of the hardware provided before entering into an AMC had not conducted evaluation of the EDUSAT Programme by obtaining feedback from the users to assess the effectiveness of the Programme. The usage statistics of the programme were not collected and reviewed by VTU for assessing the level of utilisation from time to time before scaling up the programme to the next phase. As a result, VTU could not ensure the effective utilisation of the project.

VTU replied (September 2015) that a survey has been initiated to assess the condition of the terminals supplied. However, the survey report conducted revealed that 55 colleges were not utilising the facility since its installation, and in most of the colleges, the facility was not in working condition.

2.2.8.2 e-Vidya

The e-Vidya project was initiated (2009-10) by VTU to record and digitise the lectures of subject experts[47] into video format[48] to be deployed on a local high capacity server installed in each college campus. The project also envisaged that VTU would continue to develop videos of various courses and make them available to the affiliated colleges in subsequent years so that the students could access these lectures any time through desktop, laptop, tablet or mobile phones.

In order to implement the project, VTU procured (2009-10) "Sun streaming servers" for 60 affiliated colleges at a cost of ₹2.97 crore. In this regard, we observed the following:

- The procurement was made without calling for any tenders, thus violating the requirements of Karnataka Transparency in Public Procurement Act.
- The servers were supplied to private affiliated colleges and the procurement cost was borne by the University.

[47] 120 courses developed by the National Programme on Technology Enhanced Learning (NPTEL) and 50 courses developed by VTU.

[48] MP4 format using high speed streaming server managed by content management software.

- There was no formal understanding between VTU and the colleges on the one hand and the supplier on the other hand for implementation, support and problem resolution during the currency of the project. Instead, the procurement conditions for the servers specified that only online support would be provided and on-site support would be charged based on actuals. Thus, implementation and support cost was left undefined.
- VTU unilaterally decided the project infrastructure requirements, procured and supplied them to the affiliated private colleges without deciding how the infrastructure would be maintained by the colleges.
- The affiliated private colleges reported various difficulties such as server shutdowns, lack of technical support, non-availability of passwords *etc*., while using the infrastructure made available to them.
- National Programme on Technology Enhanced Learning (NPTEL) informed that courses developed by them were available free of cost only to Government institutions and at ₹0.50 lakh to each private institutions. Hence, private institutions were required to enter into an agreement with NPTEL for the use of the courses developed by them. We, however, observed that VTU did not have any arrangement with the NPTEL regarding making available of videos to affiliated private colleges.
- There was no formal agreement with regard to updation of content of the videos supplied during 2009-10.
- The Vice chancellor of VTU, while discontinuing the project in September 2010, ordered the e-learning center of VTU to submit a report on the utilisation of the servers. We, however, observed that no such data on utilisation of servers was collected from the affiliated colleges. It was observed that the project remained discontinued as on September 2015.

Thus, VTU, by not facilitating technical support, or assessing the continued relevance of videos supplied during 2009-10 in view of revision of curriculum, and by not ensuring proper maintenance and effective utilisation of the servers rendered the investment of ₹2.97 crore on the project unproductive. We, however, observed that as of September 2015, 41 of the 60 servers supplied were not working, and hence the objective of enhancing/supplementing level of education through technology was not achieved.

Recommendation-9: VTU needs to arrange for an AMC and on-site support for all the colleges where EDUSAT/e-Vidya has been implemented. It also needs to institute an automated system for obtaining feedback with regard to utilisation of both EDUSAT and e-Vidya which would in turn help in evaluating the effectiveness of the programmes. It further needs to make arrangement for updation of content of programmes supplied in line with updation of syllabus of the VTU.

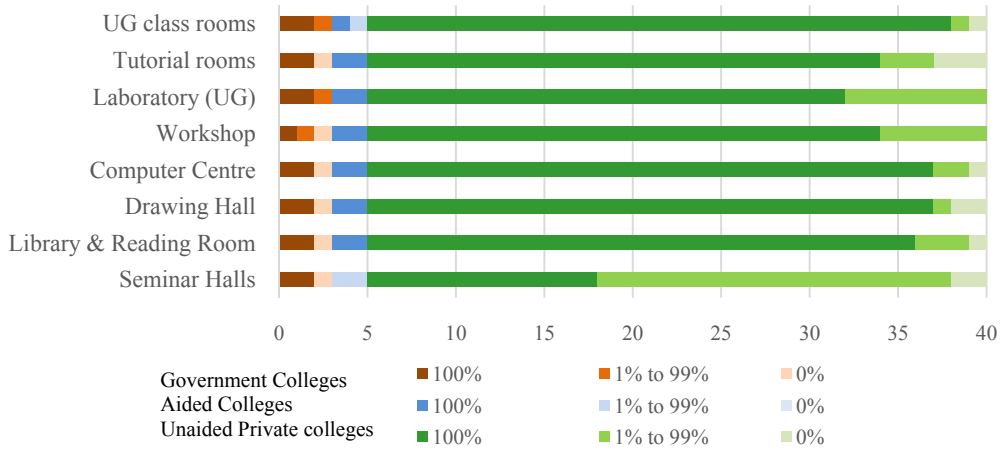
The Government agreed (December 2015) to implement above recommendation.

2.2.9 Teaching and Learning Infrastructure

AICTE is a national level apex advisory body with the mission of developing and promoting quality technical education in the country. As a regulator, AICTE has an objective to weed out all institutions not fulfilling norms and standards for quality education. Further, VTU also fixed various norms for granting affiliation to technical colleges. The norms prescribed by the AICTE/VTU with regard to basic parameters, *viz*., instructional area, amenities, administrative area and computer facilities and the actual availability in the test-checked colleges are indicated in **Chart-2.9** and **Chart-2.10.**

- **Availability of Instructional area compared to norms in test-checked Colleges**

Chart-2.9: Availability of Instructional Area



Note: Three colleges which have not completed five years of its existence have not been included for analysing the availability of infrastructure.

From the above chart, we observed that the availability of instructional areas was less than 50 *per cent* in workshop (Government colleges) and seminar halls (Government aided colleges and Private unaided colleges). In respect of one Government college test-checked (Raichur), we observed that it lacked in all the parameters of the instructional area.

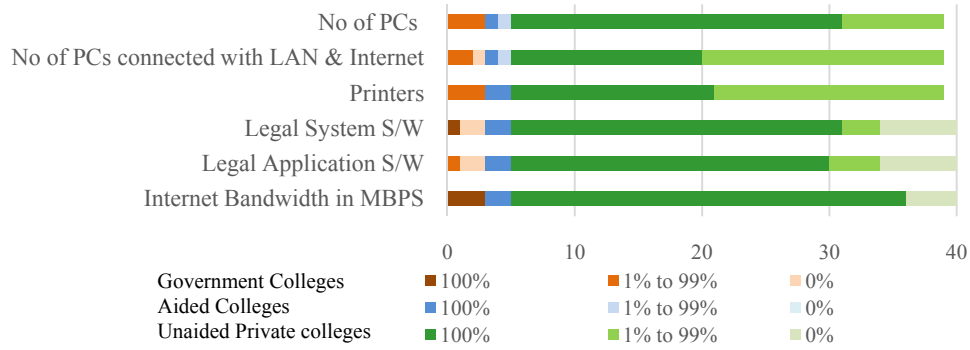
- ***Availability of administrative area compared to norms in colleges test-checked***

In the colleges test-checked, it is observed that there was deficiency in availability of department office and faculty rooms across all colleges. Further, we observed that one Government college (Raichur) lacked in all basic parameters in administrative area.

- ***Availability of computer facilities***

The norms for computers specify computer to student ratio for UG courses and PG courses to be 1:4 and 1:2 respectively, with a minimum of 20 PCs in a college.

Chart-2.10: Availability of Computer Facilities



Note: Colleges which have completed five years of its existence have been compiled for analysis for analysing the availability of infrastructure.

From the chart, we observed that all the Government colleges test-checked lacked computer facilities. However, in respect of aided and unaided colleges test-checked, we observed that while aided colleges had provided computers as per norms, only 75 *per cent* of the unaided private colleges had provided computer facilities.

It was observed that during 2010-15, the Government had allocated ₹41.30 crore towards procurement of infrastructural facilities which also included purchase of computer for all Government colleges. We observed against the said allocation, an expenditure of ₹24.68 crore was incurred and the balance amount had lapsed as the Director of Technical Education could not procure the items in a timely manner and funds were released only towards the end of the year.

Detailed study of the availability of the basic parameters in the test-checked colleges is brought out in the succeeding paragraphs.

2.2.9.1 Teaching faculty–student ratio

The AICTE norms for faculty–student ratio have been prescribed at 1:15 with separate strength for Principal/Director, Professor, Associate Professor and Assistant Professor. Analysis of the staff strength in the test-checked colleges revealed that there was shortage of faculty in the majority of the programmes available in the colleges. We observed that with regard to professors and associate professors, there was 100 *per cent* shortage in more than 25 *per cent* of colleges test-checked. The status of shortage of the teaching faculty in four basic courses, *viz*., computer science, civil engineering, electronics & communication engineering, and mechanical engineering are detailed in **Appendix-2.11**.

Further analysis of the database of the faculty available in the affiliated colleges showed that faculty members working in one college were also shown to be working in other affiliated colleges. This indicates that some faculty members were being shown as working in multiple colleges in order to secure compliance with the AICTE norms.

2.2.9.2 Laboratory facilities

The AICTE norms stipulate that the laboratories should have appropriate equipment for experiments suitable for the requirements of the affiliating University/Board's curriculum. Further, it has been stated that the desirable number of experiment set ups be so arranged that a maximum of four students could work on one set.

Based on the curriculum of each programme and as per the requirements specified for each laboratory by the colleges, we observed that there were shortages in laboratory facilities in most of the disciplines in the test-checked colleges. In test-checked colleges, the availability of laboratory facilities in the three major branches is summarised below:

- Seven out of 23 test-checked colleges under Mechanical Engineering did not have all the required equipment.
- Fifteen out of 23 colleges test-checked under Electronics and Communication Engineering had more than 25 *per cent* deficiency.
- Sixteen out of 23 colleges test-checked under Civil Engineering had more than 25 *per cent* deficiency.

The status of laboratory facilities in test-checked colleges is given in **Appendix-2.12**.

2.2.9.3 Library facilities

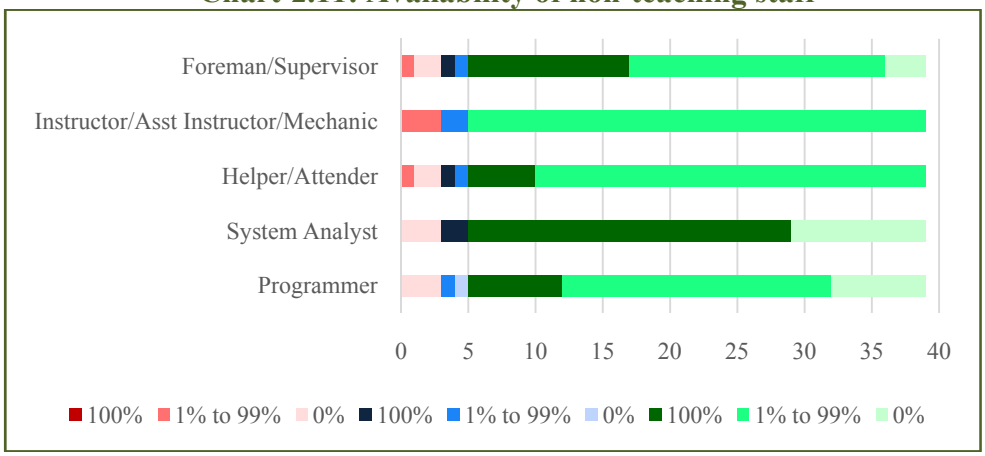
The AICTE norms specify the number of titles, volumes and journals that are to be provided in the library of a college. They also specify the seating capacity and the number of personal computers required in a library based on a percentage of the student strength in the college.

In the test-checked colleges, we observed that while there was shortage in the number of titles provided in the civil engineering library, the deficiency was less pronounced in computer science engineering. The status of the shortage is brought out in **Appendix-2.13**.

2.2.9.4 Non-teaching faculty ratio

The norms specified for non-teaching faculty are as under: Foreman/ Supervisor, one per course; Instructor/Mechanic/Helper, one per laboratory; system analyst and programmer, one and four per computer centre. We, however, observed that there was shortage of non-teaching staff in the majority of the test-checked colleges. The status of shortage of non-teaching faculty in the test-checked colleges is indicated in **Chart-2.11**.

Chart-2.11: Availability of non-teaching staff



From the above, we observed that many of the test-checked colleges suffered from inadequate teacher-student ratio, deficient laboratory facilities, poor computer-student ratio, instructional area *etc*. This was not only indicative of the lack of quality of the education provided by these institutes, but also the deficiency in monitoring by VTU as well as AICTE. This not only resulted in these institutes being recognised by AICTE but also being affiliated by VTU.

Recommendation-10: VTU needs to develop a mechanism which helps in conducting inspection periodically in order to monitor the quality of the institutions which would help VTU while extending affiliation of the institutions.

The Government agreed (December 2015) to implement the above recommendation.

2.2.10 Conclusion

In the absence of any policy/guidelines to address regional imbalances, the Government of Karnataka was unable to correct regional and sectoral imbalances. This facilitated creation of many engineering colleges which are concentrated mainly in the Bengaluru region. Also, increase in intake capacity/ establishment of colleges without demand resulted in seats being vacant in almost all the regions.

There was delay in completion of the temporary affiliation process by VTU, as a result, the admission process was completed prior to granting of affiliation. The recommendation of VTU with respect to intake capacity was overruled by Government, which rendered the affiliation process a mere formality and also hampered the quality of education. There was no fixed criterion for granting/withdrawal of affiliation. Hence, institutions were granted temporary affiliation year after year with deficiencies being pointed out by VTU and not being complied with by the institutions. This prompted the institutions to continue with temporary affiliation for a long period rather than aspire for permanent affiliation which required additional requirements to be satisfied by the institutions.

Though accreditation was mandatory, VTU as well as many of its affiliated colleges were yet to secure NAAC as well as NBA accreditation. In addition, the Government as well as VTU failed to ensure minimum standards prescribed by the AICTE regarding quality in education as majority of the colleges had deficiencies in teaching faculty, library facilities, laboratory facilities *etc*.

Further, VTU had not provided sufficient attention towards the promotion of research. VTU by not ensuring continuous support to the e-Learning projects initiated by it, *viz*., EDUSAT and e-Vidya, rendered the projects unproductive.

Thus, while the Government is having indifferent attitude towards engineering education, the Directorate of Technical Education and VTU was not fulfilling the role envisaged for them *viz*., allowing admissions to engineering colleges prior to granting of affiliation, not having a system to get colleges to seek permanent affiliation, not encouraging the colleges to accredit themselves through NBA or NAAC and also not effectively monitoring the colleges on infrastructure, faculty, performance *etc*., which are essential for quality education. Moreover, VTU has not made adequate efforts to get itself recognised/accredited and hence did not lend itself as a role model for the institutions affiliated to it.