MID-TERM EVALUATION
OF
BIOMEDICAL EQUIPMENT MAINTENANCE AND MANAGEMENT PROGRAM
Arunachal Pradesh

Conducted by:
Regional Resource Centre for North-eastern States,
(Branch of National Health Systems Resource Centre),
Ministry of Health & Family Welfare, Government of India,
Khanapara, Guwahati – 781022, Assam
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Abbreviation

AERB	Atomic Energy and Regulatory Board
AMC	Annual Maintenance Contract
BEMMP	Biomedical Equipment Management and Maintenance program
BER	Beyond Economic repair
CHC	Community Health Centre
CMC	Comprehensive Maintenance Contract
DH	District Hospital
GH	General Hospital
HWC	Health and Wellness Centers
ICU	Intensive Care Unit
IEC	Information, Education & Communication
MoHFW	Ministry of Health and Family Welfare
NHSRC	National Health System Resource Center
NHM	National Health Mission
OEM	Original Equipment Manufacturer
OPD	Outpatient Department
OT	Operation Theatre
PHC	Primary Health Centre
PIP	Program Implementation Plan
PMNDP	Pradhan Mantri National Dialysis Program
PPM	Planned Preventive Maintenance
PPP	Private Public Partnership
RFP	Request for Proposal
RoP	Records of Proceedings
RRCNE	Regional Resource Center for Northeastern States
SNCU	Special Newborn Care Units
UPHC	Urban Primary Health Centre

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Executive Summary:

The state of Arunachal Pradesh has implemented the Biomedical Equipment Management & Maintenance Program (BMMP) through Public Private Partnership (PPP) mode from DH to PHC level. The agreement for the comprehensive maintenance of biomedical equipment was signed on 9th Jan 2017 between State and the Private Partner, M/S Mediciti Healthcare Services Pvt Ltd. The tender rate was 10.89 % of the total asset value of medical equipment installed in the specified public health facilities.

The agreement subsequently was extended for another five years after the completion of agreement period in calendar year 2022.

For the comprehensive equipment maintenance, MoHFW has approved Rs. 474.95 Lakh & Rs. 566.06 Lakh in NHM, RoP 2022-24 for the FY 2022-23 & FY 2023-24 respectively for BEMMP programme.

The service provider has divided the State in to 6 zone for better management and smooth implementation of the programme. Total 19 Bio-Medical Engineers (BMEs) are posted in identified six zones i.e. Naharlagun (5 BME, HQ), East Siang (4 BME, Pasighat), Namsai (3 BME), Lower Dibang Valley (1 Roing), West Siang (3 BME, Along) and West Kameng (3 BME, Bomdila).

State has nominated one Nodal officer at state level for the monitoring and implementation of the programme. District Medical Officer and District RCH Officer are conversant with the BEMMP. Health Facility i/c is Nodal Officer of BEMMP at the facility level. I/c of the health facility / Medical Superintendent is either directly or identified one staff as nodal person to look after the programme. Apart from the nodal person within the facility other facility staffs like laboratory technician, nurse is also raising the complaint. But most of the time they use the WhatsApp group for booking the complaint about the breakdown of equipment instead of calling Toll Free number.

Most of the equipment were found to be functional in the visited health facilities except few. Minimized breakdown time of the equipment was due to regular monitoring of equipment by staff of the facility, maintaining assets and call register. There is a sense of reliability on the programme as far as the equipment maintenance and management is concerned.

During Covid equipment like ventilators and PSA plants have been installed in many of the facilities, most of them are yet to be tagged. As tagging them will be a necessary precursor for the complete equipment mapping in public health facilities. There is an apprehension that this will increase the total asset value vis-à-vis BEMMP budget to the state.

State with mutual agreement may decide to have a window period in dashboard where after the completion of warranty period of new equipment, the state can decide whether they are to be given to the service provider or any other method is to be designed for their maintenance; Service Provider should tag all the equipment and show in the dashboard, available within the facility to complete the process of mapping.

It was observed during the field visit that few equipment were not present in the facility, some equipment was lying idle in the store, few equipment shifted to other health facilities. Service engineers have revealed that the same has been intimated to DMO. In the context of this it is suggested that state with support from the service provider may conduct six monthly equipment audit and correct the mismatch, and to update the registry for optimal utilization.

It was observed none of the PHCs/CHCs have service reports, preventive maintenance, and calibration reports with them. Planned Preventive Maintenance (PPM) and Calibration are being done by the services provider, and the reports were shared with DMO of respective district. It was suggested to the service provider to submit the above-mentioned reports also to facility in charge or train them to download the same from the dashboard. It was also suggested to submit the original reports of calibrating equipment also along with the calibration reports of service provider to the District / State.

It is also suggested that all the facility to have asset register for all the medical equipment present in the facility, maintain breakdown service record, PPM and calibration report. The service provider may also try to recruit a more service engineer to make the ratio as one engineer per district.

Chapter I

Introduction

A vast variety of specialized equipment, devices, and medications in health facilities are being used to serve patients better[1]. Increased sophistication, specialization and integration with electronic circuit & network, medical equipment become complex day by day [2]. Maintenance of this critical biomedical equipment such as oxygen concentrators, lasers, ventilators, MRI scanners, insulin pumps, implantable pacemakers to instruments as straightforward as stethoscopes, injections, and thermometers to get compliance, safety, reliability, and accuracy is very important[2]. From this perspective, maintenance is a key process throughout the life cycle of every medical device.

Numbers of problems such as deprivation of services to patient on time, accurate measurement, correct diagnostic report may occur because of poor equipment maintenance and these may be avoided through implementation of a routine equipment maintenance program[3].

To reduce downtime of the medical equipment, traditionally preventive maintenance and corrective maintenance are two prime components in equipment maintenance programme[4]. The third prime component under equipment maintenance programme is calibration to enable a reliable, accurate and valid services by the equipment. Preventive maintenance of equipment is a scheduled event according to the risk ranking of the medical device[4].

Breakdown of a critical equipment in operation theatre may force to shut down the Operation Theatre [5]. Monitoring of downtime of critical equipment is an index for operationalization of the different division in a hospital.

Preventive maintenance has a great role not only providing regular services by the equipment by minimizing breakdown but also in increasing the life span of the equipment. For instance, if properly maintained, a microscope can last for about 15 years but only for eight years if not maintained properly [6]. Similarly, sterilizers can last around six years whereas weighing scales and refrigerators for about eight years.

Medical equipment brings along with it associated benefits and problems. The problem that draws the most attention is maintenance. Lack of a maintenance policy can result in no advance planning for maintenance budgets and thus non/delayed availability of spares and accessories. Many laboratories and health care programs suffer because the installation and maintenance requirements are not planned. This renders many equipment unusable, and many devices stay idle because of lack of spares or funds.

Inexpensive units can be replaced or repaired if they break down [7], to reduce costs preventive maintenance involves proper selection of the equipment. Cost effectiveness should be taken care of equipment maintenance programme.

It is essential that State plan the resources required for maintenance including repair and planned preventive maintenance. Proper maintenance of medical equipment is essential to obtain sustained benefits and to preserve capital investment. Medical equipment must be maintained in working order and periodically calibrated for effectiveness and accuracy.

The life cycle of medical equipment varies from 5 – 10 years. If the equipment is declared obsolete by the vendor, it may not be possible to get spare parts. Even if the parts are available, it can become too expensive to obtain them and repairing the equipment may no longer be economically viable. In such scenario, timely condemnation and disposal of equipment should be planned, and the necessary steps should be taken in advance to arrange replacement.

Indian Public Health context

Till a couple of years back there was no proper facility or provision in the public sector for maintenance of health care equipment in the states. It was observed during the supportive supervisory visits to the states that much equipment in hospitals and other health facilities are either unused or there is no maintenance resulting wastage of resources. This led to the Ministry of Health and Family Welfare (MoHFW), Government of India to consider framing guidelines for maintenance and management of the equipment.

To address, MoHFW had consultative meetings with officials from states to devise appropriate mechanisms to ensure that medical equipment already purchased are properly maintained. An extensive exercise was undertaken to map the inventory of all bio-medical equipment including their functionality status. The mapping was undertaken in 29 States under the guidance of NHSRC. A total of 7,56,750 numbers of equipment in 29,115 health facilities costing approximately Rs. 4564 Crores were identified. Equipment in range of 13% to 34% was found dysfunctional across states.

Medical Equipment Maintenance Manual, A first line maintenance guide for end users, Ministry of Health and Family Welfare, New Delhi was documented in October 2010.

Comprehensive guidelines were designed on Biomedical Equipment Management and Maintenance Program (BEMMP), linked with uptime of equipment (95% in District Hospitals, 90% in Community Health Centres, and 80% in Primary Health Centres). The guidelines along with the model tender document were developed in 2014.

Under BEMMP, financial support under NHM is being provided to State Governments to outsource medical equipment maintenance comprehensively for all its machinery across all the facilities.

After inventory mapping, RFPs/tenders are being rolled out to award maintenance contract by the respective states. A total of 22 States including 7 North-eastern States Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Sikkim, Tripura have implemented the program in Public Private Partnership (PPP) mode.

The state of Arunachal Pradesh is the 3rd State among NE states to implement Biomedical Equipment Management and Maintenance Program (BEMMP). State had floated the tender in the year 2016 and tender was subsequently awarded to L1 bidder M/SMedicity Healthcare Pvt. Ltd at the tender rate of 10.89 % of the asset value in 2017.

Scope of work as per MoU

As per the contract the scope of work includes:

1. Maintenance of biomedical equipment in all the public health facilities up to the PHC level supported by 24 x 7 call center.
2. To provide round the clock service 365 days in a year with uptime of 95 % for all medical equipment in DH, 90% in CHCs and 80 % in PHCs. A single break should never exceed 7 days; otherwise, penalty will be levied.
3. Medical devices which are under warranty, the Service Provider shall administer all maintenance activities on behalf State health department for the entire duration.
4. The Service Provider may choose to take authorization for doing maintenance of such equipment from existing AMC/CMC contract holders.
5. Service Provider shall not be including cost of maintaining any equipment which is under warranty/AMC/CMC in its proposal till the existing contract.
6. The sole service provider shall however be liable to ensure upkeep time of all equipment irrespective of any AMC/CMC/warranty status for any equipment.
7. Service provider shall provide standby equipment at the health facility for lifesaving equipment - Blood Gas Analyzer, ECG machine, Ventilator, Radiant Warmer and Defibrillator during any breakdown.
8. Providing user training to end-user not less than twice a year.
9. Providing preventive and corrective maintenance for all equipment up to the PHC level.
10. Operationalization of 24 X 7 Centralized Call center with Toll free number.
11. Establish 24 X 7 Customer Care Center for accepting calls and managing maintenance services.
12. To be present as representative in condemnation committee appointed by the authority at district/State level for the condemnation of medical equipment.

Penalty:

In case of default on the part of Service Provider the damages caused to the client shall made good within the time specified by the client without any extra charges failing which Security / Bank Guarantee money shall be forfeited in addition to recovery of the amount commensurate to the damages caused from the payment which are yet to be made plus extra charges in the following manners-

a. For equipment which declared asset value is below Rs. 10,000/- a penalty of Rs. 300/- every day beyond 7 days.

b. For equipment which declared asset value is above Rs. 10,000/- but below Rs. 1,00,000/- a penalty of Rs. 500/- every day beyond 7 days.

c. For equipment which declared asset value is above Rs. 1,00,000/- but below Rs. 10,00,000/- a penalty of Rs. 1,000/- every day beyond 7 days.

d. For equipment which declared asset value is above Rs. 10,00,000/- a penalty of Rs. 3,000/-every day beyond 7 days.

As per the MoU indicated below: Typological error is observed in point b and c where it is mentioned in both the point that, penalty for asset value below Rs, 10,000/ (point b) and below Rs, 1,00,000/ (point c) for the initial amount which should be **above** Rs. 10,000/ and Rs .1,00,000/-.

Methodology

Objective

The BEMMP program in Arunachal Pradesh has been rolled out in 2017 (MoU signed in January 2017) through PPP mode and continued till December 2021 as per the 5-year contract between Medicity Healthcare Pvt. Ltd. and NHM Arunachal Pradesh. The services are being continued by the same service provider Medicity Healthcare Pvt. Ltd by signing a new MoU.

The evaluation was done as a part of continuous monitoring of BEMMP programme with the following objectives:

1. To assess the implementation status of Biomedical Equipment Management & Maintenance Program (BEMMP) in different level of health facilities in Arunachal Pradesh.
2. To evaluate Service Providers compliance to the prescribed clauses as per the MoU between NHM Arunachal Pradesh & the services provider considering the BEMMP guideline.

3. To understand the issues related to the implementation of the program from State & Service Provider's lenses.

Methodology of assessment:

a. Discussion with Mission Director, State Program Nodal Officer, and Service Provider about the Program.
b. Field visit to different level of Health Facilities to assess the functional status of the equipment
c. Discussion with Medical Superintendent/ Head of the health facility to understand about the implementation process of the program.

Study Design:

a. In Arunachal Pradesh, Biomedical Equipment Management & Maintenance Program (BEMMP) is being implemented through Public Private Partnership (PPP) mode.
b. Four districts viz. Changlang, Lohit, Shi-Yomi and West Siang (Along) from three different regions considering the geographical location of the Arunachal Pradesh and based on numbers of equipment with downtime (2021-22) were selected for the evaluation of Biomedical Equipment Maintenance Program (BEMMP).
c. In the four districts, the study team visited 3 District Hospital (DH), 4 CHC and 5 PHCs. List of visited facilities are below:

Day	Districts	Facilities
23-08-2022	Changlang	1. Nampong PHC 2. Karsang PHC 3. Diyum CHC
24-08-2022	Changlang	1. Changlang DH
25-08-2022	Lohit	1. Loiliang PHC
	West Siang	1. Aalo GH 2. Kamba CHC
26-08-2022	Lohit	1. Medo PHC 2. Wakro CHC
	Shi-Yomi	1. Tato PHC (H&WC)
27-08-2022	Lohit	1. Tezu DH
	Shi-Yomi	1. Mensukha CHC

Tools for data collection:

a. Quantitative data & other relevant information was collected through structured questionnaire with multiple choice answers from key informants, i.e. State Nodal Officer, Medical Superintendent, MO i/c and Lab. Technician, Nursing Staff of OT / labour room and other persons like store keeper etc.

b. Separate Tools were used for State Nodal Officer, Medical Superintendent, MO i/c and Service Provider.

c. Total equipment list corresponding to each facility as per the dashboard was also reviewed and used for evaluation purpose.

Few Technical Definitions have been used in the report:

Downtime is the time interval throughout which an item is not capable of performing its function. **Uptime** is the time interval throughout which an item is fully functional. The well-known **mean time to restoration** (MTTR) and **mean time between failures** (MTBF) are the average times to restoration of function and the average time between consecutive failures, respectively.

General Observation :-

1. At present there is 7985 medical equipment under the BEMMP as per the dashboard. 741 equipment has been declared as BER and 50 non-functional equipment on 08/08/2022. It is also seen that 1227 equipment has been identified as critical equipment.

2. Medical Officers, other staffs of the health facilities are aware about the programme in general. There is a sense of reliability on the programme as far as the equipment maintenance is concerned. It was also found that they regularly monitor the functionality of equipment and maintain a separate register for record keeping, although the display of the tollfree number within the health facilities was not adequate.
3. At the facility level, almost in all the visited facility one staff has been designated by the facility in charge as the nodal person to look after the BMMP. He/she is either calling directly at the Tollfree number/WhatsApp group of service provider or intimating the facility in charge who intern is registering the call via Toll number or, WhatsApp group.
4. The service reports, Preventive maintenance and calibration reports of the entire district health facilities (PHC & CHCs) have been submitted at the DMO office, and the district hospital report has been submitted to MS of the respective district hospital.

5. The service provider has divided the State in 6 zone for better management and smooth implementation of the programme. The 19 BMEs are posted in identified six zones i.e. Naharlagun (5 BME, HQ), East Siang (4 BME, Pasighat), Namsai (3 BME), Lower Dibang Valley (1 Roing), West Siang (3 BME, Along) and West Kameng (3 BME, Bomdila).
6. District wise WhatsApp group including service engineer of Medicity, MO i/c and other concerned of the health facilities also has been created in addition to the Toll-free number to complaint during the breakdown of any equipment.
7. Facility staff have mentioned that sometimes they face connectivity issues regarding the Tollfree number. So mostly they are using the WhatsApp group for registering breakdown calls instead of calling on toll-free number.
8. It was observed that a prior intimation letter regarding plan for Preventive maintenance and Calibration schedules from the service provider was given to the DMO for entire district.
9. Previous BEMMP review meeting was conducted in February 2022 in presence of District Medical Officer.

Recommendations:

1. State / District / MO i/c should inform the PPP service provider during installation of any new equipment. The PPP service provider must present during the installation time for proper & complete installation of the new equipment by the vendor. The requisite software if any must be collected from the vendor and submitted to the store manager with information to the respect facility i/c for further maintenance of the equipment.
2. The PPP service provider may arrange training on operating the equipment to the end user of the health facilities.
3. All new equipment received during the COVID period without installation needs to be installed by the supplier/vendors at the earliest.
4. All new equipment needs to be tagged and maintained under Biomedical Equipment Maintenance Programme after the completion of the warranty period considering the approval of the State authority.
5. The PSA plant at CHC Menchukha was not installed completely by the vendor. As such, Mediciti Healthcare Services Pvt. Ltd. may coordinate with the concern District Medical Officer and liaise with the equipment manufacturer and help the state in proper installation of the plant.
6. Current load of oxygen at many health facilities are less as compared to the capacity of the PSA plant. The PSA plants may also be utilized for refilling of oxygen cylinders.
7. Many equipment were found to be unused during the visit. In such case the state may take a call to de-tag such equipment from the Biomedical Equipment Maintenance Programme or relocate the equipment to other health facilities where it is required.

8. All breakdown calls should be made to the Toll-Free number 18002704699 to calculate the proper breakdown time of equipment.
9. More sensitization workshop on utilization of Toll-Free number & dashboard may be conducted with other workshop.
10. State is advised to form hospital equipment committee at DHs and CHCs for annual equipment audit, declaring condemnation of Beyond Economic Repair (BER) equipment, reviewing the upkeep time of critical and sophisticated equipment on weekly basis/monthly basis, total number of breakdown call logged in a particular month, random inspection during routine filed visit etc. This will improve the program outcomes.
11. The breakdown call volumes of high end critical equipment are less in number, it is suggested that the State may categorize the high value critical and lifesaving equipment for extended warranty and Comprehensive Maintenance Contract from the Original Equipment Manufacturers.
12. The following key indicators may be analyzed by both the State & PPP service provider for improvement of the programme.

BEMMP Key Indicators:

Sl.	Index	Rationale	Definition
1	Downtime (%) (non-availability time)	Operational efficiency, actual equipment availability compared with requirements.	**T_{down} % = (T_{nd} / RT) x 100** T_{nd} = non-availability time per year. *RT = Required Time* per year.
2	Uptime (%) (availability time)	Operational efficiency, actual equipment availability compared with requirements	**T_{up} % = (T_d / RT) x 100** T_d = RT - T_{nd}
3	MTTR (mean time to restoration)	Parameter of reliability, availability	**MTTR = T_f / N_{CM}** T_f is the off-duty time for failure; N_{CM} is the total number of corrective actions.
4	MTBF (mean time between failures)	Parameter of reliability, availability	**MTBF = T_d / N_{CM}** T_d is the availability time; N_{CM} is the total number of corrective actions.
5	Class failure ratio (fails per class)	Failure rate of each class of equipment	**Class failure ratio = CMi / N_{CM} is** CMi is the number of corrective actions per year applied to the *i*th equipment class;

Sl.	Index	Rationale	Definition
			N_{CM} is the total number of corrective actions in the same year.
6	Global failure rate (defectiveness)	Fault occurrences related to the number X of devices	**GFR = N_{CM} / N_{dev}** N_{CM} is the total number of corrective actions per year; N_{dev} is the number of devices in the inventory at the end of the year.
7	AFR: age failure rate	Device obsolescence	**AFR = N_{CM} *(Age Class)*/ N_{dev} *(Age Class)*** N_{CM} is the total number of corrective actions per year; N_{dev} is the device number. Age classes: 0–2 years, 3–5 years, 6–9 years, ≥10 years
8	"Negligent" actions (%)	Operational performance of maintenance process	**Negligent Actions % = (** Nnegl / N_{CM} **) x 100** Nnegl is the number of corrective actions per year, that have not been completed within 30 days ("negligent" actions) N_{CM} is the number of corrective actions per year
9	"1 day" actions	Operational performance of maintenance process	**"1 day" actions % =** (N1day / N_{CM} **) x 100** N1day is the number of corrective actions per year, that have been completed within 24 h; NCM is the number of corrective actions per year
1	SM with failure (%)	Scheduled maintenance intervention with fault occurred	**SM with failure (%) = ($N_{SM\ failure}$ / N_{SM}) x 100** $N_{SM\ failure}$ is the number of scheduled maintenance actions per year with code ≠ NPF; N_{SM} is the number of scheduled maintenance actions per year
11	SM coverage rate (scheduled maintenance)	Scheduled Maintenance conformity to the requirements	**SM coverage rate (%) = (N_{SM} / N_{dev}) x 100**

Sl.	Index	Rationale	Definition
			N_{SM} is the number of scheduled actions per year N_{dev} is the number of devices available in that year
12	No problem found (fake faults) (%)	No fault found during the corrective maintenance work order	***NoNPF (%) = (NoNPF / N_{CM}) x 100*** N_{CM} is the number of corrective actions per year

Chapter II

About the PPP Service Provider & MoU:

The State of Arunachal Pradesh has implemented the Biomedical Equipment Management and Maintenance Program (BEMMP) since 2017. The state has signed the contract with Medicity Healthcare Pvt. Ltd. through an open tendering process adhering to RFP provided in the NHM BEMMP guidelines. State had floated the tender was subsequently awarded to L1 bidder, that was Medicity Healthcare Pvt. Ltd. The MoU was signed on 9th January 2017 between NHM, Arunachal Pradesh and Medicity Healthcare Pvt. Ltd with 10.89 % of the asset value. The contract between State NHM and Medicity Healthcare Pvt. Ltd is for 5 (Five) years. The contract was over in December 2021 and NHM Arunachal Pradesh has continued the contract with revised MoU (27th January 2022) with the Medicity Healthcare Pvt. Ltd for another 5 years.

The total project cost has been calculated at 10.89 % of the asset value of Rs. 36,96,06,836 /- (Rupees Thirty-Six Crores Ninety-Six Lakhs Six Thousand and Eight Hundred Thirty-Six only) and 18% GST. The value has been kept same as per the earlier contract (10.89%).

The State has nominated one Nodal Officer at the state level to look after BEMMP and in addition two other officials of NHM Arunachal Pradesh. The State Nodal Officer is also looking after the other National Programs in addition to BEMMP. The Nodal Officer is aware about the BEMMP dashboard. It was also informed that the state is doing regular quarterly review meetings with the Service Provider.

It was revealed that the State has not recruited any Bio-Medical Engineer / Electronics Engineer in the State to look after the BEMMP.

Service provider Team

Sl	Designation	Available HR
1	Operational Manager	1
2	Regional Manager	1
3	Senior Service Engineer	3
4	Radiology Specialist	1
5	Diploma	9
6	Junior Biomedical Engineer	4
7	At State Head Quarter, Naharlagun	5

Table 1: HR Distribution of Medicity in Arunachal Pradesh (As on 08/08/2022)

Sl.	EMPLOYEE NAME	Designation	Qualification	Experience in Mediciti	Assigned Location / Dist.	Base Location
1	Rahul Kumar kashyap	Regional Manager	Dip. Elect. E	11.7 Yars	All District	Naharlagun
2	Velumani R	Sr.BME	B.E EEE	10 Years	Namsai , Lohit , Anjaw, Changlang, Tirap, Longding	Namsai
3	Tapash Mazumder	BME	B Tech Elect. Telecom.	7.8Years	Namsai , Lohit , Anjaw, Changlang, Tirap, Longding	Namsai
4	Surojit Dey	BME	B.Tech Mech	7.2 years	Namsai , Lohit , Anjaw, Changlang, Tirap, Longding	Namsai
5	Ganesh Sonar	Jr. BME	Diploma (EEE)	5.1 years	Dibang Valley , Lower Dibang Valey	Roing
6	Shashi Shekar	BME	BSC Elect. O&MBE	6.1 years	East Siang , Upper Siang, Siang , Lower Siang	Pasighat
7	Kolian Das	Jr. BME	DIP .EEE	5.3 years	East Siang , Upper Siang, Siang , Lower Siang	Pasighat
8	Yadavalli Satyannarayana	Technical Specialist-Radiology	Diploma (ECE)	10 years	East Siang , Upper Siang, Siang , Lower Siang	Pasighat
9	Kabit Megu	Jr BME	Diploma(Electrical Eng)	3 months	East Siang , Upper Siang, Siang , Lower Siang	Pasighat
10	Tomin Zirdo	BME	B.E EEE	7.7 Years	West Siang , Lepa Rada, Shiyomi, Siang , Lower Siang	Aalo
11	Balamuruga n G	BME	Diploma (Electrical & Electronics)	9.5 years	West Siang , Lepa Rada, Shiyomi, Siang , Lower Siang	Aalo
12	Pathik Maity	Jr. BME	Diploma(Electronics & Telecommunications)	4 years	Papumpare, Lower Subansiri, Upper Subansiri, Kurung Kumey , Kra Dadi, Kamle	Naharlagun
13	Vallabhaneni Mohendra	Sr.BME	Msc(Electronics &	1.5 years	Papumpare, Lower Subansiri, Upper Subansiri, Kurung	Naharlagun

Sl.	EMPLOYEE NAME	Designation	Qualification	Experience in Mediciti	Assigned Location / Dist.	Base Location
			Instrumentation)		Kumey , Kra Dadi, Kamle	
14	Ajay Kumar Ram	Jr. BME	B.Tech EEE	4.2 years	Papumpare, Lower Subansiri, Upper Subansiri, Kurung Kumey , Kra Dadi, Kamle	Naharlagun
15	Jumge Nyokir	Jr. BME	DIP .EEE	7.2 years	Papumpare, Lower Subansiri, Upper Subansiri, Kurung Kumey , Kra Dadi, Kamle	Naharlagun
16	Mudidana Murthum Jaya Raj Kumar	Sr.BME	B. Tech (ECE)	11 years	Papumpare, Lower Subansiri, Upper Subansiri, Kurung Kumey , Kra Dadi, Kamle	Naharlagun
17	Satyam Kumar	BME	BSC Elect.	6.1 years	Tawang , West Kameng , East Kameng , Pakke Kessang	Bomdila
18	Bilipan Basumata	Jr. BME	Diploma(Electronics)	4 years	Tawang , West Kameng , East Kameng , Pakke Kessang	Bomdila
19	Buru Tajang	Sr. Admin Executive	PG in GIS	7.8 years		Naharlagun
20	Mumni Langkam	Technical Executive	B.Tech EE	4 years		Naharlagun
21	Mung Ratan	Call Centre Executive	Graduation	1 year		Naharlagun
22	Minam Megu	Admin Executive	BE-Civil	1 year		Naharlagun
23	Ibing Mech	Logistic Executive	Diploma ATL (Informatio Secutity)	2 years		Naharlagun

Sl.	EMPLOYEE NAME	Designation	Qualification	Experience in Mediciti	Assigned Location / Dist.	Base Location
24	Gyadi Yashing	Call Centre Executive	Bachlor of Education(Teacher Training)	9 months		Naharlagun

Table 2: The list of calibration equipment with service provider

Sl	Equipment Name	Manufacturer	Model	Quantity
1	Electrical Safety Analyser	Rigel Medical UK	Rigel 288+	4
2	Vital Sign Simulator	Rigel Medical UK	Uni Sim Lite	1
3	Digital Lux meter	Ambrobe	LM-100	1
4	Digital Thermometer	Metravi	DTM-900	5
5	Digital Tachometer	Ambrobe	Tach-10	2
6	Dial Regular BP apparatus with field calibration	Diamond	Regular	12
7	Irradiance meter	AVI Healthcare Pvt Ltd	Biliprobe	1
8	KVP Meter	Ray Safe		1
9	Weight Stone 20 Kg			5
10	Weight Stone 10 Kg			1
11	Weight Stone 5 Kg			1
12	Weight Stone 2 Kg			1
13	Weight Stone 1 Kg			1

Chapter III

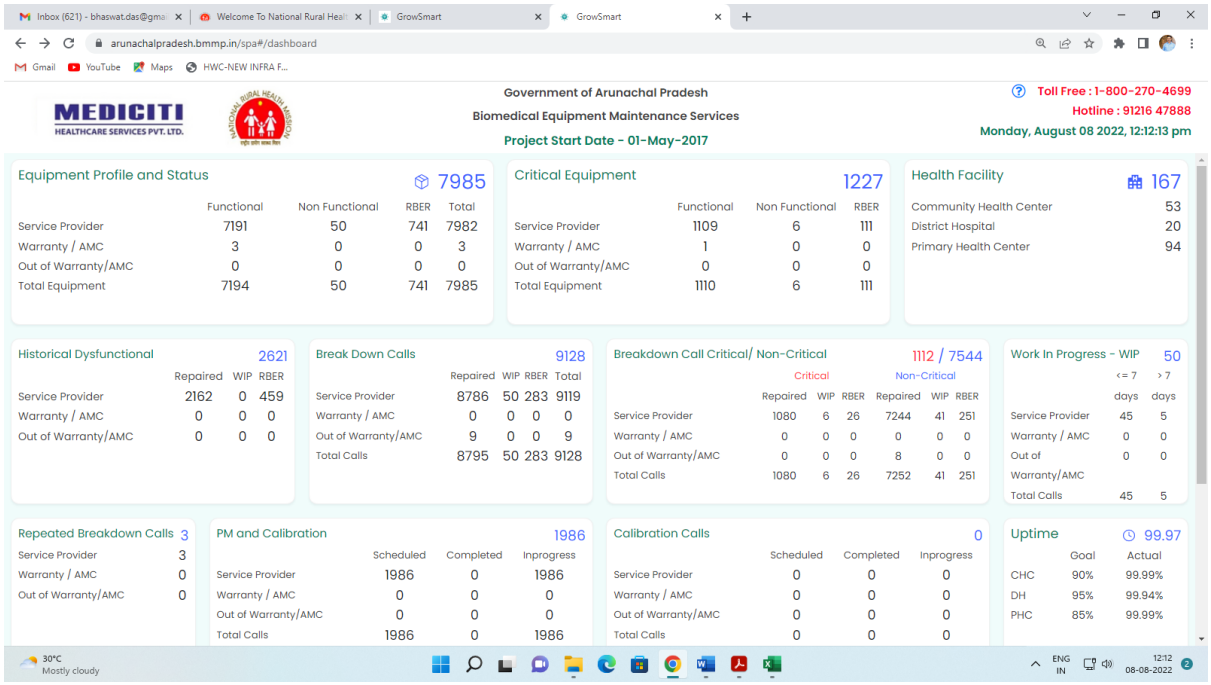
Desk Review

Equipment Management Information System – Dashboard

A real-time dashboard has been developed by the service provider which has linked with NHM Arunachal Pradesh website but not opening the link.

Few basic information like total equipment, numbers of equipment under warranty, number of breakdown calls etc can be accessed by public. Access is required to download any other information. The Nodal person of service provider mentioned that all the basic information automatically updated by the software.

Figure 1: Screenshot of the dashboard



The details of the dashboard and tollfree numbers are as follow:

https://arunachalpradesh.bmmp.in/

Toll Free Number for Service: 1-800-270-4699

Login-id and password is required to download few specific information from the dashboard. At present the access is limited to State Officials and Administrative staff of Medicity (service provider) team.

The State Nodal Officer BEMMP was informed that they utilized the dashboard for monitoring the functionality of the equipment, procurement of equipment based on repeated breakdown, calculation of penalty, shifting of equipment from one health facility to another during emergency etc.

The Nodal Officer also stated that the information on health facility wise equipment in the Dashboard was quite helpful during management of health services and rationalizing old & new medical devices during COVID pandemic. Information on health facility wise number of calls registered list for any selected time span is available in the dashboard and it can be downloaded by State / District Officials.

As mentioned by the State Nodal officer they are utilising the Dashboard data for PIP planning purpose, for procurement of new equipment and BEMMP budgeting. But the awareness and utilization of the dashboard at the district and at peripheral level is minimal.

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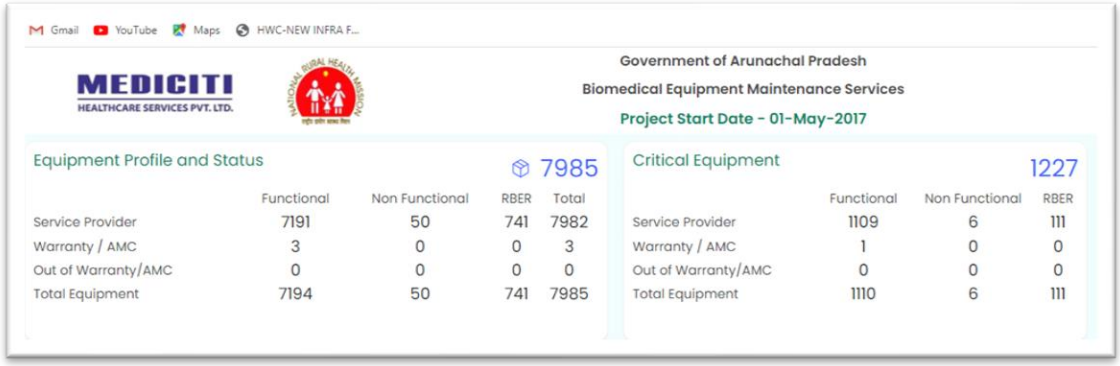
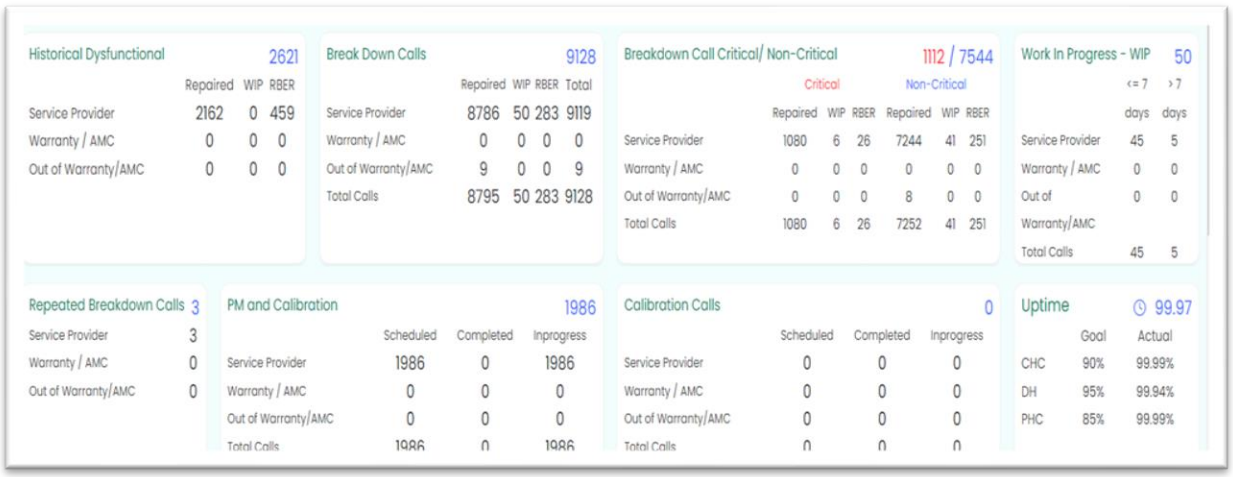
At present there is 7985 medical equipment under the BEMMP as per the dashboard. 741 equipment has been declared as BER and 50 non-functional equipment on 08/08/2022. It is also seen that 1227 equipment has been identified as critical equipment.

Figure 2: Total equipment



A total 9119 calls have been received since inception out of which 9069 have been resolved. At present only 3 equipment under warranty have been added into the program.
Equipment with warrant may be attributed to the apprehension of the State that, after the warranty period gets over the equipment will automatically get shifted in the lap of service provider and this in turn will increase the asset value of the State, creating financial liabilities. This was also clarified by the State Nodal officials, and they expressed the impending financial constraint in terms of the fixed resource envelope.
Scheduled maintenance and calibration of equipment are also available in the dashboard.

Figure 3: Total call



It was also learnt that there is option in the dashboard to know the equipment added and deleted by time at present. This will help the State to monitor the actual asset value of the equipment for any period.

A total of 741 Equipment has been marked as Beyond Economic Repair (BER). State / District needs to dispose the BER equipment through the Condemnation Committee as all districts have Condemnation Committee under the chairmanship of Deputy Commissioner / Medical Superintendent DH.

Figure 4 depicts that the upkeep time is more than 99% during 2021 – 22, across the facility level, but different scenario may emerge if the call/complaint register in are inspected.

Figure 4: Upkeep time for Equipment in the FY 2021-22 as per dashboard

Critical Equipment:

MoHFW has identified 25 nos. of critical equipment for health facilities and their upkeep time should be more than 95%. It was noticed that critical equipment is indicated in the breakdown call register but not in main equipment register in the dashboard.

Call Register & Maintenance of Equipment:

Once a call is registered in the Toll-free number (Naharlagun based Call Centre), the administrative staff located in Naharlagun is informed and the task is assigned to the concerned Service Engineer.

Service Engineer have received the tool and equipment for calibration from the headquarter Hyderabad & Naharlagun and is being doing calibration with support from Hyderabad based Bio Medical Engineer team members.

Table 3 shows that that the equipment concentration is more in 4 districts i.e., Papum Pare (12.1%), East Siang (9.7%), Changlang (7.8%) and Lower Subansiri (7.3%). Only 1% of equipment are in each newly created districts like Diabng Valley, Kamle, Kara Dadi and Lepa Rada.

The amount of equipment under BER is also highest in same districts, as above, but proportion of BER equipment to district wise total equipment is more in Longding (28.3 %), Namsai (16.5%), Tirap (14.8%), West Siang (15.3%), Upper Siang (14.6%), Long Ding (13.9%) and Changlang (13.9%). Total BER equipment in that State is 9.3 % and rest of the 18 districts have BER equipment less than 10 %.

Most common BER equipment are Sphygmomanometer (30.90 %), Needle Cutter (7.83%), Weighing scale (7.69%), Aspirator (6.88%), and Lab Microscope (6.21%).
Table 5 shows that, the cost distribution of BER equipment is also less than Rs.10,000/- (54.5%), Rs. 10,000/- to Rs. 99,999/- (25.5%) and rest above Rs. 1.0 L.

Condemnation of BER equipment: The life cycle of medical equipment will vary from 5-10 years. If the equipment is declared obsolete i.e. BER by the vendor it may not be possible to get spare parts. Even if the parts are available, it can become too expensive to obtain them and the equipment is no longer economical to repair. Condemnation of equipment should be well planned, and the necessary steps should be taken in advance to arrange replacement.

The management of medical devices has taken on a new level of complexity in recent years, due in part to the increased sophistication and specialization of equipment, integration with electronic networks, dependence on outsourcing for specialized maintenance and repair, and ever-increasing requirements for compliance, safety, reliability, and accuracy.

By using historical data of medical equipment and conducting an equipment audit in the health facilities, the management can analyze, improve efficiency and compliance of their management programs with optimization of costs.

Table 3: District Distribution of Functionality of Equipment as per dashboard (as on 08/08/2022)

District	Functional	Non-Functional	Proportion of Equipment (except BER)	BER	% of BER	Total
Anjaw	202	0	2.8	16	7.3	218
Changlang	549	14	7.8	91	13.9	654
Dibang Valley	77	0	1.1	4	4.9	81
East Kameng	341	0	4.7	9	2.6	350
East Siang	693	11	9.7	52	6.9	756
Kamle	72	0	1.0	0	0.0	72
Kara Daadi	59	0	0.8	4	6.3	63
Kurung Kumey	166	0	2.3	11	6.2	177
Lepa Rada	85	0	1.2	5	5.6	90
Lohit	330	0	4.6	25	7.0	355
Longding	143	0	2.0	56	28.1	199
Lower Dibang Valley	353	0	4.9	57	13.9	410
Lower Siang	137	0	1.9	5	3.5	142
Lower Subansiri	518	9	7.3	28	5.0	555
Namsai	289	0	4.0	57	16.5	346
Pakke Kessang	68	0	0.9	5	6.8	73
Papum Pare	872	2	12.1	88	9.1	962
Shi Yomi	56	0	0.8	1	1.8	57
Siang	155	0	2.1	10	6.1	165
Tawang	397	14	5.7	18	4.2	432
Tirap	196	0	2.7	34	14.8	230
Upper Siang	281	0	3.9	48	14.6	329
Upper Subansiri	279	0	3.9	10	3.5	289
West Kameng	501	0	6.9	40	7.4	541
West Siang	372	0	5.1	67	15.3	439
Total	**7191**	**50**	**100.0**	**741**	9.3	**7985**

Table 4: Cost wise distribution of BER equipment (in Rs.) (as on 08/08/2022)

Cost wise distribution of BER equipment (in Rs.)		
Equipment Cost	**Total**	**Total**
Less Than 10,000	404	54.52%
1000 to 49,999	189	25.51%
50,000 to 99,000	24	3.24%
1,00,000 to 9,99,999	118	15.92%
Above 10,00,000	6	0.81%
Grand Total	741	100.00%

Call registered & call completed are two important terms in BEMMP outsourced model and in some extent to in-house model also. A call is registered in the system after getting call from Nodal Officer /end user / MO i/c / Medical Superintendent of the hospital for breakdown of any equipment. The service provider closes or completes a call after getting certification of complete repair for the same breakdown equipment from the end user & MO i/c / Medical Superintendent of the hospital. Penalty to the outsourced service provider is calculated based call completion time for equipment; it differs from State to State, type of equipment and as per the MoU. In addition to that correct calculation upkeep time, downtime, breakdown rate of equipment is also based on call register in the system. Prime reason for mismatch of functional equipment as per dashboard & in the health facility is due to non-registration of breakdown call to the system through the existing 'TOLL FREE NUMBER'. Breakdown information are generally being informed to the service engineer through WhatsApp group or phone call, which in turn may lead to delayed registration in the data base.

Table 5 shows that district distribution of call status as per dashboard during April to July 2022-23, FY 2021-22, and FY 2020-21.

It is found that from Table only **21.9 %**, **34.7 % and 12.4%** calls were made in the year 2020-21, 2021-22 and for only four months 2022-23 (April to July) respectively. It was also noticed that 99.9 % calls were completed within or by 7 days in the year 202-21 & 2021-22 respectively.

Table 5.: District Distribution of call status as per dashboard

	Completed Calls <= 7 Days	Completed Calls > 7 Days	Completed Calls <= 7 Days	Completed Calls > 7 Days	Completed Calls <= 7 Days	Completed Calls > 7 Days	Pending Calls > 7 Days
	2020-21		**2021-22**		**April to July 2022-23**		
Anjaw	25	0	26	0	1	0	0
Changlang	55	0	100	0	33	0	0
Dibang Valley	0	0	55	0	4	0	0
East Kameng	62	0	112	0	11	0	0
East Siang	96	0	262	0	60	4	3
Kamle	27	0	19	0	19	0	0
Kara Daadi	8	0	15	2	13	0	0
Kurung Kumey	0	0	35	0	21	0	0
Lepa Rada	29	0	17	0	19	0	0
Lohit	63	2	45	0	12	0	0
Longding	35	0	51	0	13	0	0
Lower Dibang Valley	90	0	113	0	31	0	0
Lower Siang	34	0	27	0	0	0	0
Lower Subansiri	97	0	122	0	73	3	1
Namsai	65	0	67	0	16	0	0
Pakke Kessang	8	0	28	0	0	0	0
Papum Pare	421	8	610	0	153	0	1
Shi Yomi	17	0	14	0	7	0	0
Siang	48	0	58	0	17	0	0
Tawang	81	2	189	0	102	0	0
Tirap	12	0	45	0	34	0	0
Upper Siang	41	0	85	0	50	0	0
Upper Subansiri	41	0	92	1	35	0	0
West Kameng	155	0	214	1	131	0	0
West Siang	62	0	108	0	39	0	0
Total	**1572**	**12**	**2509**	**4**	**894**	**7**	**5**
% of call against total equipment 7244	**21.9 %**		**34.7 %**		**12.4 %**		

Table 6 implies that there is an increasing trend of performances of the critical equipment with lesser numbers of complaints over the last few years though there is increase in the absolute numbers of critical equipment, whereas, over the last few years, the complaints are booked for 'non-critical' equipment is in the range of 80 – 85%, no change.

Table 6.: Distribution of call status by type of equipment as per dashboard

Year	Criticality	Total Call	% of Total Call
2018-19	Critical	227	15.5
	Non-Critical	1168	79.6
	Not defined	73	5.0
2018-19 Total		**1468**	**17.3**
2019-20	Critical	260	13.0
	Non-Critical	1635	82.0
	Not defined	99	5.0
2019-20 Total		**1994**	**23.5**
2020-21	Critical	164	10.4
	Non-Critical	1332	84.1
	Not defined	88	5.6
2020-21 Total		**1584**	**18.7**
2021-22	Critical	261	10.3
	Non-Critical	2143	85.0
	Not defined	118	4.7
2021-22 Total		**2522**	**29.8**
2022-23	Critical	98	10.8
	Non-Critical	769	84.8
	Not defined	40	4.4
2022-23 (April to July) Total		**907**	**10.7**
Grand Total		8475	100.0

Average downtime for Equipment:

As per the MoU, the uptime for medical equipment should be 95 % in DH, 90% in CHCs and 80 % in PHCs and a single break down should never exceed 7 days (168 hrs), otherwise penalty will be levied on the Service Provider. Moreover, as per the MoU, the Service Provider should provide standby equipment at the health facility for lifesaving equipment like Blood Gas Analyzer, ECG machine, Ventilator, Radiant Warmer and Defibrillator during any breakdown. But availability of any such standby equipment was not observed in the facilities visited.

It is observed from the Table 7.b that average down time is more for high end equipment. Downtime of those equipment are more than 7 days (168 hrs) is highlighted.

It is seen that downtime of equipment less than 12 hours is 74.0 during 2018-19 to 2022-23 (up to July). The percentage is quite encouraging but the State / District need to monitor the information more vigorously about repairing equipment within 12 hours after getting the call in Arunachal Pradesh. Who register the call, close the call needs to be monitored.

From Table, 7.c it is observed that 40.72 % BP machines were repaired during 2018-19 to 2022-23 (Up to July) out of total, 10.42 were repaired Steriliser (instrument) and 5.19 %

Autoclave (Steam). Rest 43.67% other different around different 110 equipment were repaired during the same period.

The service provider should analyse the causes for more downtime e.g. HR shortage, Technical capacity of HR, supply spare parts, response from OEM, software maintenance of equipment, environment, others etc. for undertaking corrective measures.

Table 7.a– Year wise distribution of downtime as per the Dashboard

Year wise distribution of downtime (in Hrs)												
Year	**Less Than 12**	**In %**	**12 to 23**	**In %**	**24 to 71**	**In %**	**72 to 168**	**In %**	**More than 168**	**In %**	**Grand Total**	**In %**
2018-19	1100	74.9	79	5.4	127	8.7	55	3.7	107	7.3	1468	100.0
2019-20	1368	68.6	245	12.3	249	12.5	78	3.9	54	2.7	1994	100.0
2020-21	1432	90.4	55	3.5	69	4.4	15	0.9	13	0.8	1584	100.0
2021-22	1888	74.9	268	10.6	220	8.7	139	5.5	7	0.3	2522	100.0
2022-23	482	53.1	272	30.0	112	12.3	25	2.8	16	1.8	907	100.0
Total	**6270**	**74.0**	**919**	**10.8**	**777**	**9.2**	**312**	**3.7**	**197**	**2.3**	**8475**	**100.0**

Table 7.b– District wise distribution of downtime as per the Dashboard

District wise distribution of downtime (in Hrs)												
District	**Less Than 12**	**In %**	**12 to 23**	**In %**	**24 to 71**	**In %**	**72 to 168**	**In %**	**More than 168**	**In %**	**Grand Total**	**In %**
Anjaw	74	0.87	1	0.01	1	0.01	1	0.01	2	0.02	79	0.93
Changlang	310	3.66	9	0.11	21	0.25	2	0.02	3	0.04	345	4.07
Dibang Valley	52	0.61	9	0.11	18	0.21	3	0.04	7	0.08	89	1.05
East Kameng	190	2.24	62	0.73	15	0.18	26	0.31	2	0.02	295	3.48
East Siang	507	5.98	81	0.96	91	1.07	34	0.40	40	0.47	753	8.88
Kamle	79	0.93	14	0.17	4	0.05		0.00		0.00	97	1.14
Kara Daadi	43	0.51	3	0.04	2	0.02	4	0.05	2	0.02	54	0.64
Kurung Kumey	81	0.96	17	0.20	3	0.04	1	0.01	2	0.02	104	1.23
Lepa Rada	130	1.53	13	0.15	24	0.28		0.00		0.00	167	1.97
Lohit	195	2.30	20	0.24	11	0.13	2	0.02	16	0.19	244	2.88
Longding	156	1.84	17	0.20	9	0.11		0.00	1	0.01	183	2.16

District wise distribution of downtime (in Hrs)												
District	**Less Than 12**	**In %**	**12 to 23**	**In %**	**24 to 71**	**In %**	**72 to 168**	**In %**	**More than 168**	**In %**	**Grand Total**	**In %**
Lower Dibang Valley	340	4.01	21	0.25	8	0.09	5	0.06	6	0.07	380	4.48
Lower Siang	133	1.57	11	0.13	40	0.47	6	0.07		0.00	190	2.24
Lower Subansiri	316	3.73	47	0.55	37	0.44	25	0.29	16	0.19	441	5.20
Namsai	275	3.24	6	0.07	7	0.08	2	0.02	1	0.01	291	3.43
Pakke Kessang	56	0.66	3	0.04		0.00		0.00	1	0.01	60	0.71
Papum Pare	1606	18.95	109	1.29	101	1.19	50	0.59	56	0.66	1922	22.68
Shi Yomi	45	0.53	9	0.11	2	0.02		0.00	2	0.02	58	0.68
Siang	123	1.45	23	0.27	30	0.35	8	0.09	1	0.01	185	2.18
Tawang	281	3.32	105	1.24	104	1.23	48	0.57	6	0.07	544	6.42
Tirap	113	1.33	15	0.18	2	0.02		0.00		0.00	130	1.53
Upper Siang	221	2.61	73	0.86	13	0.15	12	0.14	7	0.08	326	3.85
Upper Subansiri	191	2.25	57	0.67	29	0.34	6	0.07	2	0.02	285	3.36
West Kameng	435	5.13	130	1.53	151	1.78	60	0.71	14	0.17	790	9.32
West Siang	318	3.75	64	0.76	54	0.64	17	0.20	10	0.12	463	5.46
Total	**6270**	**73.98**	**919**	**10.84**	**777**	**9.17**	**312**	**3.68**	**197**	**2.32**	**8475**	**100.00**

Table 7.c– Year wise and equipment wise distribution of call as per the Dashboard

Distribution of equipment wise call								
Sl.	ME Name	2018-19	2019-20	2020-21	2021-22	2022-23	Grand Total	In %
1	ECG 3 Channel	2	3	2	10	5	22	0.26
2	X Ray -60 mA Mobile	32	23	15	19	5	94	1.11
3	X-Ray View Boxes	5	10	4	15	6	40	0.47
4	Analyzer Laboratory	13	18	4	10	6	51	0.60
5	Semi Auto Analyzer	12	5	5	7	8	37	0.44
6	Anesthesia Units	15	11	8	12	5	51	0.60
7	Aspirators	87	103	121	185	60	556	6.56
8	Baths, Water, Laboratory		1	2	5	3	11	0.13
9	Blood donor couch	3	4		2		9	0.11
10	Centrifuges (Tabletop)	46	31	30	51	18	176	2.08
11	Computed Radiography System	5	3	9	8	5	30	0.35
12	Electrosurgical Units (Cautery Machine)	9	9	4	10	4	36	0.42
13	Dentistry Chair	28	40	28	38	21	155	1.83
14	External Manual Defibrillator	3	5		2		10	0.12
15	Eye Charts, Visual Acuity		2	1	3	1	7	0.08
16	Freezers	5	31	14	12	3	65	0.77
17	Fumigation Machine	7	6	7	3	3	26	0.31
18	Hemodialysis Machine	10	11	6	1	1	29	0.34
19	Incubators Lab	10	11	2	15	4	42	0.50
20	Infusion Pump	4		2	3	5	14	0.17
21	Surgical Lights	69	84	52	84	21	310	3.66
22	Medical-Air Compressors	2	9	4	5	1	21	0.25
23	Microscope Light	41	44	35	61	22	203	2.40
24	Monitoring Systems, Physiologic	29	13	18	31	8	99	1.17
25	Nebulizers, Nonheated	16	19	17	31	9	92	1.09
26	Operating Tables	7	7	3	2	4	23	0.27
27	Otoscopes	5		1		1	7	0.08
28	Drying Ovens	2	2	2	2	7	15	0.18
29	Oxygen Concentrators	6	13	16	17	15	67	0.79
30	Package Sealers	4			5	1	10	0.12
31	Phototherapy Units	18	11	5	14	6	54	0.64

Distribution of equipment wise call								
Sl.	ME Name	2018-19	2019-20	2020-21	2021-22	2022-23	Grand Total	In %
32	Pulse Oximeter Tabletop	5	8	5	9	3	30	0.35
33	Refractometers		1	5	2		8	0.09
34	Blood Bank Refrigerators	11	8	4	5	2	30	0.35
35	Laboratory Refrigerators	4	4	14	7	5	34	0.40
36	Scales Infant	10	16	5	12	7	50	0.59
37	Blood Collection Scales	4	2	1	3	1	11	0.13
38	Scales, Patient, Floor	6	15	8	3	3	35	0.41
39	Adult Weighing machine	25	21	18	13	8	85	1.00
40	Ophthalmic Scanner	5	1	2	2		10	0.12
41	Ultrasound Scanner	8	3	2	17	10	40	0.47
42	Shakers	9	3	2	4	1	19	0.22
43	Slit Lamps	13	4	7	10	3	37	0.44
44	Mercury Sphygmomanometers	521	773	651	1128	378	3451	40.72
45	Sterilizing Units	17	69	36	41	18	181	2.14
46	Sterilizing Units	127	199	177	284	96	883	10.42
47	Sterilizing Units, Steam	21	35	29	16	3	104	1.23
48	Autoclave Vertical	69	95	80	143	53	440	5.19
49	Stimulators Nerve	1	3	4	6	2	16	0.19
50	Syringe/Needle Cutters	13	39	13	13	4	82	0.97
51	Radiant Warmer	75	121	79	112	27	414	4.88
52	Elisa Cell Washer	3	4	2	2	3	14	0.17
53	X- ray Fluoroscopic Units	15	14	8	5	3	45	0.53
54	X-ray Dental	1	3	1	1	2	8	0.09
55	Equipment category less than 5 nos.	10	24	14	21	17	86	1.01
	Grand Total	**1468**	**1994**	**1584**	**2522**	**907**	**8475**	**100.00**

Table 7.d– District wise distribution of call of critical equipment during the period 2017-2022 as per the Dashboard

Sl.	Equipment Category	Total Calls	Completed Calls	Pending Calls
1	Blood Gas Analyser	0	0	0
2	Electrolyte Analyzer	2	2	0
3	Semi auto analyzer	45	43	2
4	Automated Haematology Analyzers	15	15	0
5	ELISA Reader	26	26	0
6	Anesthesia work station	5	5	0
7	Boyles Apparatus	58	58	0
8	Brachytherapy	0	0	0
9	Defibrillators	12	12	0
10	Single Channel ECG	17	17	0
11	3 Channel ECG	27	27	0
12	Dialysis Machine	23	22	1
13	Infant Incubator	6	6	0
14	Syringe Pump	13	13	0
15	Binocular Microscope	206	203	3
16	3 Para Patient Monitor	105	104	1
17	Oxygen Concentrators	5	5	0
18	Phototherapy Units	53	53	0
19	Dental X Ray	12	10	2
20	Mobile X Ray -60 mA	111	110	1
21	X Ray	47	47	0
22	C ARM Machine	4	3	1
23	CT Scanner	1	1	0
24	Ultrasound Scanner	31	31	0
25	Portable ultrasound Scanner	12	12	0
26	Ventilator	4	4	0
27	Radiant Warmer	468	467	1
	Total	**1308**	**1296**	**12**

Table 8– Distribution of equipment by downtime

Distribution of equipment wise call as per downtime							
Sl.	**ME Name**	**Less Than 12 Hr**	**12 to 23 Hr**	**24 to 71**	**72 to 168**	**More than 7 days**	**Grand Total**
1	ECG 3 Channel	12	5	1	1	3	22
2	X Ray -60 mA Mobile	60	8	18	5	3	94
3	X-Ray View Boxes	31	6	1	1	1	40
4	Analyzer Laboratory	36	3	6	1	5	51
5	Semi Auto Analyzer	17	7	3	3	7	37
6	Anaesthesia Units	32	5	9	3	2	51
7	Aspirators	411	75	48	17	5	556
8	Audiometers, Two Channel	1			1		2
9	Baths, Tissue Flotation	1					1
10	Water Baths	8	3				11
11	Blood donor couch	8			1		9
12	Centrifuges (Tabletop)	127	17	21	8	3	176
13	Computed Radiography System	22	1	3		4	30
14	Electrosurgical Units					1	1
15	Electrosurgical Units Bipolar	2			1		3
16	Electrosurgical Units (Cautery Machine)	24	2	5	2	3	36
17	Endoscope			1	1		2
18	Dental Chair	97	20	21	8	9	155
19	External Manual Defibrillator	8				2	10
20	Eye Charts	6			1		7
21	Fetal doppler	1	2	1			4
22	Freezers	57	2	3	1	2	65
23	Fumigation Machine	16	4	3	2	1	26
24	Hemodialysis Machine	20	2	2	1	4	29
25	Incubators Infant	2	1	1			4
26	Incubators Lab	32	2	5	3		42
27	Infusion Pump	10	2		1	1	14
28	Laminar Air flow	1					1
29	Laparoscopic Insufflators	1				2	3

Distribution of equipment wise call as per downtime							
Sl.	**ME Name**	**Less Than 12 Hr**	**12 to 23 Hr**	**24 to 71**	**72 to 168**	**More than 7 days**	**Grand Total**
30	Laser Imager	1		1		2	4
31	Surgical Lights	231	30	23	15	11	310
32	Medical-Air Compressors	12	3	3	2	1	21
33	Microscope Light	146	23	19	8	7	203
34	Microtomes, Rotary	1		1	1	1	4
35	Mixers	1		1			2
36	Monitoring Systems, Physiologic	61	6	7	7	18	99
37	Motor, Laboratory, Dental			1			1
38	Nebulizers	77	5	5	3	2	92
39	Operating Tables	16	2	2	1	2	23
40	Ophthalmic Lasers	2	1	1			4
41	Ophthalmometers	1					1
42	Ophthalmoscopes	2				2	4
43	Otoscopes	5	1		1		7
44	Drying Ovens	6	3	1	2	3	15
45	Oxygen Concentrators	47	6	10	1	3	67
46	Oxygen Plant- 45 LPM	1					1
47	Package Sealers	5	3	2			10
48	Photometers, Filter, Manual				1		1
49	Phototherapy Units	32	9	6		7	54
50	Pipettes			1			1
51	Printers, Video		3	1		1	5
52	X Ray Printers	1	1				2
53	Pulse Oximeter Tabletop	21	3			6	30
54	Radiofrequency Therapy Systems, Diathermy	1	1				2
55	Refractometers	8					8
56	Refrigerators, Blood Bank	17	5	5	1	2	30
57	Refrigerators, Laboratory	26	4	2	1	1	34
58	Rotators	3	1	1			5

Distribution of equipment wise call as per downtime							
Sl.	**ME Name**	**Less Than 12 Hr**	**12 to 23 Hr**	**24 to 71**	**72 to 168**	**More than 7 days**	**Grand Total**
59	Scales Infant	34	10	5	1		50
60	Scales, Blood Collection	8	1		1	1	11
61	Scales, Patient, Floor	31	1	3			35
62	Adult Weighing machine	68	12	3	2		85
63	Scan CT				1	1	2
64	Scanner Ophthalmic	8	1	1			10
65	Scanner Ultrasound	27	6	1	4	2	40
66	Shakers	11	1	4	2	1	19
67	Slit Lamps	27	1	4	1	4	37
68	Sphygmomanometers, Electronic	5					5
69	Sphygmomanometers	2695	372	276	89	19	3451
70	Sterilizing Units	145	13	14	8	1	181
71	Sterilizing Units	616	117	100	41	9	883
72	Sterilizing Units, Steam	81	11	11	1		104
73	Vertical Autoclave	324	42	40	28	6	440
74	Stimulators Nerve	13	1	2			16
75	Syringe/Needle Cutters	60	6	9	5	2	82
76	Tonometers Ophthalmic	5					5
77	Traction Unit	2	1				3
78	Transcutaneous Electrical Nerve Stimulation	4					4
79	Ultrasonic Dental Scalers	3					3
80	Ultrasound Surgical Units			1			1
81	Ultrasound Therapy machine	1					1
82	Vacuum Extractors	1					1
83	Ventilators	1		1		1	3
84	Radiant Warmer	291	40	51	17	15	414
85	Elisa Cell Washer	9	1	1	1	2	14
86	X- ray	29	4	5	3	4	45
87	X-ray Dental	4	1		1	2	8
Grand Total		**6270**	**919**	**777**	**312**	**197**	**8475**

Calibration & Preventive maintenance:

Table 9.1 shows that 85% of equipment had been calibrated as per scheduled total equipment 8512. An encouraging scenario is that 15 districts completed calibration of the equipment more than 95%, out of 15 districts 9 districts completed 100%. Calibration of equipment in Upper Siang, Upper Subansiri, West Kameng, Siang were less than 50 %.

Table 9.2 reveals that 85% of the scheduled preventive maintenance were completed in the year 2021-22. Similar district wise performance scenario regarding preventive maintenance of equipment were observed as calibration of the equipment.

Table 9.1 : District wise distribution of equipment calibrated in the year 2021-22

Calibration 2021-22					
District	Scheduled	Completed	Pending	% of completed / scheduled	Total Equipment (Excluding BER)
Anjaw	207	207	0	100.0	202
Changlang	686	686	0	100.0	562
Dibang Valley	98	98	0	100.0	77
East Kameng	300	300	0	100.0	341
East Siang	866	742	124	85.7	704
Kamle	94	94	0	100.0	72
Kara Daadi	72	72	0	100.0	59
Kurung Kumey	216	215	1	99.5	166
Lepa Rada	104	102	2	98.1	85
Lohit	317	317	0	100.0	330
Longding	176	174	2	98.9	143
Lower Dibang Valley	464	314	150	67.7	353
Lower Siang	170	166	4	97.6	137
Lower Subansiri	606	605	1	99.8	519
Namsai	287	287	0	100.0	289
Pakke Kessang	69	62	7	89.9	68
Papum Pare	1145	1053	92	92.0	872
Shi Yomi	66	66	0	100.0	56
Siang	215	107	108	49.8	155
Tawang	500	320	180	64.0	414
Tirap	274	273	1	99.6	196
Upper Siang	390	193	197	49.5	281
Upper Subansiri	317	158	159	49.8	279

Calibration 2021-22					
District	Scheduled	Completed	Pending	% of completed / scheduled	Total Equipment (Excluding BER)
West Kameng	501	242	259	48.3	501
West Siang	372	367	5	98.7	372
Total	**8512**	**7220**	**1292**	84.8	**7233**

Table 9.2 : District wise distribution of preventive maintenance completed in the year 2021-22

Preventive maintenance 2021-22					
District	Scheduled	Completed	Pending	% of complete / scheduled	Total Equipment (Excluding BER)
Anjaw	350	350	0	100	202
Changlang	1110	1108	2	99.8	562
Dibang Valley	146	146	0	100	77
East Kameng	416	416	0	100	341
East Siang	1286	1096	190	85.2	704
Kamle	122	121	1	99.2	72
Kara Daadi	116	116	0	100	59
Kurung Kumey	310	309	1	99.7	166
Lepa Rada	164	158	6	96.3	85
Lohit	566	566	0	100	330
Longding	284	281	3	98.9	143
Lower Dibang Valley	637	458	179	71.9	353
Lower Siang	266	259	7	97.4	137
Lower Subansiri	860	855	5	99.4	519
Namsai	506	506	0	100	289
Pakke Kessang	104	93	11	89.4	68
Papum Pare	1672	1547	125	92.5	872
Shi Yomi	99	98	1	99	56
Siang	294	150	144	51	155
Tawang	712	449	263	63.1	414
Tirap	380	378	2	99.5	196
Upper Siang	533	266	267	49.9	281
Upper Subansiri	421	210	211	49.9	279
West Kameng	783	394	389	50.3	501
West Siang	603	595	8	98.7	372
Total	**12740**	**10925**	**1815**	**85.8**	**7233**

User Training:

Table 10 : District wise distribution of user training in the year 2021-22

An encouraging scenario was observed regarding user training for the equipment. It was found that 197 training sessions were conducted out of total scheduled training sessions 205.

User training during 2021-22				
Sl.	**District**	**Scheduled**	**Completed**	**Pending**
1	Anjaw	4	4	0
2	Changlang	9	9	0
3	Dibang Valley	4	4	0
4	East Kameng	11	11	0
5	East Siang	19	19	0
6	Kamle	5	5	0
7	Kara Daadi	0	0	0
8	Kurung Kumey	2	2	0
9	Lepa Rada	4	4	0
10	Lohit	1	1	0
11	Longding	5	5	0
12	Lower Dibang Valley	3	3	0
13	Lower Siang	1	1	0
14	Lower Subansiri	9	9	0
15	Namsai	2	2	0
16	Pakke Kessang	4	4	0
17	Papum Pare	16	16	0
18	Shi Yomi	4	4	0
19	Siang	10	10	0
20	Tawang	20	20	0
21	Tirap	3	3	0
22	Upper Siang	7	7	0
23	Upper Subansiri	10	2	8
24	West Kameng	41	41	0
25	West Siang	11	11	0
Total		205	197	8

Table 11 shows that the weekly distribution call received & resolved. It was found that the average numbers of call were received & resolved was 58. This implies that calls were made in a month for 3% of the total equipment in the State and it was much lower side as estimated breakdown rate was high.

Table: 11- Weekly status of equipment as per dashboard

Status as on	Total Medical Equipment	Functional Equipment	Non Functional Equipment	BER Equipment	Total Calls Received since beginning	Total Calls Resolved since beginning	Total Calls Received in a week	Total Calls Resolved in a week
03-Jan-22	7175	6445	1	729	7520	7248		
10-Jan-22	7175	6443	3	729	7545	7271	25	23
17-Jan-22	7496	6762	5	729	7558	7282	13	11
24-Jan-22	7496	6764	3	729	7600	7326	42	44
31-Jan-22	7496	6765	2	729	7651	7378	51	52
15-Feb-22	7496	6738	27	731	7786	7485	135	107
21-Feb-22	7496	6754	10	732	7818	7534	32	49
01-Mar-22	7496	6746	18	732	7913	7621	95	87
14-Mar-22	7496	6759	5	732	7989	7710	76	89
28-Mar-22	7496	6732	32	732	8131	7825	142	115
05-Apr-22	7496	6762	2	732	8196	7920	65	95
12-Apr-22	7496	6761	3	732	8232	7955	36	35
18-Apr-22	7496	6764	0	732	8249	7975	17	20
25-Apr-22	7496	6750	14	732	8297	8009	48	34
09-May-22	8009	7243	34	732	8478	8170	181	161
17-May-22	7985	7238	15	732	8520	8231	42	61
23-May-22	7989	7247	8	734	8541	8257	21	26
06-Jun-22	7989	7246	5	738	8657	8372	116	115
13-Jun-22	7989	7233	18	738	8701	8403	44	31
20-Jun-22	7989	7231	20	738	8765	8465	64	62
28-Jun-22	7989	7210	41	738	8847	8526	82	61
07-Jul-22	7989	7233	18	738	8885	8587	38	61
12-Jul-22	7989	7228	22	739	8923	8621	38	34
18-Jul-22	7989	7207	43	739	8976	8652	53	31
25-Jul-22	7984	7229	14	741	9010	8712	34	60

RRC-NE is continuously monitoring the BMMP dashboard on every week, mostly on Monday. It may be observed from the above table that monthly on an average 200 calls are resolved.

Finance:

Payment details: -

	Date	Invoice Amount inclusive tax (in Rs.)	Received (in Rs.)	Balance (in Rs.)	Penalty
2021-22	1st quarter	1,43,19,731	1,38,34,317	21/12/2021	57,000
	2nd quarter	1,48,32,756	1,43,29,958	04/01/2022	65,000
	3rd quarter	1,49,49,499	1,44,42,737	28/03/2022	Nil
	4th quarter	1,68,06,205	1,62,36,503	22/06/2022	3,000
2022-23	1st quarter	1,57,56,617	-	-	9,500

Amount (Rs. In Lakh) approved for BEMMP As per RoP under NHM is indicated below:

Sl.	Year	BEMMP	NPCB&VI	NOHP	RNTCP	NVDCP	Others
1	2018-19	598.89	-	-	-	-	-
2	2019-20	521.10	-	-	-	-	41.50
3	2020-21	607.30	-	-	-	-	41.00
4	2021-22	725.12	-	-	-	1.20	49.00
5	2022-23	474.95	-	-	-	-	-
6	2023-24	566.06	-	-	-	-	-

Chapter IV

Facility wise field observation

1. PHC Nampong:

1. The OPD hours is 8:00 am to 2:00 PM
2. All the staffs were aware about the BMMP programme but display of the Toll-Free number was not prominent.
3. Facility in charge has assigned the nodal person to look after the BMMP related activities with the facility to the pharmacist cum store in charge.
4. All staffs are either inform to the MO i/c directly or the Pharmacist on breakdown of any equipment. The pharmacist calls on the toll-free number or through the WhatsApp group or directly to service engineers of service provider to register the complaint.
5. State has recently supplied few high-end equipment (may be under 15th FC) viz. Semi auto biochemistry analyser, Blood mixer, 3-part Hematology analyser, Digital haemoglobinometer, Electra brushless centrifuge and reagent and consumable from the state, but machines are yet to installed. The laboratory technician will also be needing the training for using the same
6. Service engineer of Mediciti Service Pvt Ltd. has done preventive maintenance and calibration of equipment
7. The staffs are not maintaining any separate asset register for biomedical equipment functionality status, calibration and PPM reports.
8. The facility is not having any standing condemnation committee, as and when the requirement arises after informing the DMO a committee is constituted for condemnation.
9. Although the service engineers of the service provider are submitting all the service reports, calibration and planned preventive maintenance report at the DMO and albeit the same are not shared with the facility i/c.

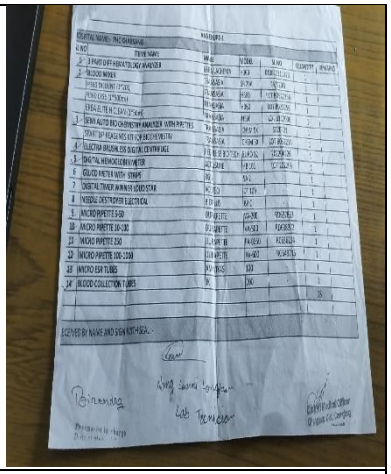
- **Some photographs from the facility**

		
New laboratory equipment yet to be installed	Colorimeter	Radiant warmer

2. PHC Kharsang:

1. Six bedded Kharsnag PHC with average OPD of 30 patients per day and Rs.10 /patient as has been collected as user fee for OPD patient.
2. The Facility have 3 GDMOs, 1 Laboratory Technician, 1 DHV (Domiciliary Health Visitor) and 5 RFW (Regular Field Worker).
3. The health facility is conducting on an average 25 delivery/month, which is highest among the PHCs in the State.
4. The staffs are aware about the BMMP programme and the pharmacist was made the Nodal person for BMMP within the facility. Other staffs are either making pharmacist aware about any breakdown incident or directly medical officer incharge.
5. 14 equipment viz. Semi auto biochemistry analyzer, Blood mixer, 3-part Hematology analyzer, Digital haemoglobinometer, Electra brushless centrifuge etc. but machines are yet to installed.
6. The service partner service engineer has not got any prior intimation from the state or facility regarding the supply of the above mentioned new laboratory equipment.

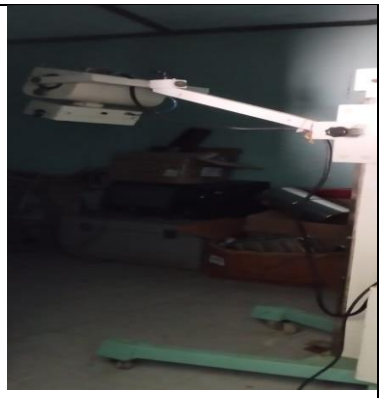
- **Some photographs from the facility**

		
Radiant warmer	Examination light	List of New Equipment supplied for the Laboratory

3. CHC Diyun

1. Fourteen bedded Diyun CHC provided OPD & IPD services with average OPD of 600 & IPD 30 per month. The average delivery per month is 20 per month. Rs.10 /patient as has been collected as user fee for OPD patient
2. The average monthly OPD of the facility is 600 per month and IPD being 30 per month.
3. The average delivery per month is 20 per month
4. Pharmacist cum store i/c has been assigned as the Nodal person for BMMP programme.
5. All the facility staffs are aware about the BMMP programme.

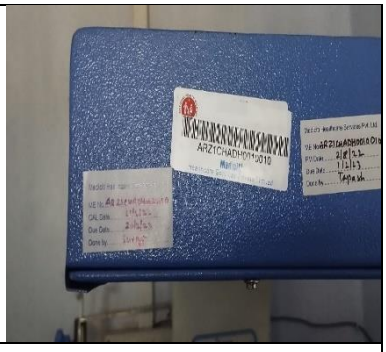
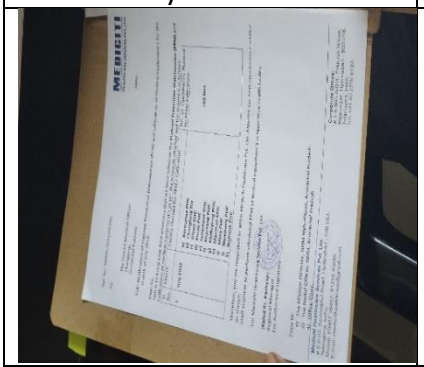
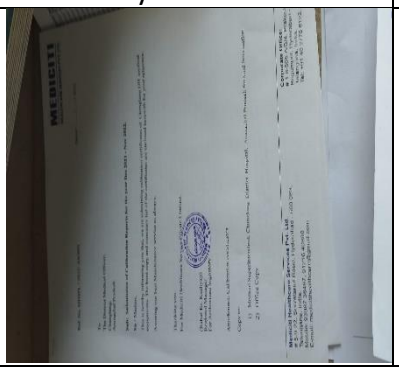
- **Some photographs from the facility**

		
Semi Autoanalyser	Laboratory equipment	X-ray machine lying unutilized
		
Centrifuge and microscope	Examination lights kept in X-ray room	New dental Chair to be tagged

4. DH Changlang

1. Eighty-five bedded hospital was established in 1962 and new building construction for the hospital is going on, OPD timing of hospital is 8:00 am to 2:00 pm.
2. The hospital has 6 GDMOs and a single specialist (MD Medicine) and 7 laboratory technicians
3. The hospital has an integrated laboratory set up both the in house and PPP laboratory were in same room.
4. The Hospital staffs are aware about the BMMP programme but the display of Toll-free number was not prominent. Medical superintendent was aware about the dashboard and WhatsApp group.
5. The Mediciti service engineers have submitted the calibration reports to the medical superintendent but the the copy of service reports and preventive maintenance reports are not submitted in the facility
6. It is suggested that Mediciti service engineer should also be informed prior to the shifting of equipment for ensuring safe and proper installation medical equipment in new building.

- **Some photographs from the facility**

		
Dental X-ray machine	Fixed X-ray machine	Calibrated radiant warmer
		
Intimation letter for PPM and calibration at DH changlang	PPM and calibration report letter and DH changlang	Equipment kept in open space ,(Autoclave, OT light ,examination light etc.)

5. PHC Loiliang

1. Loilang is a 6 bedded health facility.
2. Facility staff were aware about the BMMP programme and Toll-free number. The pharmacist cum store incharge was made nodal person for BMMP.
3. It was observed that for medical equipment PPM and calibration was completed by the service provider
4. The facility has one solar plant (2.2 KW) for power backup.
5. a condemnation committee has been formed to decides the condemnation of the equipment and intimate DMO about the condemned equipment.

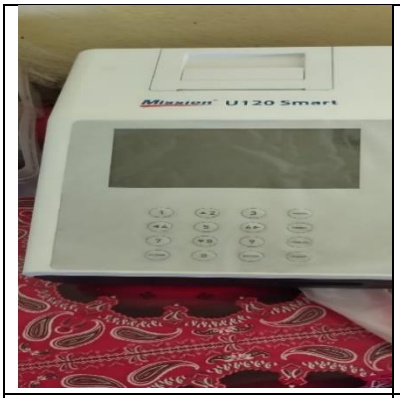
- **Some photographs from the facility**

		
Labour room	Radiant warmer PM done	Examination light PM done

6. PHC Medo

1. Ten bedded Medo PHC was upgraded to PHC from Sub-center in 2018 with monthly average OPD is 15 /day. There is no subcenter under the PHC.
2. NGO Prayas Janhit Swasthya runned the PHC prior upgradation but still 1 MO and 1 Health Assistant is still providing services.
3. The facility does not have any condemnation committee.
4. The MO i/c has not been included the district WhatsApp group for BEMMP.
5. The staffs are aware about the programme and during any breakdown they communicate to the MO i/c to register the call on the Toll-free number.

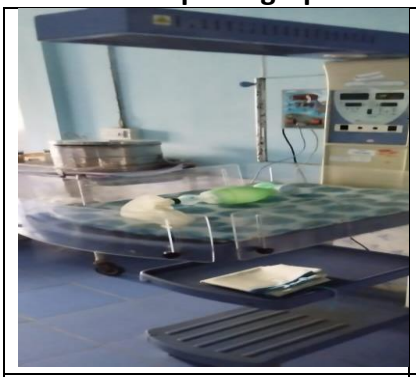
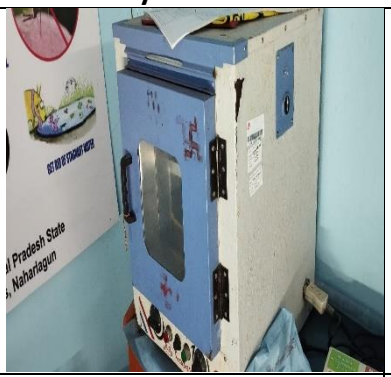
- **Some photographs from the facility**

		
Newly installed Urine analyser machine yet to be tagged	Examination light	Radiant warmer PPM completed

7. CHC Wakro

1. Janhit Swasthya Seva Kendra is running Wakro CHC through PPP mode.
2. Average OPD is 15-20 per day and 20 – 30 patients per month availed laboratory services.
3. Facility has not maintained the updated asset register for equipment. The same needs to update
4. The MO i/c and staffs are aware about the programme and register the call during any breakdown Toll-free number.
5. OPD is 15-20 per day, on an average monthly 20 patients get laboratory services.
6. Service partner engineers has completed the PPM and calibration for the equipment

- **Some photographs from the facility**

		
Radiant warmer PPM and calibration done	PPM and calibration done on Hot air oven	Ultrasound machine

8. Tezu General Hospital

1. One hundred bedded Tezu general hospital collects user fee from general OPD patient, free for pregnant woman.
2. Rs. 100/- is taken from the patients for X-ray services and minimal user for other in-house laboratory services.
3. The staffs are aware about the BMMP and during any breakdown they register the complaint either through the WhatsApp group or the Toll-free number.
4. The OT and ICU have medical gas pipeline system, the facility have two PSA plant (100 LPM & 500 LPM) and 2 MOSS type (45 LPM & 15 LPM) oxygen plant.
5. One OT technician is operating the PSA Plant and coordinating with service engineer of original equipment manufacturer (OEM) in case of breakdown. He has been trained by the service engineer of OEM for routine maintenance.
6. Biochemistry auto analyzer has not been used by the in-house laboratory technician as most of the Biochemistry tests free of cost under NHM through PPP mode.

- **Some photographs from the facility**

		
Operation Room	Fully autoanalyser at In House laboratory	ICU equipment
		
OT equipment (PPM done)	500 LPM PSA oxygen Plant installed under PM Care	Dialysis services under the PPP room

9. Aalo General Hospital

About the GH:

Eighty Bedded Aalo general hospital is functioning as FRU. Daily average OPD is 160. Total 11 specialist are posted in the general hospital which includes 3 O&G, 1 each in Anesthetist, Pediatrician, Medicine, Radiologist, Surgery, Biochemistry, Microbiologist and Pathologist. C-Section delivery is conducted in the hospital.

CT scan services is also available in the hospital where ECG technician is working as CT technician after training.

1. Medical Superintendent is well about the BEMMP programme and he has engaged one hospital staff to monitor the BEMMP. The Medical Superintendent do the equipment audit in regular interval. He is not aware about the BEMMP dashboard. Trained him about the BEMMP dashboard during the visit.

10. Kamba CHC:

Six bedded Kamba CHC has 2 MO, 1 Dental MO, 2 AYUSH MO and 2 laboratory Technician. Very less number of equipment were available in the CHC.

11. Tato PHC (H&WC):

Tato PHC has 1 MO and 1 laboratory Technician covering 2700 population. Tato PHC is a designated microscopy centre (DMC). Very less number of equipment were available in the CHC.

12. Menchkha CHC:

Six bedded Kamba CHC covering 4000 to 5000 population and has 3 MO (Allopathic), 1 Dental MO, 1 AYUSH MO and 2 laboratory Technician and 1 Laboratory Assistant.

One 300 LPM PSA oxygen generation plant was installed in the CHC, but it was not completed. The plant produces oxygen with only 50% purity. The District Medical Officer requested to PPP service provider to communicate with the OEM and complete the installation during the visit.

Around 13 equipment were found untagged under BEMMP.

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Annexure: Calibration Report

1. 3 para monitor

CALIBRATION REPORT

Monitoring Systems, Physiologic with 3 Parameters (Patient Monitor)

TRI MED SOLUTIONS (I) PVT. LTD

Report No:	CAL-AR-2022-02-0760	Date: 12-03-2022	Page 01 of 02

Customer Details			
Health Facility	Tezu DH		
State	Arunachal Praresh	District	Lohit

Medical Equipment Details			
ME Number	ARZ1LOHDH0050151	Manufacturer	Mediwaves
ME Name	Monitoring Systems, Physiologic with 3 Parameters (Patient Monitor)	Model	VS-900
Department	Sncu Room	Serial No	V9573139
Calibrated at	On Site	Condition of ME	Good
Date of Calibration	28-02-2022	Due for Calibration	27-02-2023

Environmental Conditions			
Temperature in °C	20°C	Humidity in % Rh	57%

Details of Master Equipment Used for Calibration						
No	Equipment ID	Description	Manufacturer	Model	Serial No.	Calibration Validity
1	TRI-TE-0025	VITAL SIGN SIMULATOR	RIGEL MEDICAL UK	UNI SIM LITE	46G-0640	02-10-2022

Performance Results						
No	Parameter	Units	Set Value	Measured Value	Acceptable Range	Remarks
1	Heart Rate	Bpm	72	73	67 to 77	Pass
			90	91	85 to 95	Pass

2. Oxygen Concentrator

CALIBRATION REPORT

Oxygen Concentrators (Oxygen Concentrator)

TRI MED SOLUTIONS (I) PVT. LTD

Report No:	CAL-AR-2022-02-0121	Date: 28-02-2022	*Page 01 of 02*

Customer Details			
Health Facility	Aalo GH		
State	Arunachal Pradesh	**District**	West Siang

Medical Equipment Details			
ME Number	ARZ1WESDH0130257	**Manufacturer**	Respironics
ME Name	Oxygen Concentrators (Oxygen Concentrator)	**Model**	Everflo I OPI
Department	Nursery Room	**Serial No**	22642
Calibrated at	On Site	**Condition of ME**	Good
Date of Calibration	16-02-2022	**Due for Calibration**	15-02-2023

Environmental Conditions			
Temperature in °C	19°C	**Humidity in % Rh**	58%

Details of Master Equipment Used for Calibration

No	Equipment ID	Description	Manufacturer	Model	Serial No.	Calibration Validity
1	TRI-TE-0147	GAS FLOW ANALYZER	TSI	4081	40811823001	14-07-2022

Performance Results

No	Parameter	UOM	Set Value	Measured Value	Acceptable Range	Remarks
1	Oxygen Concentration	%	93	93	91 to 95	Pass
2	Flow Rate	Lpm	1	1.0	0.8 to 1.2	Pass
		Lpm	3	3.0	2.7 to 3.3.	Pass
		Lpm	5	4.1	4.5 to 5.5	Pass

CALIBRATION REPORT

Oxygen Concentrators (Oxygen Concentrator)

TRI MED SOLUTIONS (I) PVT. LTD

Conditions of Issue of report		
1. The Standards used are traceable to National standards. 2. This report should not be reproduced except in full without written approval.		
Calibration Status	Passed ☑	Failed ☐
Calibrated By Muneendra Kumar		**Authorised Signatory** S Palaniswamy

3. Radiant Warmer (Shi Yomi District)

CALIBRATION REPORT

Warming Units, Patient, Radiant, Infant(Radiant Warmer)

TRIMED SOLUTIONS (I) PVT. LTD

Report No:	CAL-AR-2021-12-0731	Date:29-01-2022	*Page 01 of 02*

Customer Details			
Health Facility	Menchuka CHC		
State	Arunachal Pradesh	**District**	Shi Yomi

Medical Equipment Details			
ME Number	ARZ1SHICH0610003	**Manufacturer**	NA
ME Name	Warming Units, Patient, Radiant, Infant (Radiant Warmer)	**Model**	IRW/16-17
Department	Labour Room-Na	**Serial No**	829
Calibrated at	On Site	**Condition of ME**	Good
Date of Calibration	19-01-2022	**Due for Calibration**	18-01-2023

Environmental Conditions			
Temperature in °C	20°C	**Humidity in % Rh**	58%

Details of Master Equipment Used for Calibration						
No	**Equipment ID**	**Description**	**Manufacturer**	**Model**	**Serial No.**	**Calibration Validity**
1	TRI-TE-0189	DIGITAL THERMOMETER	METRAVI	DTM-900	271926/1	17-09-2022

Performance Results					
No	**Parameter**	**Set Temp**	**MeasuredValue(°C)**	**Acceptable Range**	**Remarks**
1	Temperature	33°C	33.2	32.5 to 33.5	Pass
		35°C	35.1	34.5 to 35.5	Pass
		37°C	37.2	36.5 to 37.5	Pass

CALIBRATION REPORT

Warming Units, Patient, Radiant, Infant(Radiant Warmer)

TRI MED SOLUTIONS (I) PVT. LTD

Conditions of Issue of report		
1. The Standards used are traceable to National standards. 2. This report should not be reproduced except in full without written approval.		
Calibration Status	Passed ☑	Failed ☐
Calibrated By Tomin Zirdo		**Authorised Signatory** S.Palaniswamy

4. Radiant Warmer (West Siang)

CALIBRATION REPORT
Warming Units, Patient, Radiant, Infant (Radiant Warmer)

TRI MED SOLUTIONS (I) PVT. LTD

Report No:	CAL-AR-2022-02-0066	Date: 10-03-2022	*Page 01 of 02*

Customer Details			
Health Facility	Aalo GH		
State	Arunachal Pradesh	**District**	West Siang

Medical Equipment Details			
ME Number	ARZ1WESDH0130135	**Manufacturer**	Delta Medical Appliance
ME Name	Warming Units, Patient, Radiant, Infant(Radiant Warmer)	**Model**	NA
Department	Ot Room-Na	**Serial No**	DRHWPH2K80304103
Calibrated at	On Site	**Condition of ME**	Good
Date of Calibration	26-02-2022	**Due for Calibration**	25-02-2023

Environmental Conditions			
Temperature in °C	18°C	**Humidity in % Rh**	58%

Details of Master Equipment Used for Calibration

No	Equipment ID	Description	Manufacturer	Model	Serial No.	Calibration Validity
1	TRI-TE-0189	DIGITAL THERMOMETER	METRAVI	DTM-900	271926/1	17-09-2022

Performance Results

No	Parameter	Set Temp	Measured Value(°C)	Acceptable Range	Remarks
1	Temperature	33°C	33.1	32.5 to 33.5	Pass
		35°C	34.8	34.5 to 35.5	Pass
		37°C	36.9	36.5 to 37.5	Pass