



Ministry of Health & Family Welfare
Government of India



STUDY ON
ASSESSMENT OF IMPLEMENTATION OF
**FREE DIAGNOSTIC INITIATIVES (FDI) IN
REDUCING OUT-OF-POCKET EXPENDITURE
IN RAJASTHAN AND MADHYA PRADESH**

2025

Study on
Assessment of Implementation of
Free Diagnostic Initiatives (FDI)
in
Reducing Out-of-Pocket Expenditure
in
Rajasthan and Madhya Pradesh

2025

Knowledge Management Division
National Health Systems Resource Centre (NHSRC)
Ministry of Health and Family Welfare

Study by



IIHMR University, Jaipur

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Dr P.R. Sodani

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LIST OF ACRONYMS

Acronym	Full form
AAM	Ayushman Arogya Mandir
AIDS	Acquired Immunodeficiency Syndrome
AIIMS	All India Institute of Medical Sciences
ANC	Antenatal Care
ANM	Auxiliary Nurse Midwife
ASHA	Accredited Social Health Activist
Blood C/S	Blood Culture and Sensitivity
BCMO	Block Chief Medical Officer
BMO	Block Medical Officer
CBC	Complete Blood Count
CD	Civil Dispensaries
CDC	Centre of Disease Control and Prevention
CDS	Central Drug Store
CEO	Chief Executive Officer
CGHS	Central Government Health Scheme
CH	Civil Hospital
CHC	Community Health Centre
CHO	Community Health Officer
CHW	Community Health Worker
CMC	Christian Medical College
CME	Continuing Medical Education
CMHO	Chief Medical and Health Officer
CRP	C-Reactive Protein
CS	Civil Surgeon
CT	Computed Tomography
DDW	District Drug Warehouse
DH	District Hospital

DIPHL	District Integrated Public Health Laboratory
ECG	Electrocardiogram
ECHO	Echocardiogram
EDL	Essential Diagnostic List
EHR	Electronic Health Record
EQAS	External Quality Assurance Scheme
ESR	Erythrocyte Sedimentation Rate
FDSI	Free Diagnostic Scheme Initiative
FGD	Focus Group Discussion
FRU	First Referral Unit
FY	Financial Year
GDP	Gross Domestic Product
GoI	Government of India
GHE	Government Health Expenditure
Hb	Haemoglobin
HIV	Human Immunodeficiency Virus
HQ	Headquarters
ICMR	Indian Council of Medical Research
IEC	Information Education Communication
IPD	In-Patient Department
IPHL	Integrated Public Health Laboratory
IQAS	Internal Quality Assurance Scheme
IQC	Internal Quality Control
IRB	Institutional Review Board
ISO	International Organisation for Standardization
IT	Information Technology
KII	Key Informant Interview
KPI	Key Performance Indicator
KTPL	Kirloskar Technologies Private Limited
LFT	Liver Function Test
LIMS	Laboratory Information Management System
LT	Lab Technician
MD-NHM	Mission Director - National Health Mission
MIS	Management Information System

MNJY	Mukhyamantri Nishulk Janch Yojana
MO	Medical Officer
MO I/C	Medical Officer In-charge
MOHFW	Ministry of Health and Family Welfare
MOU	Memorandum of Understanding
MP	Madhya Pradesh
MPPHSCL	Madhya Pradesh Public Health Service Corporation Limited
MPW	Multipurpose Worker
MTW	Multi Task worker
NABL	National Accreditation Board for Testing and Calibration Laboratories
NFHS	National Family Health Survey
NHM	National Health Mission
NHSRC	National Health Systems Resource Centre
NOC	No-Objection Certificate
NQAS	National Quality Assurance Standards
NSSO	National Sample Survey Organisation
NVBDCP	National Vector Borne Disease Control Programme
OBC	Other Backward Class
OOPE	Out-of-Pocket Expenditure
OPD	Out-Patient Department
PHC	Primary Health Centre
PM-ABHIM	Pradhan Mantri Ayushman Bharat Health Infrastructure Mission
PMO	Principal Medical Officer
POCT	Point of Care Biomedical Private Ltd
PPP	Public Private Partnership
RBS	Random Blood Sugar
RDK	Rapid Diagnostic Kit
RFP	Request For Proposal
RFT	Renal Function Test
RJ	Rajasthan
RKS	Rogi Kalyan Samiti
RMSCL	Rajasthan Medical Services Corporation Limited
RNTCP	Revised National Tuberculosis Control Programme
S. Bilirubin	Serum Bilirubin

SC	Scheduled Caste
SDH	Sub District Hospital
SGOT	Serum Glutamic-Oxaloacetic Transaminase
SHARP	Science House Application for Remote Pathology
SHC	Sub-Health Centre
SMS	Short Message Service
SN	Staff Nurse
SNO	State Nodal Officer
SOP	Standard Operating Procedure
ST	Scheduled Tribes
T3	Tri-Iodothyronine
T4	Thyroxine
TAT	Turnaround Time
TB	Tuberculosis
THE	Total Health Expenditure
TRF	Test Requisition Form
TSH	Thyroid Stimulating Hormone
TSP	Tribal Sub-Plan
UID	Unique Identification
UPT	Urine Pregnancy test
UPHC	Urban Primary Health Centre
USFDA	United State Food and Drug Administration
USG	Ultra Sonography

EXECUTIVE SUMMARY

Ensuring the accessibility of affordable healthcare services is a key priority of Universal Health Coverage. As per the National Health Accounts Estimates for India (2019-20) report, the share of Out-of-Pocket Expenditure (OOPE) in Total Health Expenditure (THE) in India has declined from 62.6% in 2014-15, to 47.1% in 2019-20 (National Health System Resource Centre, 2023); despite this decline, OOPE remains unacceptably high, with the cost of drugs and diagnostics constituting a significant portion of the healthcare expenses borne by individuals across the country.

To address the urgent need for accessible and quality diagnostics in public health facilities, the Ministry of Health and Family Welfare, Government of India, under the aegis of the National Health Mission launched the 'Free Diagnostics Initiative' in July 2015. The initiative intends to provide a set of essential diagnostics free of cost at various levels of healthcare facilities, for enabling providers to make rational treatment decisions, while patients benefit from having their tests conducted within the government healthcare facility, thereby reducing both direct costs and out-of-pocket expenditure.

Different states have adopted different models (in-house/hybrid (public-private partnership and in-house)) for implementing the free diagnostics service initiative. The Ministry of Health and Family Welfare (Government of India) is supporting States/Union Territories for ensuring the effective implementation of these services. This includes providing an essential diagnostics list at each level of health facilities, conducting gap analysis, providing roadmap to states for effective planning and implementation of free diagnostic initiative and establishing framework for supply chain management, optimizing human resources, ensuring quality control, and data management (NHM Free Diagnostic Service Initiative Guidance Document for Implementing Laboratory Services in States, 2019).

To understand the effective strategies adopted by states for effective implementation of FDI and reducing OOPE on healthcare, IIMR University, under the IR-HSS platform of MoHFW has conducted a comprehensive study titled *"Assessment of Implementation of Free Diagnostic Initiatives (FDI) in Reducing Out-of-Pocket Expenditure in Rajasthan and Madhya Pradesh"*.

The objectives of this study include reviewing institutional mechanisms for the effective implementation of FDI, assessing the availability, accessibility and quality of FDI laboratory/diagnostic services for patients in IPD and OPD of public health facilities, understanding the quality of diagnostics/ laboratory services provided to patients and the referral mechanisms that facilitate free diagnostic services and developing a comparative OOPE model between district-level public and private facilities.

The study conducted in the seven divisional headquarters of Rajasthan and Madhya Pradesh state, utilized a mixed method approach. The research covered District Hospitals (DH), Community Health Centres (CHCs), Ayushman Arogya Mandir-Primary Healthcare

Centres (AAM – PHCs) and Ayushman Arogya Mandir – Sub Health Centres (AAM-SHCs) in each division. Key Informant Interviews (KIIs) were conducted with State Nodal Officers (SNOs), Chief Medical and Health Officer (CMHO) at each District, Principal Medical Officer (PMO)/ Civil Surgeon of each DH and Civil Hospital (CH), the Medical Officer In-charge of CHC and AAM-PHC, and the Community Health Officer (CHO) at the AAM-SHCs. Exit Interviews were conducted with the patients who availed Free Diagnostic Services and Focus Group Discussions were conducted with the community.

The Key Findings and Recommendations of the study are as follows: -

Key Findings:

The assessment of the Free Diagnostic Scheme in both Madhya Pradesh and Rajasthan provides valuable insights into the strengths and areas for improvement in implementation of Free Diagnostic Service Initiative (FDSI). The study revealed that Madhya Pradesh and Rajasthan have adopted different models for delivering diagnostic services under FDSI. Madhya Pradesh has implemented hybrid models, namely Wet Lease Reagent Rental Model¹ and Hub and Spoke Model² supported by private partners. This approach ensures wide availability and accessibility to diagnostic services even in remote tribal areas. Wet Lease Reagent Rental model is implemented at District and Civil hospitals. The hub-and-spoke model designate urban and rural facilities as hubs (CHs, UCHCs/CHCs and UPHCs/AAM- PHCs) and spokes (CHs, CHCs, CDs, AAM-PHCs and Sanjeevani Clinics) offering varying number of tests at different level: 132 tests at DH, 85 tests at SDH, 63 at CHC, 45 at AAM PHC and 11 at AAM-SHC levels. On the other hand, Rajasthan still utilizes a traditional in-house model providing 56 tests, 37 tests, 15 tests and 14 tests at the DH and SDH, CHC, AAM-PHC and AAM-SHC levels respectively. With an increase in the type of tests provided at the government healthcare facilities, there has been a corresponding rise in both the number of beneficiaries and the number of tests conducted. The existing infrastructure at the primary as well as secondary level healthcare facilities is inadequate to accommodate this increase in patient's footfall.

In the states of Rajasthan and Madhya Pradesh, there is over 90% awareness regarding the free diagnostic services at government health care facilities, with 4,12,13,822 patients in Rajasthan, and in 33,38,440 patients in MP availed these services in FY 2022-23. In Rajasthan, there has been a 223.8% increase in number of tests conducted, and a 205.5% increase in beneficiaries from FY 2020-21 to FY 2022-23. Similarly, in MP, there has been a 1268% increase in tests conducted, and 1328.8% increase in beneficiaries over the same period. The implementation of the Public Private Partnership (PPP) model in MP, there has been an increase in the coverage, with a wider range of tests provided at government healthcare facilities (District Hospitals in MP provides 132 tests out of mandated 134 tests according to the Essential Diagnostic List), whereas Rajasthan faces a significant gap (DHs in Rajasthan provides only 56 tests out of mandated 134 tests). Further analysis revealed disparities in the availability of tests across the two states, with the largest difference

1. Wet Lease Reagent Rental Model involves selecting an outsource agency for providing state of art equipment and reagents on a lease or rental basis offering cost effective access to diagnostic services.

2. The Hub & Spoke Model is a diagnostic service delivery model that designates larger health facilities as 'Hub Labs' equipped with advanced laboratories, and AAM-PHCs / smaller centre as 'Spoke Centres' for sample collection, ensuring accessibility of diagnostics to a larger population through partnership with a private provider.

observed in CHCs in MP, and AAM- PHCs in Rajasthan (deviating by more than 35% and 76% respectively, from Essential Diagnostic List (EDL)). However, the patients' expectations for the availability of specialized tests like Ultra Sonography, Dengue NS1 and X-Ray among other tests at AAM-PHC level pose a challenge for the states; this is evident as patients opt to seek these tests at private diagnostic labs, with 27 patients out of 259 patients in Rajasthan and 10 patients out of 262 patients in MP choosing this option, thus incurring a higher OOOPE of patients on diagnostic tests in Rajasthan.

It was found that Rajasthan, uses a decentralized approach for procurement and supply of reagents and consumables for laboratory services with CMHOs and PMOs issuing open tender for these services. However, some of the supplies like Blood Group Identification Serum, Urine Albumin Testing Multi-strips, Rapid card-tests for HIV, Syphilis and VDRL are procured centrally through Rajasthan Medical Services Corporation Limited (RMSCL), upon National Health Mission's (NHM) request. Maintenance and repair of laboratory equipment is managed by the RMSCL, through 'e-Upkaran' software. In Madhya Pradesh, USFDA approved laboratory equipment are being provided by service provider agency. The service provider agency is also responsible for repair, maintenance and supply of consumables and reagents. Regarding human resource allocation, both states face a shortage of staff in diagnostic laboratories at all levels of healthcare facilities particularly laboratory technicians and assistants, resulting in increased workload.

In Madhya Pradesh, Science House Application for Remote Pathology- Lab Information Management System (SHARP-LIMS) developed by private partner 'Science House Medicals' has facilitated effective and efficient approach to service delivery, whereas Rajasthan utilizes 'e-Aushadhi', a web-based software to manage data on test conducted and stock of drugs & other surgical items. Consequently, Rajasthan has the potential for significant improvement by addressing the lack of patient-specific data, implementing end-to-end encryption, enabling automatic report generation via SMS to patients' mobile numbers. The study also highlights difference in compliance with internal and external quality assurance protocols between the two states. Health facilities in Madhya Pradesh demonstrate commitment to quality through meticulous documentation and active participation in external quality assurance programs. The implementation of the External Quality Assurance Scheme (EQAS) and the appointment of a Quality Assurance Officer in Madhya Pradesh have enhanced the quality and reliability of diagnostic services. Additionally, the process of NABL accreditation has also commenced in Madhya Pradesh. Laboratories in Rajasthan, conduct internal quality checks, but often lack documentation and do not participate in any external quality assurance programs as mandated by the guidelines. The study also identified issues in Madhya Pradesh where test requisition forms were not filled properly, leading to additional challenge in handling critical values and emergencies. Additionally, grievance redressal is also limited to District Hospitals.

Except two laboratories in Madhya Pradesh (Jabalpur and Betul), most of the laboratories in MP and Rajasthan were found not to be NABL certified.

Referral mechanisms are essential for efficient delivery of diagnostic services across healthcare levels. In Rajasthan, there is a need for a mechanism to facilitate sample transfer between laboratory at various tiers of healthcare facilities. Currently, except for patient samples for dengue and hepatitis viral load estimation, sent from District Hospitals to Medical Colleges, patients (not their samples) are verbally referred to higher hospitals without maintaining record of such referrals. Madhya Pradesh has well-established referral linkages between health facilities through hub and spoke model. All healthcare centres

working as Spokes are linked to the Hub healthcare centres. Under the Hub and Spoke model, samples of patients are collected at the Spokes and are taken to the Hub by a runner in a cold box. For recommended specialized tests that are not available at the Hub level, samples are sent to a centralised laboratory at the District Hospital. During the study, it was observed that there is a shortage of runners to transport samples, with instance where one runner may have to visit 20 spokes for sample collection. This underscores the need for increased human resources to meet transportation demands

Free Diagnostic Scheme (FDI) in both Madhya Pradesh and Rajasthan has significantly reduced out-of-pocket expenditures for patients seeking healthcare services. Across various types of health facilities, including DH, CHC, AAM-PHC, AAM- SHCs, 99.81% of patients reported a reduction in out-of-pocket expenditure due to free diagnostic tests. The government's increasing annual expenditure on FDSI is also reflect a simultaneous decrease in the OOPE of the beneficiaries. In MP, there has been substantial growth in FDI budget Utilization, from 20% in FY 2019-20 to 99% in FY 2022-23. In MP, payment to the private partner in both the Hub-and-Spoke and the Wet Lease Reagent Rental model are made post-verification, the increased number of prescribed tests across government healthcare centres indicates that an increase in the utilisation of allocated budget lowers the OOPE of patients on diagnostic services. 100% patients reported zero OOPE on the diagnostic services availed. Considering the most prescribed diagnostic tests at the various public healthcare facilities in the studied states, one patient would've saved approximately Rs. 500-900 in Rajasthan and MP. The assumption is that if these tests were not available at government health facilities, patients would have gone to private laboratories and incurred out-of-pocket expenses.

Recommendations:

• RAJASTHAN

- Rajasthan should prioritize the process of agency finalization for implementing Hub and Spoke model in the State. This model will ensure increased coverage and access to quality diagnostic services through partnership with private provider. By adopting the Hub and Spoke model, Rajasthan can streamline service delivery, optimize resource utilization and ensure equitable access to diagnostic services across State.
- Laboratory Information Management system (LIMS) should be implemented across all the laboratories in the State. This will help in streamlining lab operations by capturing data on samples collected, tests and results, thereby enhancing efficiency and compliance with quality parameters. Implementing LIMS will automate tasks, reduce cost and improve the monitoring of laboratory services.
- Establishing a robust system of monitoring of laboratory services in Rajasthan, including documentation for Internal quality assurance and Turnaround Time (TAT) is crucial. This initiative will ensure adherence to service quality standards and enhance operational efficiency across all laboratories in the state service needs to be monitored effectively as per the definition specified in the national FDSI guidelines. The use of an efficient LIMS will provide the necessary resources for this.

- Infrastructure gaps were identified at various health facilities during the study period. The State should focus on strengthening laboratory services by implementing a comprehensive facility wise laboratory assessment plan. This plan should conduct a thorough gap analysis to identify deficiencies in infrastructure, equipment, supply chain, and human resources at each laboratory.
- State and District diagnostic teams should be constituted for effective implementation of FDSI in the State.
- Laboratories in Rajasthan should be encouraged to participate in the External Quality Assurance Scheme (EQAS). A team of technical experts should be appointed to provide support in maintaining documentation for Internal Quality Assurance Scheme (IQAS) and to offer guidance for participating in EQAS.
- Strengthen the referral mechanism in Rajasthan by ensuring proper documentation of referred patients and samples, thereby improving coordination between health facilities.
- Centralized procurement system with robust supply chain and online inventory management system should be established by the state.

- **MADHYA PRADESH**

- To minimize delays and workload management in sample transportation, Madhya Pradesh should address the shortage of human resources by considering additional runners or implement more efficient sample transportation methods. The development of monitoring applications or software for ensuring sample transportation to hubs within the stipulated time frame has been suggested.
- Test requisition forms should be properly filled out, including patients' demographic and contact details, as well as the details and contact information of prescribing doctors, to ensure critical and emergency cases are managed appropriately.
- Due to the presence of staff from outsourced agencies, government lab technicians and lab assistants often adopt a passive role. They should be more involved in handling machines, using the Laboratory Information Management System (LIMS), documentation, and other processes to enhance the sustainability of the system.
- Continuing Medical Education (CME) programs should be organized for clinicians focusing on principles of evidence-based medicine and rational prescription of diagnostic tests. These programs should highlight the clinical guidelines and best practices for ordering diagnostic services.
- Establish systems to monitor the diagnostic ordering patterns of clinicians. Provide regular feedback and identify areas for improvement to encourage adherence to best practices.
- To establish referral linkages between district and medical college laboratories, Madhya Pradesh should develop and implement standardized referral protocols that outline the criteria and processes for referring cases from district laboratories to medical college laboratories.

- **Other Recommendations:**

- As more patients benefit from the scheme, upgrading infrastructure, and increasing trained human resources at all levels of healthcare facilities will be necessary in the coming years.
- Following a training needs analysis, both the states should develop a comprehensive annual training plan, calendar and modules for capacity building laboratory staff. With the rapid advancement in health care technology, it is imperative to improve their abilities, ensuring the provision of high-quality diagnostic services.
- To maintain a high level of awareness about the Free Diagnostic Scheme, regular updates on this programme is essential. It is recommended that distinct and interactive educational resources be created and disseminated across all healthcare facilities.
- Regular assessments of the Free Diagnostic Scheme should be conducted to assess its impact, identify bottlenecks, and make necessary amendments to optimize health care service delivery.
- Clinicians' feedback on laboratory services and coordination between laboratory in-charge and clinicians are essential for improving effectiveness of Lab services. Similarly, a robust grievance redressal system should be established at all laboratories across, all levels of healthcare facilities.
- Data on error & repeat sampling and sample rejection rates need to be maintained for greater transparency and equipment efficacy.

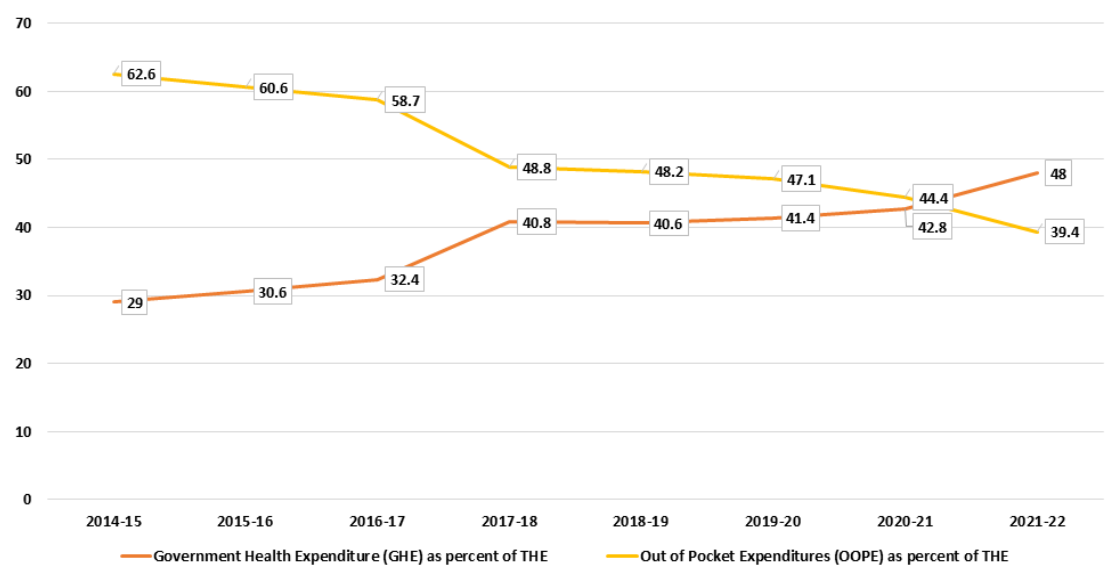
Hence the study can conclude that while rolling out the Free Diagnostic Service Initiative (FDSI) using different models, both states have demonstrated a significant increase in the number of beneficiaries and tests conducted, as well as a reduction in out-of-pocket expenditures. However, infrastructure and human resource gaps remain a challenge, particularly in Rajasthan, affecting service delivery and patient outcomes. Madhya Pradesh should focus on ensuring the sustainability of its model by enhancing the role of permanent lab technicians and assistants. In contrast, Rajasthan should consider adopting the hub-and-spoke model to enhance coverage and operational efficiency of the FDSI.

CHAPTER I: INTRODUCTION

1.1 Background

The continuous rise in overall health expenditures has posed significant challenges for developing countries to provide affordable healthcare services to the people and India is no exception to that (Mishra & Mohanty, 2019). India has the highest levels of out-of-pocket expenditure (Pandey, Kumar, Dandona, & Dandona, 2018). The average out-of-pocket expenditure on the delivery has increased in 12 states including 2 union territories (National Family Health Survey 5, 2019-21). It has been witnessed that with an increase in the Government Health Expenditure (GHE) as percentage of THE (Fig. 1.1), OOPE of people as percentage of THE has decreased significantly in recent years (National Health System Resource Centre, 2023).

Fig. 1.1: Government Health Expenditure and OOPE as % of Total Health Expenditure (in %)



Source: National Health Accounts for India (2021-22)

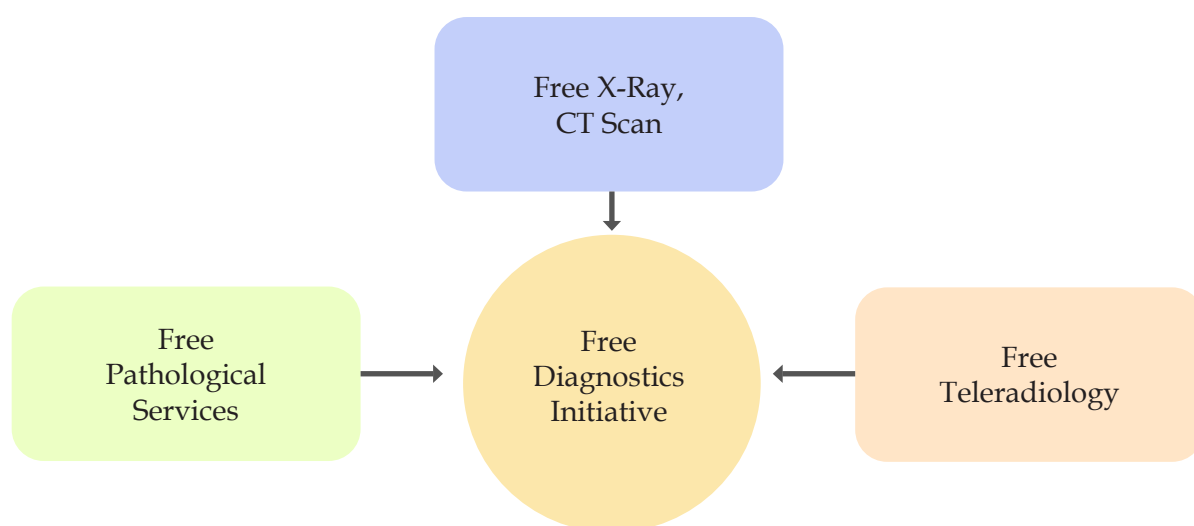
According to the NSS 75th round report, 11.8% of the expenditure on non-hospitalized treatment of ailments was spent on diagnostic services (National Statistical Office, 2019).

Diagnostic services are an integral part of healthcare, providing relevant information to ensure proper screening, detection, and treatment of people. However, the availability of these services was limited at public health facilities. This has led to the treatment of people without proper diagnosis and has posed severe challenges to the quality of healthcare delivery across states in India.

To overcome the same, the Free Diagnostic Service Initiative was launched by the National Health Mission in 2015 and by 2018, it was rolled out in all 31 states of the country. Out of 31 states, in 9 states the PPP model was followed while in the rest 22 states, the facility was developed in-house. The free diagnostic services include pathological services, radiology services, and teleradiology services as shown in Fig. 1.2. The initiative was focused on ensuring the availability of appropriate diagnostic services at public health facilities, promoting the diagnostic-based screening and treatment of patients, reducing out-of-pocket expenditure, and improving the overall quality of comprehensive healthcare services at public health facilities.

As we are aware in the states of Rajasthan and Madhya Pradesh health status indicators are not very encouraging, and when coupled with low socio-economic indicators, government support is required in reducing out-of-pocket expenditure for healthcare by implementing the FDI. It has been more than 8 years since the FDI was rolled out and more than 5 years since it was implemented across 31 states. Thus, it has become important for the policymakers to assess whether the initiative has progressed well to achieve its objectives.

Fig. 1.2: Components of Free Diagnostic Initiative



Source: (NHSRC, Free Diagnostics Service Initiative, n.d.)

Rajasthan and Madhya Pradesh have implemented the free diagnostic initiative fully where the Lab services, the X-ray, CT-Scan and Teleradiology services are offered. For the year 2017-18, Total Health Expenditure (THE) for India is estimated to be Rs. 5,66,644 crores (3.3% of GDP and Rs. 4,297 per capita), and in Rajasthan per capita expenditure is Rs. 1,369 and in Madhya Pradesh is Rs. 980 which is lowest among 21 states.

Out-of-pocket expenditure in India is Rs. 2,097 per capita and in Rajasthan, it is Rs. 3,406 and in Madhya Pradesh, it is Rs. 2,422. These expenditures are higher than many other states which are similar or higher in population size. According to Household Healthcare Utilization and Expenditure in India: State Fact Sheets 2014, the out-of-pocket expenditure per hospitalization case in rural areas is Rs. 12,841 while for urban it is Rs. 14,854 while in Madhya Pradesh it is Rs. 10,467 and Rs. 23,728 respectively. These numbers are on the higher side when compared with the India average of Rs. 14,473 for rural and Rs. 21,985

for urban areas (NHSRC, Household Healthcare Utilization & Expenditure in India: State Fact Sheets, 2014).

The percentage of share of diagnostic services as part of total medical expenditure is 14.3% in rural areas while in urban it is 12.8% in public healthcare facilities. Rajasthan has also doubled its budgetary allocations on the free diagnostic test scheme mainly in the Tribal Sub-Plan (TSP) area (Raghuraman, Abraham, Rao, Minni, & Jha, 2019). Madhya Pradesh has allocated 2.8% of its total expenditure on health which is lower than the average expenditure of 18 other states (Suhag & Mann, 2018).

1.2 Objectives of the Study

With this background, the proposed study was conducted with major objectives to assess the implementation of Free Diagnostic Initiatives (FDI) in reducing out-of-pocket expenditure (OOPE) in two states, namely Rajasthan and Madhya Pradesh, with the following specific objectives:

1. To review the institutional mechanism for effective implementation of free diagnostic Initiative.
2. To assess the availability and accessibility of FDI Laboratory/diagnostics services for the patients in IPD and OPD of public health facilities.
3. To assess the quality of diagnostics/laboratory services provided to patients at public health facilities.
4. To study the referral mechanism between public health facilities for facilitating free diagnostic service to patients.
5. To develop a comparative model of OOPE in public and private facilities at the district level.

1.3 Scope

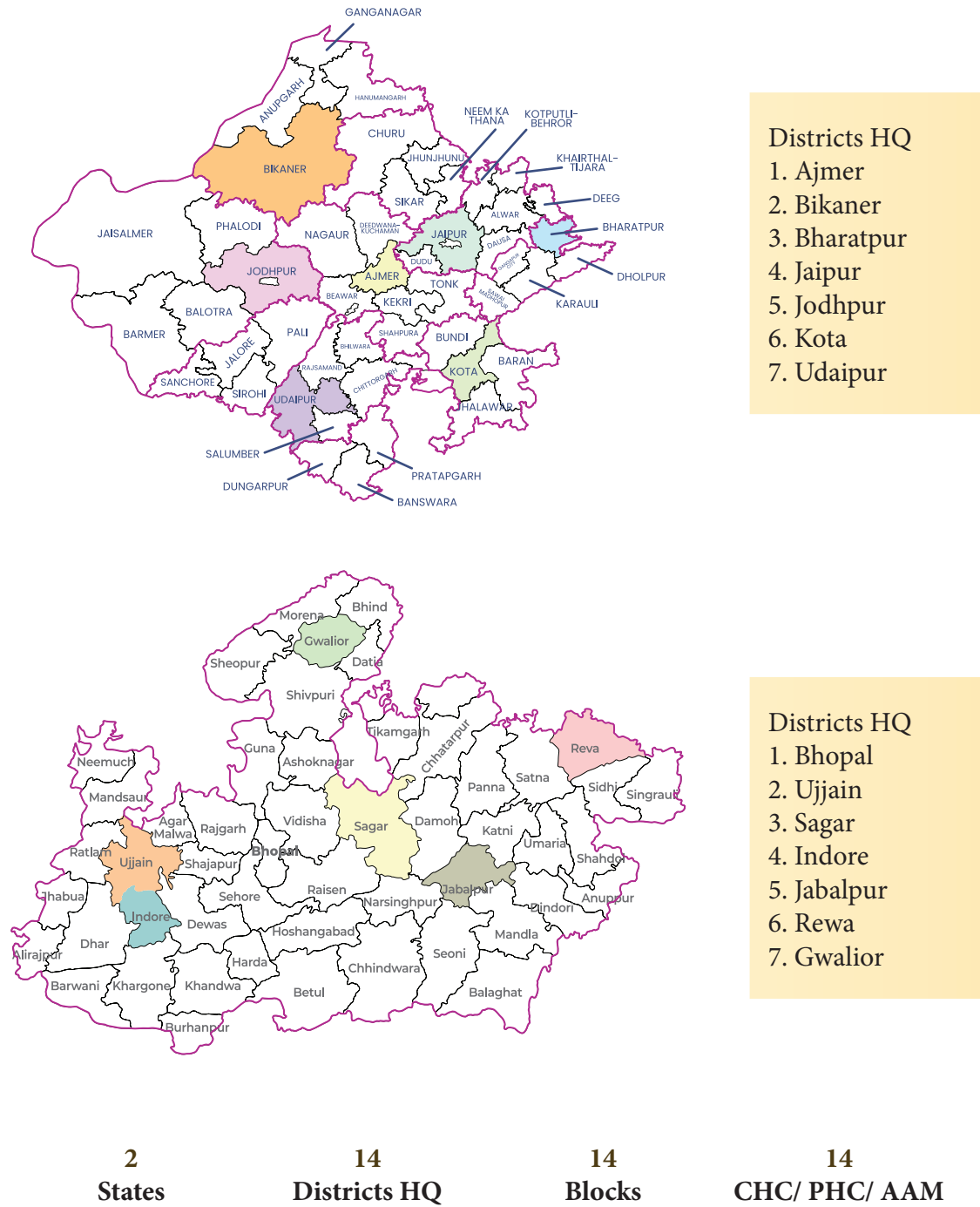
The study assessed the Implementation of Free Diagnostic Initiatives (FDI) in the States by analysing the available data, literature and records and by data collection at Sector, Block, and District levels. The study team also investigated the overall institutional training framework for laboratory staff and others.

1.4 Geographical coverage

The geographical coverage of the study encompassed two states namely Madhya Pradesh and Rajasthan. (See map Figure 1.3)

Fig. 1.3: Study Areas

Study Areas: States of Rajasthan and Madhya Pradesh



1.5 Expected outcomes

The study will help the Government of India to review the institutional mechanisms for effective implementation of the FDI scheme in Reducing Out-of-Pocket Expenditure and provide valuable insights into the effectiveness, impact, and potential areas of improvement for Free Diagnostic Initiatives in reducing out-of-pocket expenditure in Rajasthan and Madhya Pradesh for ensuring universal health coverage.

CHAPTER II: METHODOLOGY

To achieve the study objectives, the following methodology was used for collecting primary and secondary data.

2.1 Review of Secondary Data

The data has been analysed to estimate the out-of-pocket expenditure averted due to FDI at the household level. The utilization pattern and estimation of out-of-pocket expenditure reduced due to FDI in the states of Rajasthan and Madhya Pradesh has been assessed by secondary data for a reference period of three years: 2022-23; 2021-22; and 2020-21. Further, to assess the impact of FDI on reducing out-of-pocket expenditure, a sample-based study has been conducted at the community level. The study consisted of Focus Group Discussions (FGDs), Exit Interviews and Key Informant Interviews (KIIs) with key stakeholders. The Discussion section of the report focuses on corroborating the findings of this study with evidence from similar secondary literature.

2.2 Review Institutional Mechanisms for Effective Implementation of FDI

A detailed review of records, guidelines and SOPs for implementation of FDI has been undertaken in the study states. Data have been collected from government records to assess the institutional mechanisms for the effective implementation of FDI in Rajasthan and Madhya Pradesh. Several relevant documents, records, and reports of the Government of Rajasthan and the Government of Madhya Pradesh were reviewed to understand the objective, management and implementation of schemes. This thorough review encompassed various aspects, including planning, implementation, management, monitoring, supervision, performance assessment, and coordination among key stakeholders at different levels.

To understand the implementation of FDI at DH, CHC, AAM-PHC and AAM-SHC levels, records were reviewed at various levels. The process documents developed by the state team for procedures of supply chain/logistic management including processes of quality assurance like the procedure for accreditation of laboratory, calibration of equipment and diagnostic tools, and procedures for collating results with reference laboratories have been reviewed. Referral mechanisms between all health facilities for facilitating free diagnostic service to the patient as well as between mother laboratories and spoke laboratories have also been assessed. Records were also reviewed for grievance redressal mechanisms as well as training of human resources for implementing the FDI.

Primary data was collected from administrators / service providers working at the state/ district/ block/ sector/ village level to assess and analyse the providers' perspectives in managing and implementing FDI.

From each division of both the studied states, one district was selected (which is divisional HQ). The following districts were selected for conducting the study in the states of Rajasthan and Madhya Pradesh (Table 2.1).

Table 2.1: Districts included in the study for Assessment of FDI in Rajasthan and Madhya Pradesh

Sn	Rajasthan	Madhya Pradesh
1	Ajmer	Bhopal
2	Bikaner	Gwalior
3	Bharatpur	Indore
4	Jaipur	Jabalpur
5	Jodhpur	Rewa
6	Kota	Sagar
7	Udaipur	Ujjain

2.3 In-Depth Interviews

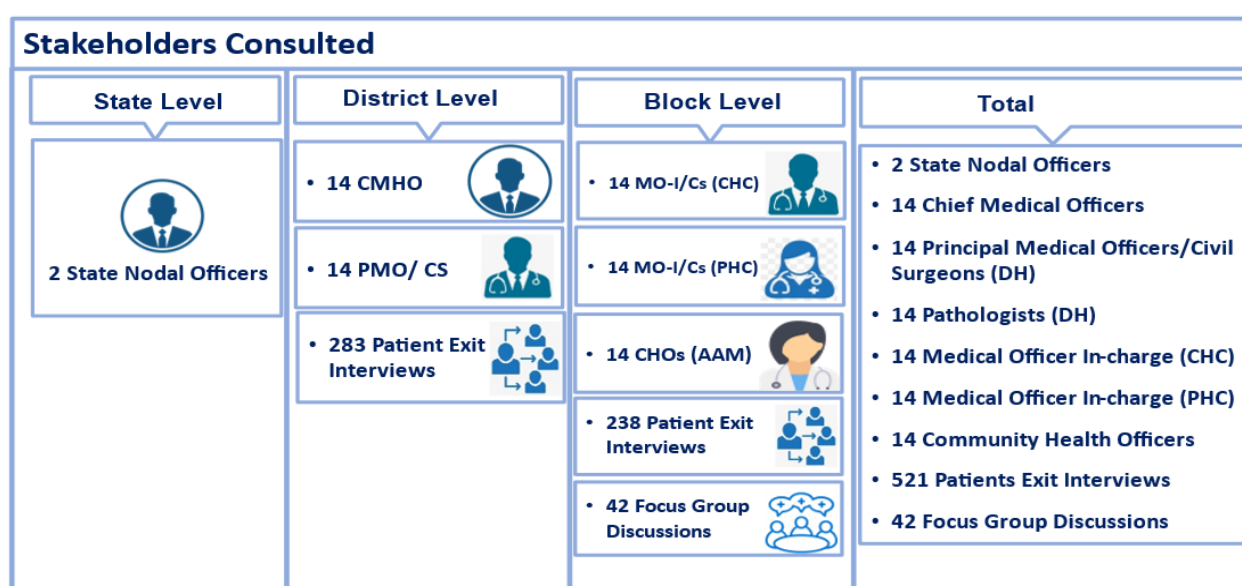
Apart from conducting the review of records, administrators and service providers' perspectives in managing and implementing of FDI scheme have been gathered. The administrators and service providers were approached at the state, district, block, AAM-PHC and AAM-SHC levels for In-depth Interviews.

To understand the supply-side factors influencing the implementation of FDI, in-depth interviews with State-level nodal officers were conducted. District-level nodal officers (CMHO and PMO) were also approached to conduct in-depth interviews on various aspects of FDI implementation in all the seven sampled districts of the study states.

Since District Hospitals were not available in the districts of Bharatpur and Kota of Rajasthan state, therefore one high-load CHC, which will be upgraded as a District Hospital was selected after consultation with CMHO for the study.

From each of the selected districts, one block was identified, in consultation with CMHO and for each block, the CHC Medical Officer In-Charge was approached to understand the implementation of this scheme at the CHC level. Similarly, from the selected block, one AAM-PHC was selected in consultation with the CHC Medical Officer In-Charge for conducting an in-depth interview with the Medical Officer of the AAM-PHC to better understand the perspectives of implementation of FDI at the AAM-PHC level and within the AAM-PHC area, one AAM-SHC was selected (Fig. 2.1).

Fig. 2.1: Stakeholders Consulted



A total of 72 In-depth Interviews were conducted, 36 in Rajasthan state and 36 in Madhya Pradesh. Details are as mentioned in Table 2.2.

Table 2.2: Sampling Framework for In-depth Interviews of Program Managers in Study States

Sn	Level	In-depth Interviews to be Conducted		
		Rajasthan	Madhya Pradesh	Total
1	State-Level Program Officers	1	1	2
2	Chief Medical and Health Officer (CMHO)	7	7	14
3	Principal Medical Officer (PMO/ CS) (DH/SH)	7	7	14
4	Medical Officer In-charge (CHC)	7	7	14
5	Medical Officer In- charge (AAM-PHC)	7	7	14
6	Community Health Officer (AAM-SHC)	7	7	14
Total		36	36	72

2.4 Exit Interviews

Exit Interviews have been conducted at DH, CHC, AAM-PHC, and AAM-SHC levels with beneficiaries (who have availed the services under FDI) to understand the client's perspectives towards FDI, their satisfaction level, OOPE, waiting time at the public health facility in availing diagnostic services under FDI, availability of all prescribed diagnostic services, quality of laboratory services being provided under FDI at various public health

facilities. The beneficiaries' interview helped to assess the referral mechanism (use of Hub and Spoke Model) at the facility level if any diagnostic test was not available where the beneficiary had approached for their advanced diagnostic tests.

A total of 521 Exit Interviews were conducted: 259 in Rajasthan and 262 in Madhya Pradesh. The details of the exit interviews mentioned in Tables 2.3 & 2.4 are as follows:

Table 2.3: Number of Exit Interviews conducted in the study states, at different levels of healthcare facilities

Sn	Level	Exit-Interviews Conducted		
		Rajasthan	Madhya Pradesh	Total
1	District Hospital/Satellite Hospital	140	143	283
2	Community Health Centre	70	70	140
3	Primary Health Centre	35	35	70
4	Ayushman Arogya Mandir - Sub Health Centre	14	14	28
Total		259	262	521

Table 2.4: Demographic Profile of Respondents of Exit Interviews

	Rajasthan	Madhya Pradesh	Total
Gender			
Male	141 (54.44%)	97 (37.02%)	238
Female	118 (45.56%)	165 (62.98%)	283
Age			
Less than 20	23 (8.88%)	14 (5.34%)	37
20 -30	109 (42.08%)	116 (44.27%)	225
31 - 40	56 (21.62%)	58 (22.14%)	114
41 - 50	27 (10.42%)	33 (12.60%)	60
51 - 60	27 (10.42%)	20 (7.63%)	47
61 - 70	14 (5.41%)	13 (4.96%)	27
71 - 80	3 (1.16%)	6 (2.29%)	9
More than 80	0 (0.00%)	2 (0.76%)	2
Total (N) =	259	262	521

2.5 Focus Group Discussions (FGD)

The FGDs have been conducted in identified blocks, sectors and villages in each study district to understand the community's perspectives towards FDI. These perspectives included quality of laboratory services, availability and accessibility of laboratory services, referral mechanisms, benefits received, reasons for not availing the benefits of FDI and how has FDI been useful in reducing the out-of-pocket expenditure towards healthcare. Suggestions on how to improve the implementation of FDI to reduce OOPE and improve quality of diagnostic services was also taken from the community. A group of 10-15 community members participated in each FGD conducted at every CHC, AAM-PHC and AAM-SHC. A total of 42 FGDs were conducted; 21 in each study state. The details of conducted FGDs are shown in Table 2.5.

Table 2.5: Details of FGDs conducted in the study states at levels of healthcare facilities

Sn	Level	FGDs Conducted		
		Rajasthan	Madhya Pradesh	Total
1	Community Health Centre	7	7	14
2	Ayushman Arogya Mandir (AAM - PHC	7	7	14
3	Ayushman Arogya Mandir- SHC	7	7	14
Total		21	21	42

2.6 Study Tools

To collect the data the following study tools were developed:

- Structured Questionnaire for In-depth interviews with
 - State Nodal Officer
 - Chief Medical and Health Officer (CMHO)/ Principal Medical Officer (PMO)
 - Members of the District Diagnostic Team
 - Medical Officer In-charge (MO-I/C) at CHC/ Medical Officer at AAM-PHC/ Community Health Officer (CHO) at AAM-SHC
- Questionnaire for Exit Interviews with patients at Public Health Facilities (DH/ CHC/ AAM-PHC/ AAM-SHC)
- Focus group discussion guide for Focus Group Discussion with Community Members

2.7 Analysis and Documentation

After quantitative data collection, the data was analysed by using Stata ver. 17.0 and qualitative data have been analysed by using Atlas-TI.

The key findings were supported by verbatim anecdotal evidence obtained from the community through FGDs. Tables, figures, and graphs are presented in the report to illustrate the key findings.

2.8 Ethical Approval for Study

The finalized study tools along with the proposal were submitted to the Institutional Review Board (IRB) of IIHMR University, Jaipur and ethical approval was taken on the proposal and tools of the study. Written consent has also been taken from the respondents before administering the study tool.

2.9 Training of Project Team

To build the capacity of the study team to reduce bias and bring uniformity in data collected through KII tools and the FGD checklist, two-day training programme was organized at IIHMR University for all team members of the study. The training included knowledge about the free diagnostic initiative scheme, methods of data collection through approved tools and research ethics.

CHAPTER III: RESULTS

3.1 Institutional mechanisms for effective implementation of FDI

For effective implementation of the Free Diagnostic Initiative, Institutional Mechanism plays a major role. Institutional mechanisms can facilitate coordination and collaboration, ensuring the availability of assured, free-of-cost diagnostic services through seamless delivery processes, effective referral mechanisms, efficient supply chain management, proper equipment maintenance, and the availability of trained human resources. Examining these institutional mechanisms, allow us to develop a comprehensive understanding of the system's strength and areas of improvement. This review specifically investigates the institutional mechanisms within Madhya Pradesh and Rajasthan, highlighting their respective service delivery models, referral mechanisms, procurement processes, and other critical aspects.

Table 3.1.1: Review of State-wise Institutional Mechanisms

Process	Madhya Pradesh	Rajasthan
Services Delivery Model	Wet Lease Reagent Rental model for pathology service at DH and Civil Hospital (CH); Hub and Spoke model at CH, CHC and AAM-PHC.	In-house Model
Referral Mechanism	Sample Transfer under the Hub and Spoke model	No sample transfer . Only patients are being referred to a higher health care facility.
Medical Product	Fully automated USFDA-approved machines installed by Service Provider (M/s POCT Science House Medicals Pvt Ltd consortium)	Procured by Rajasthan Medical Service Corporation Limited (RMSCL) on request of National Health Mission (NHM) Rajasthan and decentralized purchase also from CM&HO and PMO
Procurement: Reagents and Consumables	Procurement and Inventory management by Service Provider agency (M/s POCT Science House Medicals Pvt Ltd consortium)	Decentralized: Local purchase of reagents and consumables by CMHO and PMO.

Process	Madhya Pradesh	Rajasthan
Biomedical Equipment Maintenance	The service provider is responsible for the repair and maintenance of the machines installed as stipulated in the agreement. AOV International for laboratory equipment installed by MP Govt.	Outsourced to specialized service providers Kirloskar Technologies Private Ltd (KTPL)
Sample Labelling Method	Samples are registered, and collected in preprinted bar-coded vacutainers, and patient UID generated in LIMS	Vacutainers have labels on which patient registration number, date and test name, ID and patient names are handwritten
Sample transportation	Samples are transported through hired runners by Service provider agency on bikes. A dedicated pick-up person is assigned to a government health facility. Use of cold boxes with temperature monitoring during transportation.	Sample transportation is not done. Patients are verbally referred to higher centres for testing. Samples of some specialized tests are sent from DH to Medical College through a sample transport person.
Human resources and training	Government and Service Provider agency staff. The service provider agency has conducted training sessions on machines and Laboratory Information Management Systems (LIMS)	Permanent and contractual staff hired under NHM, along with biomedical engineers for equipment management at the zonal level. All laboratory technicians and Assistants were trained in the beginning of program
Sample Collection Process	• Staff Nurse/ Lab technician / Multi Task worker (MTW) serves as Phlebotomist their duties includes • Registration • Sample collection • Pre barcoded labelling • Storage	• The Staff at Peripheral health facility conduct tests under in-house mode. Their duties include • Registration • Sample collection • Manual Labelling

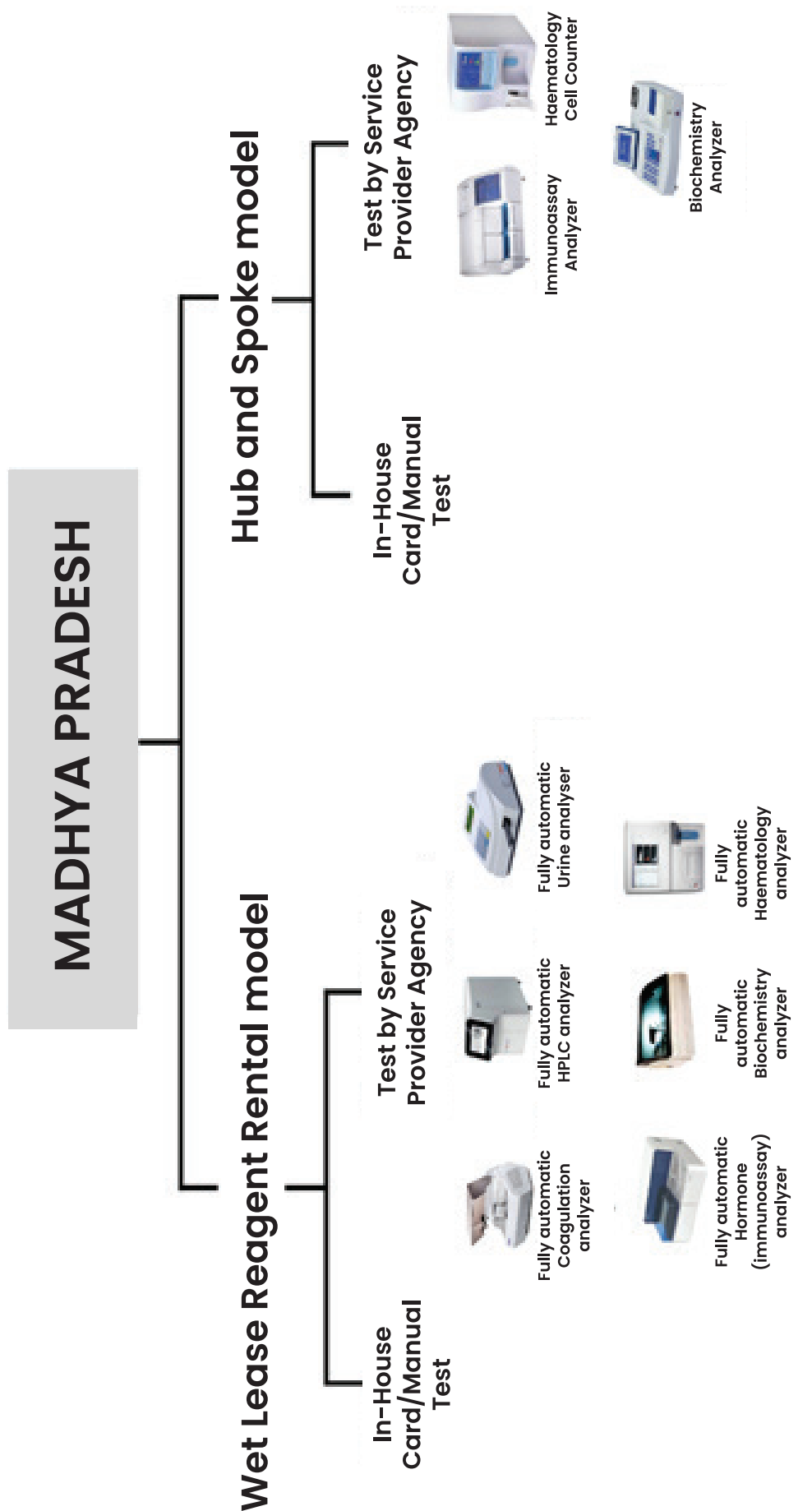
Process	Madhya Pradesh	Rajasthan
Sample Collection Process	• Sample dispatch • Preparing consignment paper • Record maintenance with patient details • Report printing and providing to patients. (In critical cases, communicated over the phone)	• Test Conducted • Record maintenance with patient details • Report is provided in print mode (in critical cases communicating over the phone)
Percentage Of Sample Rejections	The rejection rate is 3-5 % every day.	There is no data available for Rajasthan.
Pre-Analytical Turnaround Time (Time from sample collection to time of registration of the sample at the hub laboratory)	24 hours in Urban Spokes and 48 hours in Rural Spokes (as per availability of staff)	Not applicable in Rajasthan
Analytical Turnaround Time (time from sample registered at the hub to online report generation)	6 hours	Online report not available. TAT is from one hour to 12 hours
Reason For Delay In TAT	Shortage of human resources (runners) Ineffective monitoring of outsourced services.	Sometimes the machine breakdown delays the process.
Strengths of Sample Transportation System	PPP mode helps in addressing the gaps in infrastructure and laboratory facilities in the state. Ensure availability of the maximum possible number of tests at different levels of facilities	
Patient Satisfaction/ Feedback Mechanisms	Through a call centre established by the service provider (Science House)	No mechanisms to take feedback from patients.
Quality	SOPs are available IQAS and EQAS available	SOPs are available IQAS is available, but there is a lack of documentation of IQAS at some of the visited facilities EQAS is not available

Process	Madhya Pradesh	Rajasthan
Laboratory Management Information System	SHARP-LIMS provided by outsourced agency	Only DIPHL Kotputli has LIMS; others use e-Aushadhi

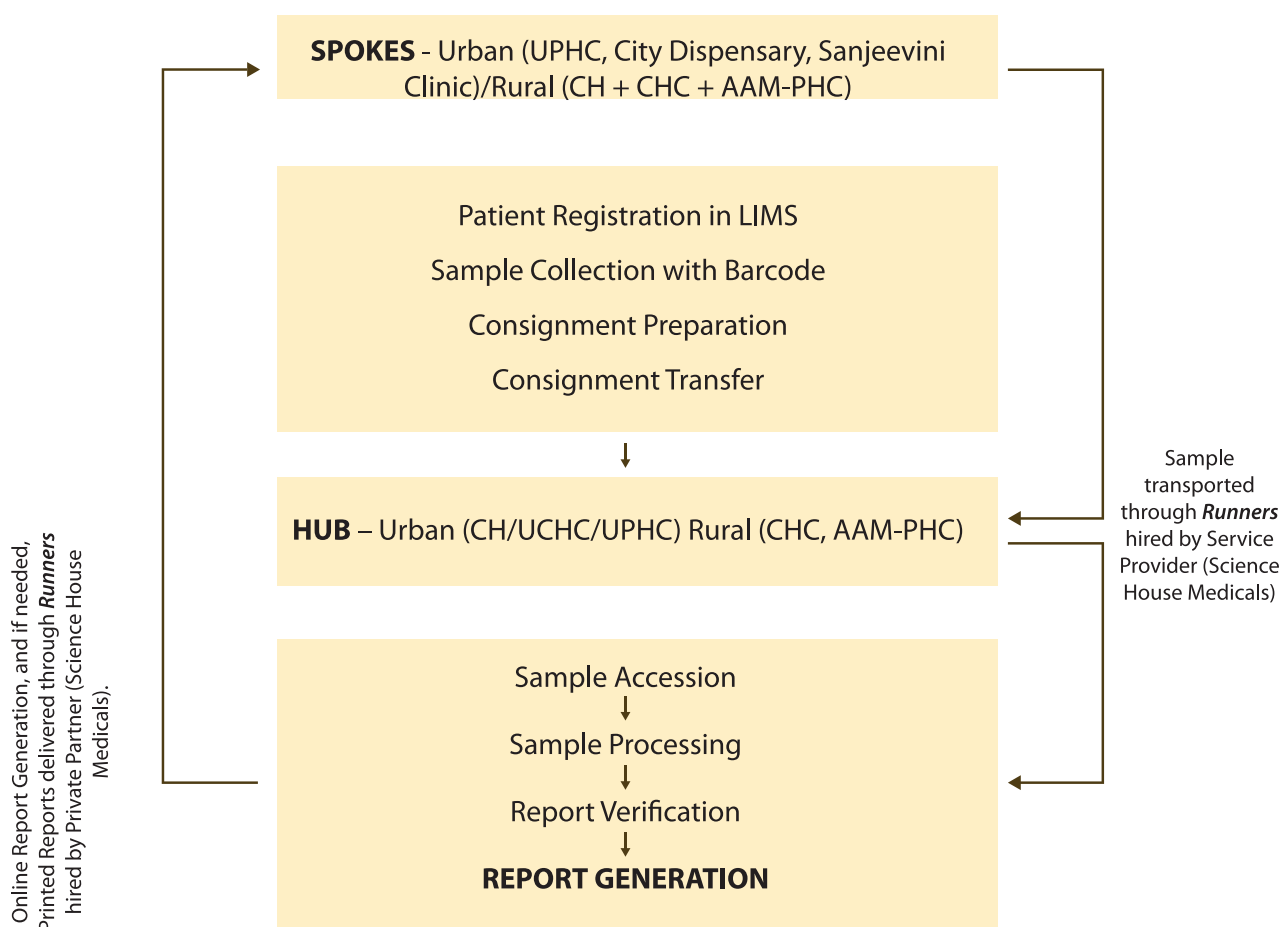
Table 3.1.2: Supply Chain Management in Rajasthan and Madhya Pradesh

Supply Chain		
Consumables	Rajasthan	Madhya Pradesh
Rapid Tests/ Card Tests	Centralized purchase by RMSCL on NHM request	Supply by MPPHSCL
Reagents for Machine Tests	Decentralised (Local purchase by CMHO/ PMO)	Supplied by the service provider agency (Science House)
Laboratory Equipment	Supplied by Government and Local Purchase	Supplied by the service provider agency (Science House and POCT)
Indent	e-Aushadhi (online indenting from AAM-PHC level onwards)	SHARP - LIMS
Indent Frequency	Fortnightly	Weekly

Fig. 3.1.1: Models in use under FDSI in Madhya Pradesh



Hub & Spoke Model



Operational Model

In Madhya Pradesh, the Free Diagnostic Scheme was launched with 48 tests at District Hospital level; 31 at Civil Hospital; 25 at CHC; 13 at AAM-PHC and 5 at AAM-SHC level. To expand the scope of diagnostic services within the state, Madhya Pradesh (MP) has been implementing the Free Diagnostic Scheme at District and Civil Hospitals using the Wet Lease Reagent Rental model since March 2020. The Wet Lease Reagent Rental Model is a financial model to provide wide range of diagnostic services in Madhya Pradesh, by optimizing operational efficiency and cost effectiveness. This model cuts off the initial capital cost of the Govt to procure high end diagnostic equipment by putting in place a symbiotic arrangement where the onus of procurement and maintenance is on the private partner. The Private partner in due course get reimbursed by the State Govt, based on performance (no. of tests conducted). Additionally, this model has low operating cost, which allows healthcare facilities to allocate their resources more efficiently. This arrangement ensures continuous upskilling of healthcare personnel in advanced diagnostic technologies.

The Wet Lease Reagent Rental model at all District Hospitals and Civil Hospitals of Madhya Pradesh has been implemented on hybrid mode (PPP + in-house) through an outsourced service provider agency, which was selected through open tender. As per the conditions under agreement between Govt. of MP and service provider agency, 6 USFDA-approved brand-new machines have been installed by service providers (consortium of Science House Pvt Ltd and M/s POCT Services Pvt. Ltd.) at all DH of MP at their own

cost. As per the agreement, these machines are being operated by Govt. lab technicians working at the health facilities, with the service provider agency providing trainings as well as handholding the staff for a period of 6 months initially. At each DH, one supervisor and lab technician have been appointed round the clock by the service provider agency. Among the responsibilities of the service provider agency, other than maintenance and timely calibration of equipment, they also ensure internal quality control and external quality assessment for laboratory services.

Wet Lease Reagent Rental model was adopted as it is a radical departure from the conventional model in ways that it provides continuous, uninterrupted availability of reagents besides ruling out the possibilities of machine-reagent incompatibility. As per the MOU, the arrangement and management of the supply of reagents and consumables is done by the service provider, and this allows the government to focus on other aspects of the initiative. Centralized access and customizable data handling enable insightful analysis of community health. Service provider captures all the patient transactions (from sample collection till final report generation) in a LIMS software, with all the machines at all District and Civil Hospitals connected with that LIMS software so that all testing procedure from sample collection to report generation is automated and synchronized.

Additionally, as part of the Public-Private Partnership (PPP), a Hub and Spoke (hybrid) Model for diagnostic services at urban and rural health facilities (CH/CHC/ AAM-PHC) has been operational since February 2022. The Hub-and-Spoke model was implemented after the selection of the private partner agency (Science House Medicals Pvt Ltd) through an open bid system. Under this project, service provider agency is operating 324 hub laboratories and 1610 spoke centres in both urban and rural areas, which ensures that patients do not have to travel more than 7.5 km to access immediate diagnostic services. Under the Hub and Spoke Model, the service provider agency has installed three USFDA approved brand new machines at Urban/ Rural Hubs (CH/UCHC/UPHC & CHC/ AAM-PHC). Service provider agency is responsible for repair and maintenance of all machines and equipment deployed at Hub centres. Maintenance of Bio medical equipment and machines installed by MP Govt is being done by an outsourced agency, AOV International.

NHM-MP is responsible for providing essential infrastructure such as electricity, water supply, dedicated space with furniture, and patient engagement facilities. This includes civil work, electrical wiring, water pipelines, and IEC activities.

Human Resources:

For wet lease rental reagent model at District / Civil Hospital, Pathologist / Laboratory In charge Medical Officer has been appointed as Nodal Officer. Other staff of these District/ Civil Hospital laboratories includes Lab technician, staff nurse and data entry operator. Staff nurse, Data entry operator and one LT perform their duties at sample collection area, whereas other LT work in processing samples in lab and emergency. Number of LT deployed at each laboratory depends on type of hospital and Number of beds. However, there was shortage of laboratory staff at these DH/ Civil Hospital Laboratories.

Under Hub and Spoke model, one divisional coordinator and one district level supervisor has been appointed by the service provider agency to oversee the smooth implementation of the program. Under the Wet Lease Reagent Rental Model, every District Hospital has been provided with one Laboratory Supervisor and a few sanctioned LTs. For smooth operation of these services, state level and divisional coordinators have been provided

by service provider agency. Under the Hub and Spoke model, at each healthcare facility acting as a Hub, one Lab Technician, whose responsibility includes receiving, processing of samples and reporting, and one runner-person for sample transport have been appointed by the service provider agency.

Sample Collection and Transportation:

Samples are registered, collected, and tested by Community Health Officers (CHO) at AAM-SHCs. At UPHCs, CD/Sanjeevani clinics, CHs, CHCs, and AAM-PHCs functioning as spokes, and at UHCs, UPHCs, Rural CHCs, CHs, and AAM-PHCs operating as hubs, samples are collected on a walk-in basis by Staff Nurses, Lab Technicians, and MTWs. Samples collected at the respective spokes are carefully stored in prescribed cold storage or containers according to the SOP for different types of samples. At the hub, the collected samples are processed using the equipment as per the defined time cycles and availability. Samples are collected at the respective centre in a vacutainer provided by the agency. Proper steps are undertaken before collecting the sample such as hygiene maintenance, wearing gloves and so forth. The LT or other staff collecting samples also ensure that biomedical waste guidelines and universal precautions are being followed including the presence of a fully functional needle-cutter, color-coded waste bags and personal protective gear. Samples at urban spokes can be stored for a maximum of 24 hours, while at rural spokes, the storage timeline extends to a maximum of 48 hours. This is because the selected agency collects samples from rural spokes on an alternate day basis. As per the MOU of NHM-MP, Cold boxes are being provided by NHM-MP as part of logistic support. These cold boxes should be equipped with temperature monitoring devices and contain enough ice packs at the requisite temperature; however, there is no system in place which monitors the maintenance of temperature during sample transportation, ensuring effective transportation of samples. According to SOPs, regulatory measures must be followed during the transport of infectious and other diagnostic specimens to ensure that, in the event of an accident, runner and the public are not exposed to infectious material. However, in Indore, it was observed that due to a shortage of runners, one runner has to cover even 20 centres in a day to collect and transport the samples to the hub at the district, which makes the runner more prone to meeting with an accident. At each Spoke, LT/ SN/ MTW has been deployed by NHM-MP for sample collection, registration, record keeping, storage and packaging of samples for transport. Samples are also directly collected from patients visiting the hub facilities. This direct approach has been used by the patients who are either living in proximity of the hub, or who want to avail the medical care provided by the specialized medical staff.

After sample collection and testing, the results are verified by the technician at the hub laboratory. The authorized reports are then made available for the patient to download from an online portal.

Supply Chain Management:

To have seamless service delivery in the states, it is imperative to have a functioning supply chain. As per the guidelines, for a robust supply chain management, the government, as well as private partners, must adopt an uninterrupted, practically viable network to meet the demand of the healthcare system. Adhering to that, in Madhya Pradesh, supply for consumables and Rapid diagnostic kits or diagnostics under National Health Programs is being done in a centralized mode, as Madhya Pradesh Public Health Service Corporation Limited (MPPHSCL) procures these card tests and central district stores receive supply

from the vendors. For the Machine tests, the supply of reagents and consumables, and the inventory management needed for laboratory services is being done by the service provider agency (M/S Science House Medicals Pvt. Ltd.) in Madhya Pradesh, as has been stated in the MOU for Hub and Spoke Model. Online indenting using LIMS for the aforementioned supply is being done every week and within a day or two, Labs receive required consumables and reagents. As per the MOU for Hub and Spoke Model, the private provider has been instructed to procure the required reagents and consumables on its own. In all the health facilities visited during the survey period, no data on stock-out of consumables was available.

Quality Assurance:

Quality Assurance is a fundamental aspect of healthcare services. In Madhya Pradesh, for ensuring the reliability and accuracy of diagnostic results, all laboratories operating under Wet Lease Reagent Rental and Hub & Spoke model adhere to Standard Operating Procedures (SOPs) for equipment functionality, sample collection, and testing. Additionally, the Internal Quality Control is also an essential part of this process, ensuring that the diagnostic services remain accurate and reliable. These laboratories follow a well-defined set of SOPs for calibration and running controls. These procedures are meticulously developed and consistently followed to guarantee the Internal Quality Assurance System (IQAS). The Madhya Pradesh government has instituted an External Quality Assurance Scheme (EQAS) system as a cornerstone of its Quality Assurance framework. This scheme is designed to continuously assess and monitor the quality and accuracy of diagnostic services provided in the state. Laboratories in MP are participating in the External Quality Assurance Program (EQAP) of CMC Vellore and AIIMS New Delhi. As part of the EQAS, the state government diligently maintains and submits Quality Control Test Reports for each hub laboratory every quarter. To strengthen the oversight of quality assurance in the state's diagnostic services, a dedicated Quality Assurance Officer has been appointed. This officer plays a pivotal role in monitoring the services provided by the outsourcing partner, Science House Medicals. By overseeing and evaluating the processes and standards, the Quality Assurance Officer ensures that the diagnostic services meet the stringent quality requirements set by the government.

Data Management and Monitoring:

The state has implemented a comprehensive Laboratory Information Management System (LIMS). Science House Application for Remote Pathology (SHARP)-LIMS is used as the authorized LIMS software in Madhya Pradesh, which is a product of service provider agency. All the machines at District and Civil Hospitals and Hub and Spoke are connected with that LIMS software so that all testing procedure from sample collection to report generation is automatic. A central dashboard is also available at the state level for monitoring all testing in the state. The ownership and access of data is in a centralized mode in Bhopal, in accordance with officials from NHM and Science House Medicals.

When a patient visits a Hub and Spoke facility for diagnostic tests, the first step is to register the patient in the LIMS. For registration, the basic details to be captured are the patient's name, age, gender, city, phone number, and Aadhar number. Patient registration data from sample collection sites at government health facilities get automatically fed into the dashboard on a real-time basis. The dashboard reflects facility-wise data on the total number of patients tested, total number of tests done, total number of each type of test conducted, percentage of patients tested (out of a total number of patients) and percentage

of tests complying with the stipulated turnaround time. It allows for easy retrieval and management of patient records. Stringent measures are in place to safeguard patient data and ensure compliance with privacy regulations. Access to patient information is restricted to authorized personnel from the state and Service provider agency (Science House Medicals) only. To ensure efficient and secure communication with the patients, a link to download the authorized reports is sent to the patient by SMS. For security and confidentiality purposes, this link only works via an OTP, which is sent to the patients' registered phone number. The report is also made available for downloading from an online portal, and associated spokes users can also print their patients' reports through the LIMS, streamlining the entire testing process for the benefit of patients and healthcare providers.

Incident reporting is also taking place in Madhya Pradesh and being reflected in the LIMS. Penalties have been levied on the service provider for the incidents reported by the Pathologist at District laboratories and the Facility In charge at Hub Facilities. If any machine breaks down, it should be repaired within 72 hours, or alternative arrangements should be made by the service provider. Otherwise, a penalty of Rs. 5000 per day will be levied upon the service provider. In the event of a sample failure in EQAS or external validation, a penalty of Rs 1000 per failed sample will be imposed. For a second occurrence of failure, a penalty of Rs 2000 per sample will be applied.

Monitoring of timely payment to Service providers is also done through LIMS. Service providers generate bills of services provided at the DH level, the Pathologist, and at the Hub Facility the MO-In charge verifies these services and forwards these bills within a stipulated time to CMHO, where after verification from CMHO, payment is done through a centralized mode by State NHM Office.

Diagnostic Committees and Teams:

In Madhya Pradesh, the State Diagnostic Technical Committee was constituted in December 2022. This committee is chaired by the CEO of Lab Services from the Department of Health Services, Madhya Pradesh. Its members consist of representatives from the Finance Department, National Health Mission (NHM), the Head or a representative of the Department of Pathology, Medical College Bhopal, and All India Institute of Medical Sciences (AIIMS) Bhopal. Other members include a Microbiologist/ Biochemist from the Medical College Bhopal, SNO Ayushman Arogya Mandir under NHM, a Pathologist/ Microbiologist from a District Hospital, in Madhya Pradesh, a Biomedical Engineer from NHM, and a consultant or representative from development partners like CHAI (Clinton Health Access Initiative) or Jhpiego. Additionally, a Specialist Pathologist from a National Accreditation Board for Testing and Calibration Laboratories (NABL) accredited private laboratory in Bhopal is part of the committee. This committee has been entrusted with the responsibility of overseeing the design, implementation, and monitoring of diagnostic services throughout the state. According to the established guidelines, the committee is required to convene a meeting every three months to fulfil its mandate. However, no meetings have been convened since its formation.

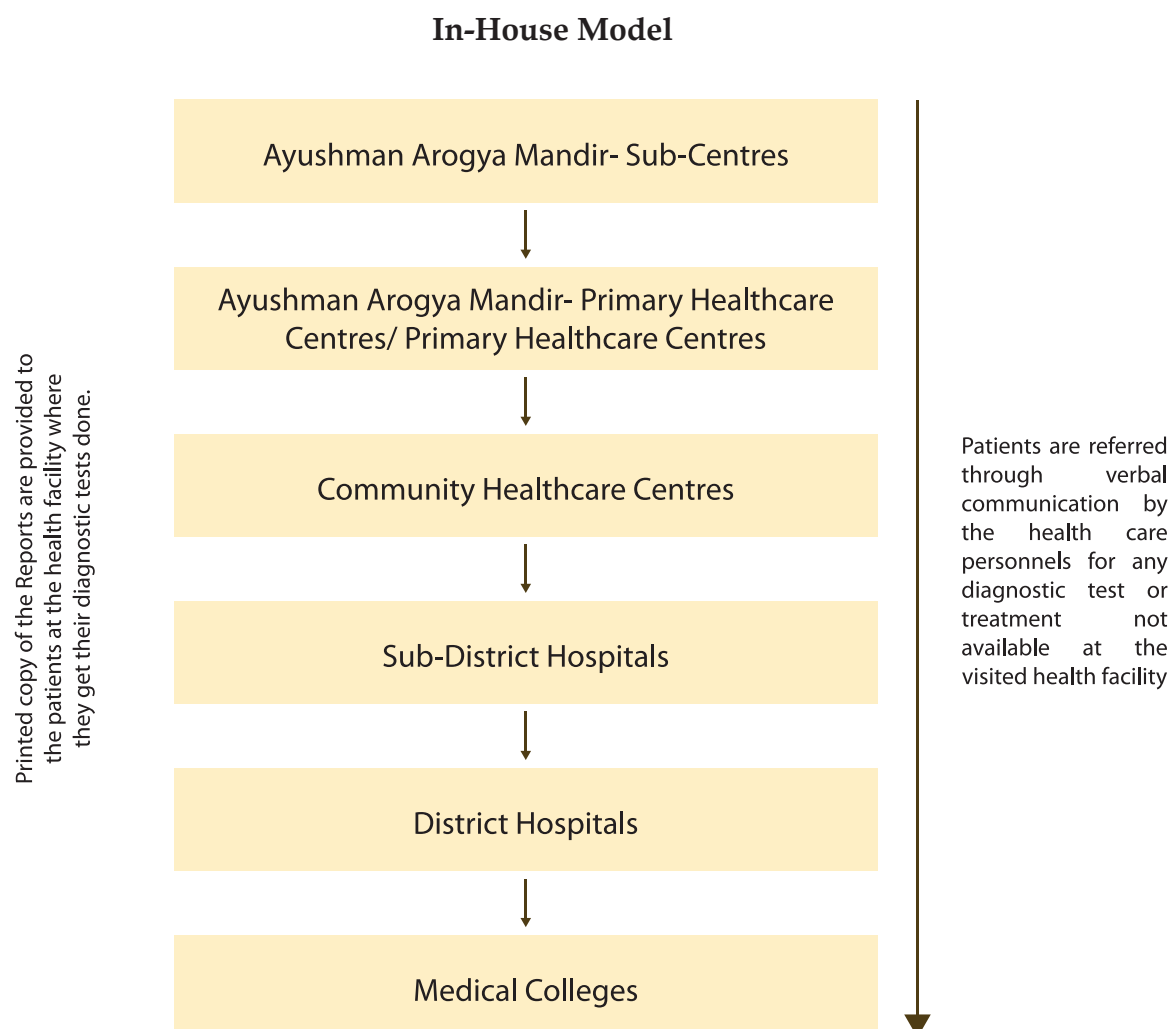
District Diagnostic Teams are not available in Madhya Pradesh. In MP, the CEO and Deputy CEO of Lab Services are responsible for rolling out the Free Diagnostic Initiative in the state. At all institutions providing diagnostic services under the Wet Lease Reagent Rental model, the Pathologist / Medical Officer In charge of Lab- Services is appointed as the Nodal officer for implementing the model. For the Hub and Spoke Model, CMHO and

BMO are in charge of the implementation and monitoring of the scheme.

Effectiveness and Challenges:

The diagnostic services program in Madhya Pradesh has demonstrated its effectiveness through a well-structured operational model, systematic sample collection, transport system, strong quality assurance measures, and efficient data management. However, in MP manpower for sample transportation, monitoring of sample storage, and data entered in the test requisition forms was found to be incomplete/deficient, which needs to be addressed to make diagnostic services optimum in the state. Delegating diagnostic services to private partners can lead to stagnation in the roles of government laboratory technicians. The availability of private alternatives sometimes reduces the opportunities for government technicians to engage actively in handling sophisticated equipment, utilizing Laboratory Information Management Systems (LIMS), and performing other critical tasks.

3.1.2 FDI in Rajasthan



Operational Model

A free diagnostic Initiative in Rajasthan, also known as “Mukhyamantri Nishulk Janch Yojna” was initiated to improve access to diagnostic tests within public health facilities.

It was started in a phased manner to provide complete free-of-cost treatment facilities to all patients visiting government hospitals. The free diagnostic services are provided at all health facilities in Rajasthan in-house mode.

As per the guidelines of the Government of India and the Free Diagnostic Service Initiative (FDSI) of the National Health Mission, 33 mother labs, 117 hub labs and 3009 spokes are proposed to be set up in Rajasthan. It is also proposed that 143 tests be made available at the DH level, 117 at the SDH level, 101 at CHCs and 66 at AAM-PHCs. Govt. of Rajasthan has issued the Request for Proposal (RFP) multiple times for finalizing the service provider, but the bids could not be finalized, thus the Hub and Spoke was not functional during the time of study.

Under Pradhan Mantri Ayushman Bharat Health Infrastructure Mission (PM-ABHIM) establishing Integrated Public Health Laboratories (IPHL) at District Hospitals has been initiated in Rajasthan. In Rajasthan, the District Integrated Public Health Laboratory (DIPHL) at District Hospital Kotputli became operational in July 2023 and the process has commenced for establishing similar laboratories in other districts. These DIPHLs will serve as the hub for block public health laboratories and shall conduct tests which are not available at the block level. Similarly, the Block Public Health Laboratories (BPHL) also serve as the hub for CHC, PHC and Ayushman Arogya Mandir – Primary Health Centre and Sub Health Centre (AAM-PHC/SHCs) and other facilities. Apart from the Laboratory services, the model has been implemented using the existing human resources of the RNTCP programme as sputum runner person for sample transport from health facilities/ collection centre to hub laboratories (CHC/DH).

Human Resource:

In Rajasthan, human resource deployment for laboratory services at healthcare facilities operates through two primary mechanisms: permanent positions and contractual/ outsourced positions. In cases of human resource shortages in healthcare facilities, the guidelines specify that staff can be hired according to the outsourcing policy. This measure was introduced to address the staffing deficits for smooth implementation of FDSI.

Supply Chain Management:

In order to ensure smooth service delivery throughout the states, a robust supply chain management is necessary to be in place. At the District Hospitals in Rajasthan, offline indenting by Laboratory staff is being done to Civil Surgeon Store and from there they get supplies on a fortnightly basis. The Storekeeper at the central store of District Hospital indent items using the software e-Aushadhi. The lab equipment are either supplied by the Rajasthan Medical Service Corporation Limited (RMSCL) or procured at District level based on rate contract by RMSCL. Procurement of rapid diagnostic kits and diagnostics under National Health Programs is being done in centralized mode by RMSCL and supply is being done through District Drug Warehouses (DDW). Those equipment and reagents which are not in the rate contract of RMSCL are purchased by health institutions themselves. The specifications/ nature of supplies to be taken through the local purchase is being decided by a technical committee headed by CMHO, CHC/ AAM-PHC in charge and one employee from the accounts department. There was no information about consumables stock-outs in any of the medical facilities that were visited throughout the survey period.

RMSCL plays a critical role in the effective implementation of FDSI. It provides laboratory

equipment or rate contract for procurement of these equipments across the state and facilitates equipment maintenance and repair through the 'e-Upkaran' software, ensuring the availability of biomedical engineers at both the state and zonal levels. KTPL has been hired as an outsourced agency for biomedical equipment maintenance. These biomedical engineers are responsible for monitoring the daily online reporting of investigations conducted under the FDSI Scheme from AAM-PHC level and upwards through the e-Aushadhi application. They also oversee the online updating of inventory, including equipment and instruments, and ensure annual maintenance contracts for all available equipment at healthcare facilities up to the AAM-PHC level.

Record Maintenance, Documentation and Monitoring:

At the onset of the scheme uniform format like list of available tests at the health facility, timings of sample and report collection, test requisition form, report format, Record Keeping Register and Equipment Logbook was developed by Govt. of Rajasthan and circulated across the state. Names of Officer in-charge, Lab technicians outside the laboratories have been displayed at all the health facilities. It was noted that sample collection was done by the SN/ LT at AAM-PHC/ CHC/ District Hospital and by CHO at AAM-SHCs. During the study, it was noted that the patients are verbally referred to a higher health facility for diagnostic tests which are not conducted at the facility, but the details of the patients who have been referred are not maintained at the healthcare facility. However, the sample of the some of the specialized tests (Dengue and Viral Load Estimation for Hepatitis) are being transported from District Hospital Laboratory to Medical College Laboratories. The records maintained only the number of tests carried out on a particular day by the facility. e-Aushadhi software is being used for data management and patient registration.

The Medical Officer In charge of AAM-PHC and CHC is the nodal officer for the effective implementation of FDI at their facility and they have been entrusted with the responsibility of supervising and monitoring the implementation of Free Diagnostic Services regularly and resolving the problems that occur during implementation. CMHO is a district-level Nodal Officer for the smooth implementation and monitoring of MNJY. State-level Nodal Officers reported conducting monitoring visits at districts but their records were not available in the States. They do not hold separate reviews for Free Diagnostic Services Initiative, but it is a part of review meetings conducted with Chief Medical and Health Officers by MD – NHM and/ or Director – Public Health.

Quality Assurance:

To ensure that all procedures are conducted in a safe and consistent manner, SOPs and work Instructions are mandatory in the laboratories. In Rajasthan, SOPs were available at the tertiary levels of healthcare but have yet to be fully implemented at the primary and secondary levels. However, a positive trend towards their implementation has been observed during visits to the facilities.

From the state the detailed instructions for ensuring internal quality assurance standards have been shared with all the laboratories across all health facility of Rajasthan. During visits to various facilities, it was reported that equipment undergoes regular calibration, and control samples are routinely analysed to verify the accuracy of conducted tests. However, there was noted deficiency in the availability of detailed records documenting procedures, results, and any corrective measures taken in many of the visited facilities. As per the guidelines of FDSI, timely implementation of External Quality Assessment

Scheme (EQAS) is required for all laboratories in the state. However, laboratories within the governmental setup in Rajasthan are yet to commence participation in EQAS.

Diagnostic Committees and Teams:

As per the guidelines, a dedicated State-level Diagnostics Team and District-level Diagnostic Team should be constituted to manage the Free Diagnostics Initiative in the state. In Rajasthan, State or District diagnostic teams have not been formed. In Rajasthan Assistant State Nodal Officer for the Mukhya Mantri Nishulk Jaanch Yojana oversees the scheme at the state level, while implementation responsibilities at the district level are managed by the Chief Medical and Health Officer (CMHO). Additionally, at the District and Sub-District Hospital level, the Principal Medical Officer is tasked with implementing the scheme.

Effectiveness and Challenges:

Free diagnostic service scheme in Rajasthan has made significant contribution by ensuring availability of essential/ basic diagnostic services to the patients in the state, protecting their right to treatment and promoting universal health coverage. Challenges faced by Rajasthan includes limited infrastructure, limited number of available tests, lack of sample transfer, lack of proper documentation, staff shortage and training of laboratory staff.

3.2. Availability and accessibility of FDI laboratory/diagnostics services for the patients in IPD and OPD of public health facilities.

Table 3.2.1: - Number of Health Facilities providing Free Diagnostic Services in MP and Rajasthan

Type of Health Facility	Number of Health Facilities	
	MP	Rajasthan
DH	51	64
SDH / Satellite/ CH	108	7
CHC	345	693
AAM-PHC	1,199	2,170
AAM-SHC	9,387	14,423

The health facilities from the district to the village level providing services in the study states are mentioned in Table 3.2.1. The provision of free diagnostic services is a key component of the National Health Mission aimed at ensuring affordable care and achieving universal health coverage. Free diagnostic services play a crucial role in the early detection of diseases and health conditions, which is essential for effective intervention and prevention of disease progression. This strategic approach aligns with broader healthcare goals and contributes to the creation of a more inclusive and resilient healthcare system.

All public health care facilities in rural and urban areas of MP and Rajasthan are providing

Free Diagnostic services. The hub-and-spoke model in MP comprises of two distinct components: urban and rural facilities serving as central hubs and peripheral spokes. These hubs encompass various levels of healthcare facilities such as CHs, CHCs and AAM-PHCs. The spokes encompass a range of healthcare facilities including CHCs, CDs, AAM-PHCs and Sanjeevani Clinics. In MP, 324 Hubs and 1610 Spokes are operational. The number of medical tests performed at different health facilities in the study states is detailed in Table 3.2.2.

Table 3.2.2: - Number of Tests Available at various levels of Health Facilities in MP and Rajasthan

Type of Health Facility	Number of Tests at each facility as per National Essential Diagnostic List	Number of Available Type of Tests			
		MP	Gap (%)	Rajasthan	Gap (%)
DH	134	132	2 (1.49)	56	78 (58.21)
SDH	111	85	26 (23.42)	56	55 (49.55)
CHC	97	63	34 (35.05)	37	60 (61.86)
PHC/UPHC Ayushman Arogya Mandir (AAM - PHC/ AAM-UPHC)	63	45	18 (28.57)	15	48 (76.19)
AAM-SHC	14	11	3 (21.43)	14	0 (0)

*As per the latest guidelines of NHM-MP, all urban and rural AAM-PHCs, CHCs and Civil Hospitals (less than 100 beds) will have 80 tests, out of which 50 will be under Hub and Spoke Model, while 30 will be conducted in an in-house mode.

Essential Diagnostic list of Govt of India recommends 14 tests at Ayushman Arogya Mandir - Sub Health Centres (AAM-SHCs), 63 tests at Ayushman Arogya Mandir – Primary Health Centres (AAM-PHCs), 97 tests at Community Health Centres (CHCs), 111 tests at Sub-District Hospitals (SDHs) and 134 tests at District Hospitals (DHs).

Rajasthan: Table 3.2.2 highlights that, except at Ayushman Arogya Mandir (AAM-SHCs), all other healthcare facilities in Rajasthan exhibit a diagnostic test availability gap of around or greater than 50%. It is noteworthy that all these tests are conducted in-house, limiting the range of diagnostic tests performed. However all the facilities in the Rajasthan are providing the required number of tests as mandated by the Mukhya Mantri Nishulk Jaanch Yojana

The study revealed that until April 2023, in Rajasthan, 40 specific tests were provided to patients free of cost through an agency in an outsourced mode. These tests include those conducted under various national health programs (e.g. cancer and hormones tests) and

those available at Medical Colleges. The outsourced agency established laboratories at 07 divisional headquarters and set up collection Centres across 54 districts, sub-districts, and satellite hospitals. Remarkably, spanning from October 21, 2019, to April 30, 2023, a significant total of 1,48,82,806 tests were conducted, catering to the healthcare needs of 22,45,587 patients through the Special Test Facility. It's noteworthy that the contract with this outsourced agency remained valid only until April 2023.

During the study, it was observed that the 7 AAM-SHCs which were visited by the study team in Rajasthan were conducting fewer than the 14 tests mandated by the guidelines.

Madhya Pradesh: Under the directives of NHM-MP, the AAM - Sub Health Centres are mandated to perform 11 diagnostic tests in-house. At the AAM-PHC level, 45 tests (11 inhouse card tests and 34 machine tests) are available, while CHCs offers 63 tests, including 11 inhouse test, SDH offer 85 tests and DH offer 132 test including 33 inhouse test under the wet lease rental reagent model.

Except for the AAM-SHC in Gwalior, the 11 mandated tests were not being conducted at the AAM-SHCs visited during the study. At the Hanota-Patkui AAM-SHC in Sagar only 8 tests were being performed with Typhoid, Iodine and water purity tests unavailable. Similarly, at the Sodang AAM-SHC, only 6 tests were available, with Typhoid, TB, Iodine and Water purity tests not being conducted. At the AAM-SHC in Jabalpur only 10 tests were being performed, with the water purity test being the only one not conducted.

Test Conducted against Beneficiaries

Table 3.2.3 for Rajasthan & Table 3.2.4 for Madhya Pradesh provide evidence that the total number of tests conducted, and the number of beneficiaries has significantly increased over the past three financial years. This trend suggests enhanced access to healthcare services for a larger and expanding coverage of free diagnostic services in both the states. In Rajasthan, from 2013 to October 2023, a total of 63,71,24,612 diagnostic tests were conducted for 25,08,43,142 patients, resulting in an average of 2.89, 3.15, and 3.06 tests per patient over the consecutive three years. In Madhya Pradesh, the average number of tests per patient was consistently three or more during the same period

Table 3.2.3: - Total Number of Tests Conducted and Beneficiaries in Rajasthan

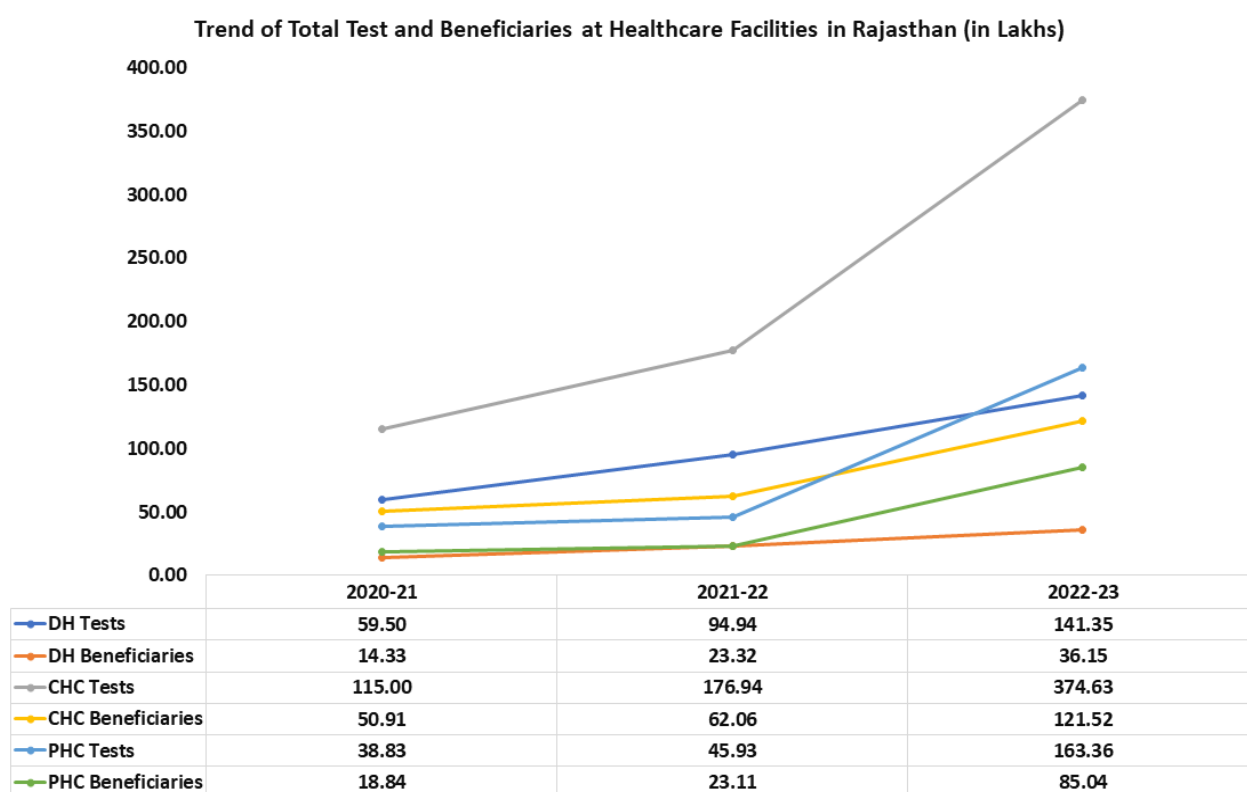
FY	Total Number of Test	Total Beneficiaries	Average Number of Tests per Beneficiary
2020-21	3,89,50,873	1,34,91,364	2.89
2021-22	6,05,60,036	1,92,42,214	3.15
2022-23	12,61,05,852	4,12,13,822	3.06

Table 3.2.4: - Total Number of Tests Conducted and Beneficiaries in Madhya Pradesh

FY	Total Number of Test	Total Beneficiaries	Average Number of Tests per Beneficiary
2020-21	8,80,891	2,33,643	3.77
2021-22	54,82,703	16,50,526	3.32
2022-23	1,20,50,815	33,38,440	3.62

During in-depth interviews, State Nodal Officers, Chief Medical and Health Officers (CMHOS), Pathologists, and Service Providers indicated that the implementation of the Free Diagnostic Initiative in both Rajasthan and Madhya Pradesh has led to a significant increase in patient footfall in both Outpatient Departments (OPD) and Inpatient Departments (IPD). The trends in medical diagnostic tests conducted at facilities in Rajasthan over three years are illustrated in Graph 3.2.1

Figure 3.2.1: Trend of total tests and beneficiaries at different levels of healthcare facilities in Rajasthan



Similarly, the trends of medical diagnostic tests in MP, as detailed in Table 3.2.5, have also shown a significant increase over the specified period.

Table 3.2.5: Number of Tests Conducted at various facilities at MP

Project	Facility Type	2020-2021	2021-2022	Percentage Change (%)	2022-2023	Percentage Change (%)
Wet Lease	DH	8,80,891	65,31,743	641.5%	1,01,17,923	54.9%
	CH		8,29,916	-	19,32,899	132.9%
Hub-and-Spoke	CH		20,191	-	13,49,936	6585.8%
	CHC		46,067	-	56,11,858	12081.9%
	UPHC		13,821	-	7,57,732	5382.5%
	AAM-PHC		3,103	-	15,38,233	49472.4%
	AAM-SHC		2,520	-	1,79,182	7010.4%

The Wet Lease Reagent Rental model was implemented in District hospitals and Civil hospitals of Madhya Pradesh in the year 2020. Since its inception, District Hospitals has conducted 10,117,923 tests and Civil Hospitals conducted 1,932,899 tests in 2022-2023.

The Hub-and-Spoke model was introduced in Madhya Pradesh in February 2022. Under this model, all eligible facilities have significantly increased their test volumes in the subsequent year. The most notable increase occurred at the AAM-PHC level, with an increase of 49472.4% due to the implementation of Hub and Spoke model.

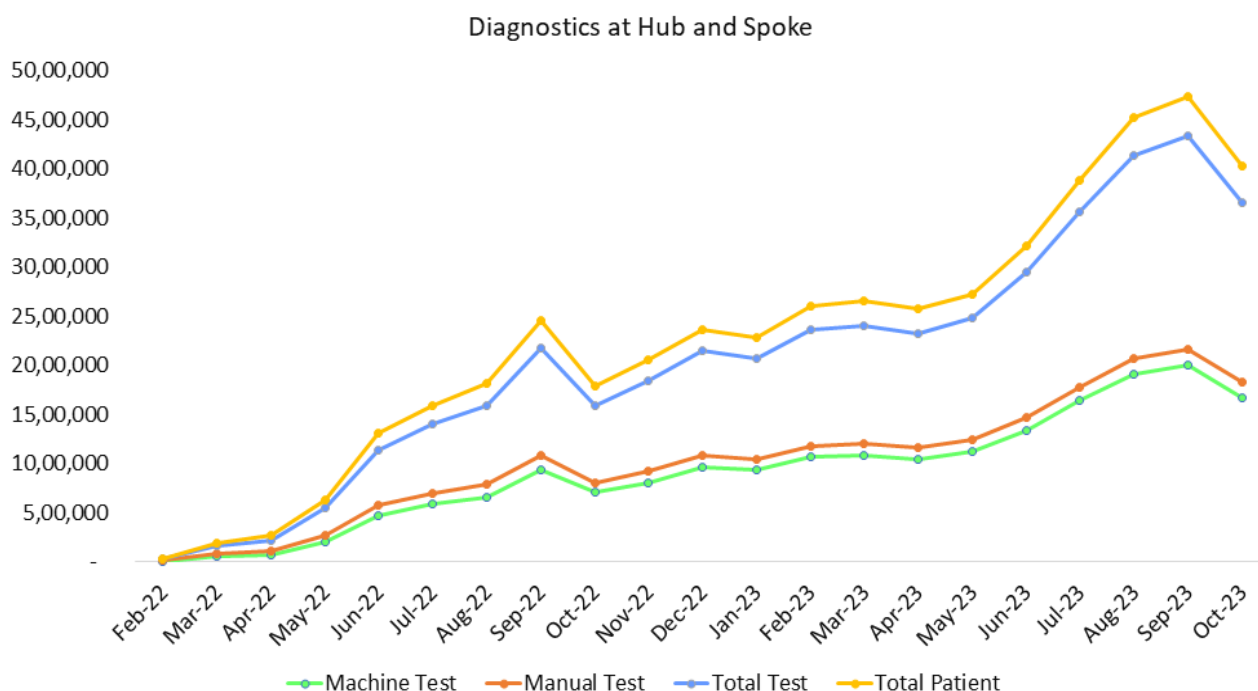
Since its introduction in February 2022, hub-and-spoke model has greatly enhanced the accessibility and availability of the free diagnostic services in MP (Table 3.2.6). From February 2022 to July 2023, a total of 2,15,51,678 tests were conducted, benefiting 45,78,758 patients under the scheme.

Table 3.2.6- Total Tests and Beneficiaries under Hub and Spoke Model (February 2022 to July 2023) in MP

Machine Test	Manual Test	Total Test	Total Patients
1,92,67,630	22,84,048	2,15,51,678	45,78,758

The monthly data depicted in Graph 3.2.2 further illustrates an upward trend in machine tests, manual tests, total tests, and total patients, highlighting the increasing impact of the initiative in MP.

Figure 3.2.2: Monthly Trend of Hub and Spoke Data of MP



Tables 3.2.7 to 3.2.12 reveal the testing trends at different levels of healthcare facilities visited by the study team in Rajasthan and Madhya Pradesh. At the District Hospital level, there has been a consistent increase in the total number of tests conducted over the last three years, indicating an expanding testing capacity. Community Health Centres (CHCs) exhibit diverse patterns, locations like Ajmer (Pisangan), Bharatpur (Sewar), and Kota (Sultanpur) display an upward trajectory in testing activities, whereas others, like Jaipur (Amer), show fluctuating numbers. Primary Health Centres (AAM-PHCs) also present varying testing patterns, with Ajmer (Saradhana) and Jodhpur (Kosana) showing a steady rise, while Bikaner (Janglu), Kota (Barod) and Udaipur (Devla) experience fluctuations.

In Madhya Pradesh Hub and Spoke model became operational in February 2022, resulting in a sharp increase in the number of tests conducted and patients tested.

Overall, the data underscores the dynamic nature of testing activities across different levels of healthcare facilities in Rajasthan, reflecting efforts to enhance testing capacities and adapt to evolving healthcare needs.

During Key Informant Interviews in Madhya Pradesh, it was shared that due to the free availability of diagnostic services, patients sometimes proactively request specific tests, and clinicians occasionally overprescribe them.

Table 3.2.7: Total Test Conducted at District Hospitals visited in Rajasthan.

District Hospital - Total tests					
	2020-2021	2021-2022	Percentage Increase (From 2021 to 2022)	2022-2023	Percentage Increase (From 2022 to 2023)
Ajmer	1,56,338	2,15,685	37.96	3,43,885	59.44
Bharatpur	47,146	96,862	105.45	1,12,913	16.57
Bikaner	51,894	65,811	26.82	1,13,573	72.57
Jaipur	2,19,830	3,02,001	37.38	6,47,500	114.40
Jodhpur	97,760	1,36,362	39.49	2,10,788	54.58
Kota	9,469	17,085	80.43	56,059	228.12
Udaipur	42,688	87,764	105.59	1,39,225	58.64

Table 3.2.8: Total Test Conducted at District Hospitals visited in Madhya Pradesh

District Hospitals - Total tests					
	2020-2021	2021-2022	Percentage Increase (From 2021 to 2022)	2022-2023	Percentage Increase (From 2022 to 2023)
Bhopal	3,07,019	4,93,803	60.84	6,33,784	28.35
Gwalior	2,84,187	3,66,730	29.05	4,28,382	16.81
Indore	45,720	32,966	-27.90	30,896	-6.28
Jabalpur	1,02,115	1,96,844	92.77	3,03,196	54.03
Rewa	2,40,971	2,47,628	2.76	3,97,750	60.62
Sagar	3,05,058	37,464	-87.72	1,28,371	242.65
Ujjain	2,24,229	3,43,805	53.33	4,56,478	32.77

Table 3.2.9: Total tests conducted at CHCs visited in Rajasthan

CHC - Total tests					
	2020-2021	2021-2022	Percentage Increase (From 2021 to 2022)	2022-2023	Percentage Increase (From 2022 to 2023)
Ajmer (Pisangan)	57,208	78,122	36.56	90,925	16.39
Bharatpur (Sewar)	8,722	12,778	46.50	13,820	8.15
Bikaner (Deshnok)	22,820	51,661	126.38	58,098	12.46
Jaipur (Amer)	26,985	24,700	-8.47	89,106	260.75
Jodhpur (Borunda)	7,590	18,016	137.36	42,455	135.65
Kota (Sultanpur)	60,756	1,09,637	80.45	1,45,794	32.98
Udaipur (Kotra)	15,967	30,008	87.94	43,265	44.18

Table 3.2.10: Total Tests conducted at the CHCs visited in Madhya Pradesh

CHC - Total tests					
	2020-2021	2021-2022	Percentage Increase (From 2021 to 2022)	2022-2023	Percentage Increase (From 2022 to 2023)
Bhopal (Kolar)	42,994	82,220	91.24	1,27,011	54.48
Gwalior (Laxmiganj)	14,628	29,954	104.77	28,639	-4.39
Indore (Depalpur)	-	-	-	27,840	-
Jabalpur (Manmohan Nagar)	-	-	-	31,652	-
Rewa (Semariya)	9,827	-	-	17,117	-
Sagar (Banda)	38,893	47,534	22.22	54,676	15.03
Ujjain (Ghatiya)	-	-	-	17,681	-

Table 3.2.11: Total tests conducted at the AAM-PHCs in Rajasthan

PHC-Total tests					
	2020-2021	2021-2022	Percentage Increase (From 2021 to 2022)	2022-2023	Percentage Increase (From 2022 to 2023)
Ajmer (Saradhana)	16,106	17,631	9.47	21,737	23.29
Bharatpur (Peepla)	0	0	-	847	-
Bikaner (Janglu)	3,247	4,016	23.68	4,000	-0.40
Jaipur (Rundal)	2,403	4,487	86.72	4,834	7.73
Jodhpur (Kosana)	213	781	266.67	1,528	95.65
Kota (Barod)	6,048	4,853	-19.76	8,946	84.34
Udaipur (Devla)	4,379	1,451	-66.86	9,005	520.61

Table 3.2.12: Total tests conducted at the AAM-PHCs in Madhya Pradesh

PHC-Total tests					
	2020-2021	2021-2022	Percentage Increase (From 2021 to 2022)	2022-2023	Percentage Increase (From 2022 to 2023)
Bhopal (Misrod)	11,544	16,482	42.78	19,585	18.83
Gwalior (Utila)	4,072	4,223	3.71	4,326	2.44
Indore (Ataheda)	125	112	-10.40	544	385.71
Jabalpur (Boria)	-	-	-	4,667	-
Rewa (Rahat)	-	-	-	18,786	-
Sagar (Patauwa)	-	-	-	0	-
Ujjain (Panbihar)	2,290	5,036	119.91	6,585	30.76

Exit Interview

Exit Interviews were conducted with the patients who utilized laboratory services during their visits to Health Facilities. Table 3.2.13 indicates that awareness of free diagnostic service Initiative exceeds 90% in both states. This finding corroborated by the Focus group discussions with community members at the village, sector, and block Levels. Community members were generally aware of the availability of Free Diagnostic Services at all Govt Health Facilities, with majority availing themselves of these services. However, they have expressed a desire for access to specialized tests like Sonography and CT-Scan at the AAM-PHC/ CHC level.

Table 3.2.13: State-wise awareness of Free Diagnostic Service (in %)

Health Facility (N)/State	MP	Rajasthan
DH (283)	97.9	98.57
CHC (140)	92.86	95.71
AAM-PHC (70)	91.43	100
AAM-SHC (28)	100	100

Table 3.2.14 indicates the percentage of OPD and IPD patients who participated in the exit interviews. The data reveals that the major of the interviewees utilized the Outpatient services in the health facility.

Table 3.2.14: Services availed at the Health Facilities (in %)

Health Facility (N)/State	MP		Rajasthan	
	OPD	IPD	OPD	IPD
DH (283)	76.92	23.08	86.43	13.57
CHC (140)	100	0	87.14	12.86
AAM-PHC (70)	91.43	8.57	97.14	2.86
AAM-SHC (28)	100	0	100	0

Table 3.2.15 illustrates that in Madhya Pradesh, 58.67% of patients were prescribed more than 5 tests, while in Rajasthan 40% of patients were prescribed more than 5 tests on average. During key informant interviews with Facilities' in-charges and Pathologists, concerns were raised regarding the over-prescription of tests by clinicians. They suggested that an audit of the test prescribed, and diagnosis made should be conducted to ensure rationality of the test prescription by clinicians. At AAM-SHC in Rajasthan, commonly prescribed tests for 71.43% of patients were Hb, RBS and Malaria Rapid card test. In Madhya Pradesh, the majority of patients at AAM-SHCs, were tested for BP, Blood Sugar and Hb.

Table 3.2.15: Number of Diagnostic Tests prescribed by the Doctor (in %)

Health Facility (N)/ State	MP						Rajasthan					
	1	2	3	4	5	More than 5	1	2	3	4	5	More than 5
DH (283)	23.08	9.79	13.99	10.49	13.99	28.67	35	27.86	15	3.57	7.14	11.43
CHC (140)	28.57	24.29	18.57	8.57	1.43	18.57	32.86	32.86	20	4.29	1.43	8.57
AAM-PHC (70)	20	34.29	17.14	17.14	0	11.43	42.86	28.57	14.29	5.71	2.86	5.71
AAM-SHC (28)	35.71	57.14	7.14	0	0	0	71.43	14.29	0	0	0	14.29
Total (N)=	65	51	40	27	21	58	97	74	40	10	12	26

As shown in Table 3.2.16, over 90% of patients in Madhya Pradesh reported during exit interviews that all prescribed tests were available at the health facilities. At the CHC level, 84 % of patients reported the availability of all prescribed tests. In Rajasthan, more than 85% of patients indicated that all prescribed tests were available at the health facility.

Table 3.2.16: Availability of prescribed tests in the in-house lab of the hospital (in %)

Health Facility (N)/State	MP	Rajasthan
DH (283)	95.8	85.71
CHC (140)	84.29	87.14
AAM-PHC (70)	94.29	88.57
AAM-SHC (28)	100	85.71
Total (N)=	243	224

Table 3.2.16 highlights the availability of prescribed tests in in-house labs across health facility levels in Madhya Pradesh (MP) and Rajasthan. However these figures also reveals gaps in diagnostic services across Rajasthan and Madhya Pradesh. At several DHs (e.g., Sagar, Rewa, Jabalpur, Mhow, and Kotputli), essential services like USG, X-ray, ECHO, and Dengue NS1 testing were reported unavailable by patients, though required by guidelines.

Similarly, in CHCs such as Kunhari, Amer, and Borunda, tests like CBC, ESR, Dengue NS1, and malaria antigen were reported missing, despite guidelines suggesting their availability in specific cases. Other tests not mandated at the CHC level (e.g., CRP and USG) were also

in demand, indicating a user-driven need to strengthen referral pathways.

AAM-PHCs such as Patauwa and Devla reported diagnostic gaps as well, with patients facing delays or needing to be referred to higher centers for tests like Widal and USG. Though most tests were provided at no cost, AAM-PHC Boria (Jabalpur) charged a nominal fee for CBC tests done through a machine installed by the Rogi Kalyan Samiti.

Data reveal that due to these gaps, 66.67% of patients in MP opted for private labs for tests unavailable at DHs, while at CHCs and AAM-PHCs, 54% of patients sought care at higher centers, and 45% turned to private facilities. This indicates a demand-supply mismatch in diagnostic services and points to the need for better alignment of resources with user expectations and state guidelines.

As shown in Table 3.2.17, in Madhya Pradesh, out of 6 Patients who reported non-availability of diagnostic tests at DH, 3 Patient for USG, 1 for X-ray indicated that they needed to get these tests done at a Private Lab, while 1 case of ECHO said they would go to higher health facility and the other one for USG said they would not get these tests done. At CHCs and AAM-PHCs in MP, 54% of patients said they would go to higher Centres, while 45% said they would get tested at a private lab.

Table 3.2.17: Preferred alternative due to non-availability of diagnostic tests in facilities

Health Facility (N)/ State	MP (n=19)			Rajasthan (n=35)		
	Private Lab	Higher Centre	Will not do these tests	Private Lab	Higher Centre	Will not do these tests
DH (MP-6, RJ-20)	4	1	1	16	3	1
CHC (MP-11, RJ-09)	5	6	0	9	0	0
AAM-PHC (MP-2, RJ-4)	1	1	0	0	4	0
AAM-SHC (RJ-2)	0	0	0	2	0	0
Total (N)=	10	8	1	27	7	1

Table 3.2.17 reflects that in Rajasthan out of 20 patients who were informed about the non-availability of Diagnostic tests at DH, 80% (2 cases for X-ray, 3 for Dengue NS1, 1 case for Malaria Parasite Slide and Dengue NS1, 1 case for Dengue NS1 and CRP, 1 case for ECG, 7 for USG, 1 for TSH, Blood test, Vit D3 and Vit B-12) said they would get these tests conducted at a Private lab. Meanwhile 15% (3 cases - 2 cases for Dengue NS1, 1 for T3, T4, TSH and USG) said they would go to higher centres and 5% (One case of CRP) said they would not get these tests done. These tests, except Vit B-12, should be available at district level hospitals and should have been provided as per the guidelines. Non availability suggest gaps in the program implementation. There should be referral linkages between health care facilities.

At CHC (2 for Scrub Typhus – IgM and IgG, 1 for CRP, 1 for USG, 2 for Malaria Parasite Antigen, 1 for CBC and Serology, 1 for CBC, Dengue NS1, ESR, 1 for CBC, Dengue NS1 and Serology) and AAM-SHC (2 cases of USG) all the patients shared that they would get these tests done at Private Lab. At the AAM-PHC level, all 4 cases who reported non-availability of USG said that they would go to the higher centre for the remaining tests.

In AAM-PHCs at MP 50% of respondents (1 case of Widal and Dengue NS1) said they would go to a higher centre and 50% (1 case of Widal and X-ray) would go to a private lab.

At CHC in MP, 54.55% (4 USG cases, 1 ECG and 1 LFT, RFT, Vit B-12) reported going to a higher centre and 45.5% (3 USG, 1 X-ray, 1 case of Urine Culture and Sensitivity) responded that they would go to a private lab.

As shown in Table 3.2.18, when enquired about the cost of the unavailable tests, 80% of respondents at the District Hospital (DH) in Madhya Pradesh stated that the cost would be less than 1000, while 18% of respondents at Community Health Centres (CHC) reported that the cost of these tests would be below 1000. In Rajasthan, 42.11% of respondents at District Hospitals (DH) and 33.33% at Community Health Centres (CHC) indicated that the cost of these tests would be below 1000, whereas 10.53% of DH respondents reported a cost ranging from 1000 to 2000 (Dengue and USG).

Table 3.2.18: Cost incurred of the tests unavailable at the health facility

Health Facility (N)/ State	MP (n=18)			Rajasthan (n=34)		
	0	Below 1000	1000-2000	0	Below 1000	1000-2000
DH (MP-5, RJ-19)	1	4	0	5	12	2
CHC (MP-11, RJ-09)	6	5	0	0	9	0
AAM-PHC (MP-2, RJ-4)	1	1	0	0	4	0
AAM-SHC (RJ-2)	0	0	0	2	0	0
Total (N)=	8	10	0	7	25	2

3.2.1 Sample Collection and Test Report

As per the Guidelines of Free Diagnostic Initiative, at CHCs, FRUs and 24*7 AAM-PHCs, sampling timings for OPD should be from 6 am-3 pm . The laboratory technician should be available on call after working hours for emergency tests.

In Rajasthan, the sample collection timings in winter are from 09:00 AM to 01:00 PM and report dispatch time from 02:00 to 03:00 PM. During summer, sample collection is from 08:00 AM to 12:00 PM and report dispatch is from 01:00 to 02:00 PM. These timings are displayed

at the facilities. For IPD patients and Emergency cases, a Lab technician is available around-the-clock for sample collection. In Rajasthan, only offline printed diagnostic reports are available, necessitating patients to wait in line to receive their reports.

In Madhya Pradesh, District Hospitals have their own Sample collection timings. At JP Hospital DH Bhopal, the sample collection is from 08:30 AM to 1:30 PM while at DH Ujjain, it is from 08:00 AM to 02:00 PM; at DH Sagar, it is from 09:00 AM - 01:45 PM; at DH Rewa, Jabalpur and Gwalior it is from 09:00 AM - 02:00 PM. Additionally, Laboratory Technicians are available around-the-clock for sample collection of emergency and IPD Patients.

In Madhya Pradesh, patients receive their reports online through SMS. However, for those who prefer a hard copy, report dispatch timings at different district hospitals vary, with reports typically provided after 3:00 PM. It is noteworthy that reports are made available to patients as soon as the results are received.

At CHCs in Madhya Pradesh, sample collection timings are from 09:00 AM to 02:00 PM and from 05:00 to 06:00 PM. At AAM-PHCs, the sample collection timings are from 09:00 AM to 02:00 PM, while the hard copy of the report can be collected the next day.

At the Spoke Facilities, the laboratory technicians/trained ANMs are responsible for registration, collection, labelling, and storage of samples and dispatching them to the hub laboratories. However, there is a notable scarcity of staff at some spoke Facilities. For instance, as CHC- Banda in Banda Block, Sagar which functions as a Hub with 3 spokes, faces staffing challenges. At one spoke AAM-PHC Chakeri-Bineka, a Medical Officer and a nursing staff are posted but are currently on deputation at CHC Banda. Consequently, only one personnel of outsourced agency for telemedicine is available at the facility. If patients consulting a doctor via telemedicine require diagnostic tests, runner from CHC Banda are called for sample collection. Similarly, at another spoke under the same hub, AAM-PHC Patauwa, only one pharmacist and one telemedicine personnel are available.

Reports from hub to spokes are transmitted through the Laboratory Information Management System (LIMS). Patients can collect printed reports from the health facility where the sample was collected. Notification that the reports are ready is sent to the patient via SMS, which includes a link for downloading the soft copy of the reports. Additionally, the report is available for download from an online portal, and associated spoke staff can also print their patients' reports through the LIMS.

Waiting time before Sample Collection

During the exit interviews with the patients who utilized laboratory services, 81.12% at DH in Madhya Pradesh reported a waiting time of "Less than 30 minutes" before giving the samples, compared to 70% at the DHs in Rajasthan. Conversely, only 2.8% in MP, and 3.57% in Rajasthan reported waiting "More than 2 hours" for sample collection. Table 3.2.19 details the waiting time reported in both the states.

Table 3.2.19: Waiting time for the patients before giving samples for tests in Rajasthan and MP (in %)

Health Facility (N)/State	MP				Rajasthan			
	Less than 30 minutes	Between 30 minutes to one hour	One hour to two hours	More than two hours	Less than 30 minutes	Between 30 minutes to one hour	One hour to two hours	More than two hours
DH (283)	81.12	11.19	4.9	2.8	70.71	15	10.71	3.57
CHC (138)	94.29	5.71	0	0	91.18	2.94	0	5.88
AAM-PHC (70)	94.29	2.86	0	2.86	100	0	0	0
AAM-SHC (28)	100	0	0	0	100	0	0	0
Total (N)=	229	21	7	5	210	23	15	9

3.2.2 Community Involvement in FGD for Understanding Perception on Free Diagnostic Initiative

In Rajasthan, 254 individuals participated in the Focus Group Discussions across 7 districts, comprising 132 men, and 122 women. Age distribution was relatively even, with 29.92% of aged 30-45, 29.13% aged 18-30 years and 27.95% aged 45-60 years. Educational attainment analysis revealed that over 21% of the participants were illiterate, 16.54% completed education up to class VIII and only 5 participants had a post-graduation degree or higher qualification.

The caste-wise breakdown shows that nearly half (49.61%), of the participants belonged to Other Backward Class community (OBC), followed by Scheduled Tribe (19.69%) and Scheduled Caste (15.35%) categories. Regarding occupation, 77 women were housewives, comprising over 63% of all female participants. The agriculture sector employed over 25% of all participants. More than 10% of the respondents were students as well.

In Madhya Pradesh, a total of 240 members participated in Focus Group Discussions across 7 districts, comprising 112 men, and 128 women. The age distribution showed 35% were in 18-30 age group, followed by 28.3% in the 30-45 age bracket. Regarding education, more than 21% had completed education up to class VIII, and there was a significant proportion of illiterate participants at 14.58%. Only 6 participants had post-graduate degree or higher. 40% of the participants were from Other Backward Class (OBC) communities, followed by Unreserved (28.33%) and Scheduled Caste (23.75%). Occupationally, 76 women were housewives, constituting 60% of all females. The agriculture sector employed more than 16% of all participants.

In both States, awareness of the Free Diagnostic Initiative was notably high. The scheme

has significantly enhanced healthcare accessibility across communities, extending its reach to even the most remote regions the state. Participants in the Focused Group Discussions (FGDs) expressed appreciation for the initiative's availability across a spectrum of health facilities, ranging from large Medical College Hospitals and District Hospitals to smaller Ayushman Arogya Mandir – Sub Health Centres catering to distant populations, effectively bridging geographical gaps. This extensive implementation has enabled communities, including those in the remotest corners of the state, to access healthcare promptly and conveniently. The initiative has thus fostered greater inclusivity in healthcare provisions, particularly benefitting areas with diverse population sizes.

Availability of referred diagnostic tests:

Community members appreciated the extensive coverage of diagnostic tests, which has significantly enhanced the perception of healthcare accessibility. While the quality of tests received has been praised, some of the community members have voiced concerns about the limited variety of tests offered. Regular screening for Non-Communicable Diseases such as Diabetes and Hypertension have gained popularity, instilling confidence in the scheme. The professionalism exhibited by the health care service provider at the health facilities has been widely acknowledged, making them more approachable. As illustrated by a female participant in the FGD participants in Bikaner,

"2 years ago, during my pregnancy, I didn't have to travel to the city for my test; all of them were conducted in the nearby CHC. And the doctor as well as the person who took my blood sample were very supporting and comforting. I was very grateful and happy that I even got my child delivered in that CHC only."

This indicates that since the inception of the scheme, it has garnered support from the community with the quality as well as the quantity of tests delivered at the health centres.

In MP, there is a widespread awareness and knowledge about the scheme. It provides a greater number of tests at every level of healthcare facility, enhancing utilization and fostering trust in the initiative. However, sporadic shortages of specific tests like Ultra-Sonography and X-ray, sometimes lead to delays in result dissemination. Nonetheless, as expressed by a respondent in Ujjain, this initiative had a positive impact on the community.

"Since we have been benefiting from the government schemes, we visit private facilities less frequently. Most of the prescribed tests are available here only, and we also receive the report within a day"

3.3 Quality of diagnostics/ laboratory services provided to patients at public health facilities.

3.3.1 Equipment (Adequacy and Availability)

In Madhya Pradesh, the service provider agency is responsible for providing USFDA certified Laboratory Equipment at DH, Civil Hospitals and the Hubs, ensuring proper installation and operation of the equipment. The agency also manages the processing and reporting of the samples collected from the spokes at these locations.

Responsibilities of the Service provider Agency include replacement/ upgradations/ customizations of laboratory equipment, computers (desktop/ laptop), multi-functional printers, and bar-code readers, as well as obtaining and renewing of statutory licenses as needed.

In Rajasthan currently, only 15 types of diagnostic tests are available at the AAM-PHC and UPHC level as conceptualized in the MNJY Scheme. However, in November 2022, directions were issued from the office of MD-NHM to expand this by ensuring 66 types of tests at AAM-PHC and UPHC. Under the Diagnostic head of the 15th Finance Commission, districts have received funds to procure CBC Machines, semi-autoanalyzer machines, and related equipment to enhance diagnostic capabilities at these levels

3.3.2 Human resources

Human Resources are limited at all levels of health facilities in both the study states. The HR status of laboratories at the facility level of Rajasthan is detailed in Table 3.3.1.

Table 3.3.1: HR status of Laboratories at different facility-level hospitals in Rajasthan

Facilities visited		Pathologist			Microbiologist			Lab Technician			Lab Assistant		
		SP**	Avail	Gap (%) w	SP	Avail	Gap (%)	SP	Avail	Gap (%)	SP	Avail	Gap (%)
Ajmer	DH	2	1	1 (-50%)	0	0	-	17	12	5 (-30%)	4	4	0
	CHC	-	-	-	-	-	-	4	2	2 (-50%)	2	1	1 (-50%)
	PHC	-	-	-	-	-	-	1	1	0	0	0	0
Bharatpur	DH	-	-	-	-	-	-	5	3	2 (-40%)	3	0	3 (-100%)
	CHC	-	-	-	-	-	-	2	0	2 (-100%)	2	1	1 (-50%)
	PHC	-	-	-	-	-	-	1	0	1 (-100%)	1	0	1 (-100%)
Bikaner	DH	1	0	1 (-100%)	0	0	-	3	1	2 (-67%)	3	4	1 (+33%)
	CHC	-	-	-	-	-	-	2	2	0	2	2	0
	PHC	-	-	-	-	-	-	0	0	0	1	1	0
Jaipur	DH	1	3	2 (+67%)	0	0	-	14	11	3 (-22%)	4	4	0
	CHC	-	-	-	-	-	-	1	1	0	2	2	0
	PHC	-	-	-	-	-	-	1	1	0	0	0	0
Jodhpur	DH	1	0	1 (-100%)	0	1	1 (+100%)	3	3	0	-	-	-
	CHC	-	-	-	-	-	-	1	1	0	0	0	0
	PHC	-	-	-	-	-	-	1	0	1 (-100%)	0	0	0

Facilities visited		Pathologist			Microbiologist			Lab Technician			Lab Assistant		
		SP**	Avail	Gap (%) w	SP	Avail	Gap (%)	SP	Avail	Gap (%)	SP	Avail	Gap (%)
Kota	DH	-	-	-	-	-	-	1	2	1 (+100%)	1	1	0
	CHC	-	-	-	-	-	-	1	0	1 (-100%)	2	2	0
	PHC	-	-	-	-	-	-	1	1	0	0	0	0
Udaipur	DH	1	0	1 (-100%)	1	0	1 (-100%)	14	2	12 (-86%)	4	2	2 (-50%)
	CHC	-	-	-	-	-	-	2	1	1 (-50%)	0	1	1 (+100%)
	PHC	-	-	-	-	-	-	1	0	1 (-100%)	0	0	0

*In Bharatpur and Kota, DH were not available, hence in consultation with CMHO high case load CHCs, which will be upgraded in DH were visited during the study period. ** SP: Sanctioned Post, Avail: Available

The HR status of laboratories at the facility level of Madhya Pradesh is shown in Table 3.3.2.

Table 3.3.2: HR status of Laboratories at different facility-level hospitals in MP

Facilities visited		Pathologist			Microbiologist			Lab Technician			Lab Assistant		
		SP	Avail	Gap (%)	SP	Avail	Gap (%)	SP	Avail	Gap (%)	SP	Avail	Gap (%)
Bhopal	DH	4	4	0	1	1	0	10	6	4 (-40%)	6	4	2 (-33%)
	CHC	-	-	-	-	-	-	1	1	0	1	1	0
	PHC	-	-	-	-	-	-	0	1	1 (+100%)	0	0	0
Gwalior	DH	1	1	0	0	0	0	12	12	0	2	2	0
	CHC	-	-	-	-	-	-	3	3	0	0	0	0
	PHC	-	-	-	-	-	-	1	0	1 (-100%)	0	0	0
Indore	DH	2	1	1 (-50%)	0	0	0	5	3	2 (-40%)	0	0	0
	CHC	-	-	-	-	-	-	3	1	2 (-33%)	1	0	1 (-100%)
	PHC	-	-	-	-	-	-	0	0	0	0	0	0
Jabalpur	DH	1	1	0	0	0	0	11	11	0	2	2	0
	CHC	-	-	-	-	-	-	1	1	0	0	0	0
	PHC	-	-	-	-	-	-	0	0	0	0	0	0
Rewa	DH	1	1	0	0	0	0	10	10	0	3	3	0
	CHC	-	-	-	-	-	-	1	1	0	0	0	0
	PHC	-	-	-	-	-	-	1	0	1 (-100%)	0	0	0
Sagar	DH	2	2	0	1	0	1 (-100%)	8	6	2 (-25%)	1	1	0
	CHC	-	-	-	-	-	-	3	3	0	0	0	0
	PHC	-	-	-	-	-	-	1	1	0	0	0	0
Ujjain	DH	2	2	0	0	2	2 (+200%)	12	12	0	6	6	0
	CHC	-	-	-	-	-	-	2	2	0	1	0	1 (-100%)
	PHC	-	-	-	-	-	-	2	1	1 (-50%)	0	0	0

*SP: Sanctioned Post, Avail: Available

3.3.3 Training

During the implementation phases of Mukhyamantri Nishulk Jaanch Yojana (MNJY) in Rajasthan, Facility In-charges were briefed through a series of video conferencing, about site preparation, deployment of trained staff, availability of diagnostic equipment and functional status and availability of reagents and consumables. State-level Officials were appointed as District In-charges to closely monitor the implementation of MNJY. Even after a decade of implementation of MNJY, no separate State-level or district-level Training Plan for Laboratory staff is available in Rajasthan. None of the facilities have a record of induction training, orientation training and refresher training provided to Laboratory Staff.

As most of the facilities are preparing for certification under the National Quality Assurance Standards, laboratory staff has also been provided training on Bio-Medical Waste Management, and Infection Prevention. None of the staff has received Training on Laboratory Safety and NABL accreditations.

Training under various national Health Programs like NVBDCP for Malaria, Dengue and Chikungunya is being provided regularly to Lab staff. Lab Technicians working at Pipad City DH at Jodhpur were provided one-day training on Quality Management Systems at SMS Hospital Jaipur. Training on Malaria, Dengue and Chikungunya was also provided to the LT posted at the DH Pipad City. Laboratory Staff working at IPHL Kotputli were provided 4 days of training on “Assuring Optimal Technical Standards”, Good Lab Practices and Practical Laboratory training for District Public Health Laboratories from July 06-09,2023 by CDC India Officials.

In Madhya Pradesh also, no State and District level training Plan for the training of Laboratory Staff was available. Record of Induction and refresher training was also not available. All facilities shared that Staff is being trained under NQAS and trainings are being conducted under the National Health Program, records of which are available with NHM. No Separate training on Laboratory Safety is being provided.

At Madhya Pradesh training was conducted for the outsourced staff of Science House and POCT posted at Laboratories of District Hospitals and Civil Hospitals. Science House staff posted at Hubs were also trained. The training focused on operating Machines, Internal and External Quality Assurance Procedures and using LIMS during initiation of these services in State. Additionally, Staff Nurses, MPW and LTs working at Hub Facilities were also trained on LIMS and Machine Operation. However, there was no training plan was available.

3.3.4 Standard Operating Procedures

Standard Operating Procedures (SOPs) are essential for maintaining a controlled and safe laboratory environment, minimizing the risk of accidents, and ensuring the accuracy and reliability of diagnostic tests. During visits to District Hospitals in both states, it was observed that all facilities had operational SOPs in place, accompanied by work instructions and clinical protocols. Furthermore, facilities participating in or preparing for the National Quality Assurance Standards (NQAS) were found to have well-established SOPs. In Madhya Pradesh, all Hub facilities inspected were equipped with SOPs and comprehensive work instructions, ensuring adherence to established protocols.

3.3.5 Laboratory Information Management System (LIMS)

In Rajasthan, the record of diagnostic services is available on e-Aushadhi, a web-based application. At e-Aushadhi, the number of diagnostic tests performed, the number of patients tested, and test-wise information are available, but the unavailability of patient-wise information creates issues. IPHL at District Hospital Kotputli has started using LIMS since July 2023.

In Madhya Pradesh, all Health Care Facilities, where services are being provided through POCT, Science House and on the Hub and Spoke model through Science House, Laboratory Management Information System is in Place. All machines in the laboratories are connected to the software. This Software captures information on patient registration, results of tests performed, critical values and TAT. Data related to all tests done is automatically sent from the machine to a server without any manual intervention.

The LIMS collects, stores, archives, analyses laboratory data and generates reports which can be used by district and state administration, Ministry of Health & Family Welfare.

Inventory management (kits and reagents etc.) is also done through LIMS in Madhya Pradesh.

3.3.6 Internal Quality Control (IQC)

For Internal Quality Control (IQC), it is mandatory for laboratories in both Rajasthan and Madhya Pradesh to perform control tests on their machines before processing patient samples. In Rajasthan, although health facilities affirmed the practice of running controls, documentation of these activities was not readily available during facility visits. In Madhya Pradesh, machines operated by outsourced agency undergo daily IQC, with meticulous documentation of the results. These results are shared with the Pathologist and Senior Lab technician at DH and with the Senior Lab technician at CHC. POCT and Science House have a Quality Manager in the State and a Quality Supervisor at every division. These Quality Supervisors are connected to all Lab Technicians of POCT and Science House Labs through WhatsApp Groups. The results of IQAC are uploaded to the mentioned group daily. Upon receiving confirmation ("OK") or recommendations for correcting any deviations, patient samples are processed on the machines accordingly.

3.3.7 External Quality Assurance Scheme (EQAS)

In Rajasthan, there is currently no system for External Quality assessment for Laboratory services. In Madhya Pradesh, all Laboratories operating under Science House and POCT participate in an EQAS and actively monitor their results. EQAS samples for the biochemistry test and coagulation profile are being received from CMC Vellore and tested every month while the haematology samples come from AIIMS Delhi and are tested quarterly. District Hospitals and Civil Hospitals in Madhya Pradesh participate in EQAS for 23 biochemistry tests monthly, and 4 tests for coagulation profiles and haematology quarterly. The indenting of controls and EQAS samples is managed through Laboratory Information Management Systems (LIMS). EQAS samples are received by the Service Provider Office in Bhopal from CMC Vellore and AIIMS Delhi, which are then distributed to laboratories across Madhya Pradesh using both the wet lease rental reagent model and the Hub and Spoke model. Lab technicians in Madhya Pradesh run EQAS samples before

the 10th of each month and upload the results by the 20th of the month using a designated link. Quality supervisors from Science House and POCT regularly provide feedback on these results to ensure continuous improvement in laboratory services.

3.3.8 Turnaround Time

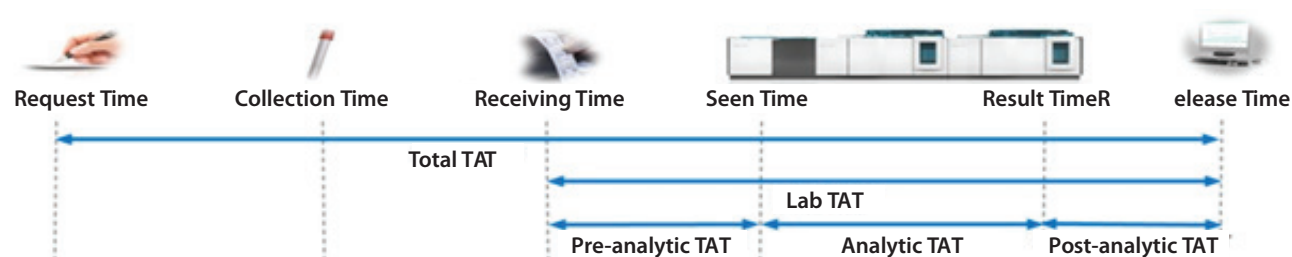
Turnaround time for laboratory services plays a crucial role in ensuring that patients receive prompt and efficient medical care. This time frame encompasses the entire process from the moment a patient's sample is collected at a government health facility, where the necessary tests are prescribed, to the point at which the results are available for healthcare providers and patients. The endpoint of this process can vary; it is either the printing of physical reports at the health facility or the receipt of electronic reports at the health facility, particularly when the infrastructure for printing is not readily available.

When it comes to Total Turn Around Time (TAT), the process entails Request Time and culminates at the Release Time, as shown in Fig. 3.3.1. The whole process is split into six parameters of time, viz.

1. Request Time
2. Collection Time
3. Receiving Time
4. Seen Time
5. Result Time
6. Release Time

The Receiving Time to Release Time has been clubbed under Laboratory TAT, which was further divided into Pre-Analytic TAT, Analytic TAT and Post-Analytic TAT.

Fig. 3.3.1: Turn Around Time



Source: (Badrick, Gutscher, & Chin, 2018)

Table 3.3.3 revealed how various sample collection indicators are functioning in both the studied states.

Table 3.3.3: Turn Around Time (TAT) for facilities in Rajasthan and Madhya Pradesh

Indicators	Rajasthan	Madhya Pradesh
Sample Collection	Fixed (8 am to 12 pm)	Variable (Facility-wise)
Rapid diagnostic tests/ Point-of-care tests	Within 1 hour	Within 1 hour
Delivery/Collection of reports	Collection at the counter	Online/SMS with the link sent to the registered mobile
Mechanism of monitoring turnaround time	Not available	LIMS

*It is to be noted that in MP, the Turnaround Time is 24 hours at the Hub and Spokes model; while data is not available for Rajasthan.

Rapid diagnostic tests/point of care tests are done within the health facility and the turnaround time at MP and Rajasthan both within one hour. In Rajasthan, the sample collection timings in winter are 09:00 AM to 01:00 PM and reporting is 02:00 to 03:00 PM in summer sample collection timings are 08:00 AM to 12:00 PM and report dispatch time is 01:00 to 02:00 PM. But the report of the card test is being provided immediately and for the rest of the tests, the report is being provided on the same day. During the visit to health facilities, it was observed by the study team that in all DH, there was a long queue of patients/ attendants for report collection, as there was no provision for online report dispatch.

In Madhya Pradesh, reports of card tests are being provided immediately at all health facilities, and for routine tests, TAT is 1 hour, while for specialized tests it is 4 hours. At Hub and Spokes, the Turnaround Time is 24 hours.

Reports from hub to spokes are being sent through LIMS. The intimation that the reports are ready is being sent through SMS to the patient along with the link for downloading the soft copy of the reports. Patients receive a hard copy of reports where the sample was submitted. In Madhya Pradesh, Monitoring of turnaround time is being done through LIMS. The State Nodal Officer shared that 90% of tests in the State are within the stipulated turnaround time.

In Rajasthan, monitoring of turnaround time of the tests is not possible due to the non-availability of the state-level dashboard for ensuring compliance with the stipulated turnaround time for the diagnostic test in the state.

3.3.9 Test results: Incidence of erroneous results and Repeat Sampling Test

For Identifying errors and deviations in test results, procedures for clinician feedback, staff comments and internal and external audits were not found in both MP and Rajasthan State. DH Kotputli were recording instances of sample errors for the years FY 2021-22 and FY 2022-23. In total, 117 samples were identified as having errors during this period.

Sample errors in diagnostic testing may be due to a variety of issues, such as collection errors, processing errors, labelling errors, or other factors that may impact the reliability or accuracy of the diagnostic results. Identifying and documenting sample errors is a crucial aspect of quality control in healthcare settings, as it allows for the investigation of root causes and the implementation of corrective measures to improve the overall quality of diagnostic testing.

Even though the sample rejected information was available in the LIMS in Madhya Pradesh, some districts were not maintaining a record of the data. Moreover, there is a noted absence of data regarding repeat samples. This arises because each time a patient returns to provide another sample for testing, a new patient ID is generated. Consequently, it becomes challenging to accurately track the rate of repeat samples. Sometimes, samples are rejected due to insufficient volumes.

3.3.10 Record Maintenance

Pre-printed Test Requisition Forms (TRF) were available at all the facilities visited in Rajasthan and Madhya Pradesh.

Madhya Pradesh

As per the feedback received from Pathologists at District Hospitals, the test requisition forms are not filled properly. Due to the unavailability of age and sex data of patients, it is very difficult to corroborate test results. The contact number of patients and clinicians is required for promptly sharing critical values of the test, and in Madhya Pradesh, some cases were found where online Reports cannot be shared due to the unavailability of the patient's mobile number.

DH Ujjain had a register for the Patients under the National Viral Hepatitis Program, in which data of positive patients was recorded and patients were informed. In rest of the Laboratories visited across Rajasthan and Madhya Pradesh, record/ documentation of notification to patients or clinicians about the critical value was not available. In Madhya Pradesh, DH Ujjain operates in two adjacent buildings, With separate patient registration registers maintained for each Outpatient Departments (OPD). Additionally, an Inpatient Department (IPD) register is kept at the laboratory. Similarly, DH Bhopal maintains separate patient registration registers for OPD and IPD patients in the laboratory. DH Gwalior, Rewa and Jabalpur are maintaining Patient Registration and Report Registers. However, at DH Indore and Sagar, due to staffing shortages, offline patient registration and report registers for laboratory services are not maintained. Instead, all records are managed exclusively online through the Laboratory Information Management System (LIMS). CHC Depalpur in Indore District also relies on an online report register for their operations. Critical value and Turnaround time at all the health facilities of MP is maintained online in LIMS, no offline register is available for Turnaround Time.

Rajasthan

To establish a universal reporting system, the Government of Rajasthan introduced standardized formats for test requisition and reporting under Mukhya mantri Nishulk Jaanch Yajana at every level of health facility. These Formats are designed to simplify the process. Each health facility has these test requisition forms, which includes essential patients information such as name, age, gender and the specific test requested with standardized reporting format

Daily Patient Registration register, and Report register were the same at all health facilities of Rajasthan. IPHL Kotputli has LIMS. Before LIMS, they were maintaining an offline daily patient registration register, but now they maintain only online data. A separate register for critical value was found at DH Kotputli only. As per the requirement of reports and records under NQAS, DH Kotputli has just started maintaining the Critical Value register from July 2023. At some of the Health Facilities, they mention critical values in red colour and at others they just circle the values if deemed critical.

3.3.11 Availability of NABL Accredited Laboratory in MP and Rajasthan

In Rajasthan, none of the laboratories are accredited by the National Accreditation Board for Testing and Calibration Laboratories (NABL). However, in Madhya Pradesh, two laboratories have achieved entry-level NABL accreditation: Jabalpur and Betul. Additionally, several other district laboratories in Madhya Pradesh, including those in Bhopal, Sagar, and Ujjain, have initiated the process of obtaining NABL accreditation and are in various stages of this accreditation process.

3.3.12 Biomedical Equipment Management and Maintenance Program

In Rajasthan, the maintenance of bio medical equipment is facilitated by in-house zonal-level bio-medical engineers supported by the 'e-Upkaran', web-based Equipment Inventory & Maintenance Management System, which was the first of its kind implemented across Rajasthan to link health institutions and manage equipment maintenance effectively. Bio-medical equipment maintenance and management activities in Rajasthan are outsourced to KTPL, and to AOV International in Madhya Pradesh.

All laboratories in both states have barcoded equipment and access to a toll-free number provided by the service providers. Regular preventive maintenance and calibrations of equipment are conducted by teams from KTPL and AOV International. Each health facility is equipped with a User ID and Password for equipment maintenance, allowing them to register complaints for repair. Engineers from KTPL and AOV International address these complaints promptly, typically within 24 hours of registration.

As reported by states the downtime of equipments has never exceeded 2%, indicating a minimum uptime of 98% for biomedical equipment.

3.3.13 Grievance Redressal

As per the Guidelines, the laboratory should have a documented procedure for the management of complaints or other feedback received from clinicians, patients, laboratory

staff and other stakeholders. A call centre should be established for grievance redressal and records should be maintained for all complaints their investigation, and the action taken.

Rajasthan

In Rajasthan, complaints related to diagnostic services may be registered through a call on 181 or online through the Sampark portal. But none of the facilities visited, received or addressed any complaint received through 181 or online to date.

In Rajasthan, none of the laboratories visited had a grievance redressal committee for Laboratory services.

Madhya Pradesh

In MP District, only District Hospital Ujjain had a separate grievance and suggestion box outside the laboratory.

There was no documentation available about any grievance/ suggestions/ feedback received and addressed for lab services.

Whenever any patient/community member has any grievances related to lab services, he directly approaches to Lab Charge or facility charge, and in most of the cases, it was resolved immediately, so no documentation was available on complaints/ suggestions/ feedback.

In MP, a service provider agency had set up a call centre, from that call centre regular feedback is being taken from the patients who have availed laboratory services.

3.3.14 Patient Satisfaction

As shown in Table 3.3.4, during exit interviews, when enquired about satisfaction from the Free Diagnostic Scheme, the level of satisfaction was very high among all the service recipients

Table 3.3.4: Satisfaction level from the scheme in the states of MP and Rajasthan (in %).

Health Facility (N)/ State	MP				Rajasthan			
	Fully Satisfied	Satisfied	Not Satisfied	Don't Know	Fully Satisfied	Satisfied	Not Satisfied	Don't Know
DH (283)	88.81	9.79	1.4	0	84.29	15	0.71	0
CHC (140)	72.86	27.14	0	0	82.86	15.71	1.43	0

Health Facility (N)/ State	MP				Rajasthan			
	Fully Satisfied	Satisfied	Not Satisfied	Don't Know	Fully Satisfied	Satisfied	Not Satisfied	Don't Know
AAM-PHC (70)	80	17.14	0	2.86	97.14	2.86	0	0
AAM-SHC (28)	92.86	7.14	0	0	100	0	0	0
Total (N)=	219	40	2	1	224	33	2	0

When asked about the basic facilities available in the waiting area of the sample collection facility, more than 80% of respondents reported the availability of drinking water and functional toilets at all levels of health facilities. While chairs were also present, they might occasionally prove insufficient due to the high number of patients. (Table 3.3.5)

Table 3.3.5: Amenities while waiting for sample collection in Rajasthan and MP (in %).

Health Facility (N)/ State	MP				Rajasthan			
	Had chairs	Had drinking water	Facility was clean	Functional toilet facility	Had chairs	Had drinking water	Facility was clean	Functional toilet facility
DH (283)	87.41	90.21	97.9	90.91	81.43	90	96.43	91.43
CHC (138)	91.43	95.71	100	100	86.76	89.71	100	98.53
AAM-PHC (70)	97.14	80	100	85.71	88.57	100	88.57	88.57
AAM-SHC (28)	100	92.86	100	92.86	92.86	85.71	100	57.14
Total (N)=	237	237	259	243	217	234	248	234

As shown in Table 3.3.6, the level of satisfaction with the conduct of staff at all levels of health facilities was exceptionally high. Respondents described the staff as courteous and felt comfortable asking questions when interacting with them.

Table 3.3.6: Level of satisfaction from the behaviour of the Staff (in %)

Health Facility (N)/State	MP	Rajasthan
DH (283)	100	95.71
CHC (138)	100	98.53
AAM-PHC (70)	97.14	100
AAM-SHC (28)	100	100
Total (N)=	261	250

Table 3.3.7 displays the percentage of patients who were informed about the dates for collecting their diagnostic test reports at various types of health facilities in Madhya Pradesh and Rajasthan. The numbers in parentheses represent the count of patients surveyed at each type of facility in both states. Overall, it's evident that a high percentage of patients in both states were aware of when to return for their diagnostic test reports. Rajasthan consistently showed a high level of awareness across all types of health facilities, especially in CHCs, AAM-PHCs, and AAM-SHCs.

Table 3.3.7: Knowledge of report collection time (in %)

Health Facility (N)/State	MP	Rajasthan
DH (283)	95.1	95.71
CHC (138)	85.71	100
AAM-PHC (70)	97.14	100
AAM-SHC (28)	92.86	100
Total (N)=	243	251

Table 3.3.8 depicts the turnaround time for diagnostic in Rajasthan and Madhya Pradesh. In Rajasthan, all the test conducted are in house and the reports for the same are shared within 24 hours, eliminating the need to refer patient samples to the higher centres. On the other hand, in Madhya Pradesh, the timing for report collection at District Hospitals is typically after two hours of sample collection. However, reports can only be generated after verification from pathologists, resulting in 45% of patients returning to collect their reports after four hours or getting it online. Additionally, specialized test samples (e.g., Anti CCP, Beta SHG, Testosterone, Cortisol, LHFSH, Prolactin, PTH, Progesterone, Myoglobin, CA-125, CEA, PSA) are sent to higher centres in Bhopal, with reports provided within seven days of sample collection.

Table 3.3.8: Time to collect report (in %)

Health Facility (N)/State	MP					Rajasthan				
	Within 1 hour	After 2 hours	After 4 hours	After 24 hours	Within 7 days	Within 1 hour	After 2 hours	After 4 hours	After 24 hours	Within 7 days
DH (283)	0	19.58	45.45	23.08	11.89	0	76.43	21.43	2.14	0
CHC (138)	0	52.86	11.43	32.86	2.86	0	89.71	7.35	2.94	0
AAM-PHC (70)	0	42.86	5.71	45.71	5.71	0	97.14	2.86	0	0
AAM-SHC (28)	100	0	0	0	0	100	0	0	0	0
Total (N)=	14	80	75	72	21	14	202	36	5	0

Table 3.3.9 highlights the high level of satisfaction with the quality of diagnostic services offered at health facilities in both Madhya Pradesh and Rajasthan. This high satisfaction is reflected in the increasing number of patients seeking diagnostics services in both states.

Table 3.3.9: Satisfaction level with the quality of services provided (in %)

Health Facility (N)/State	MP			Rajasthan		
	Fully Satisfied	Satisfied	Not Satisfied	Fully Satisfied	Satisfied	Not Satisfied
DH (283)	87.41	11.19	1.4	85.71	12.86	1.43
CHC (140)	70	28.57	1.43	75	23.57	1.43
AAM-PHC (70)	80	17.14	2.86	94.29	5.71	0
AAM-SHC (28)	92.86	7.14	0	92.86	7.14	0
Total (N)=	215	43	4	211	45	3

3.4. To study the referral mechanism between public health facilities for facilitating free diagnostic service to patients

Rajasthan

In Rajasthan, the referral linkages between different levels of healthcare centres are primarily managed through direct patient referrals, rather than sample transfer. But even when patients are being referred from the lower level to a higher level of healthcare centre, there is no official document or record being kept, and instead patients are verbally instructed to visit the higher facility for the diagnostics. There are a few instances in the studied districts, where samples are sent from District Hospitals to Medical colleges for specific test, such as Dengue and Hepatitis Viral Load Estimation. In Ajmer, AAM-PHC

Saradhana is a delivery point, but for Ultrasound scan s during pregnancy, patients are referred to Zenana Hospital at Ajmer. The waiting time for an ultrasound at Zenana Hospital is approximately 20 days, leading many patients to opt for services at Private Sonography Centres near the AAM-PHC.

Fig. 3.4.1: Referral System in Rajasthan

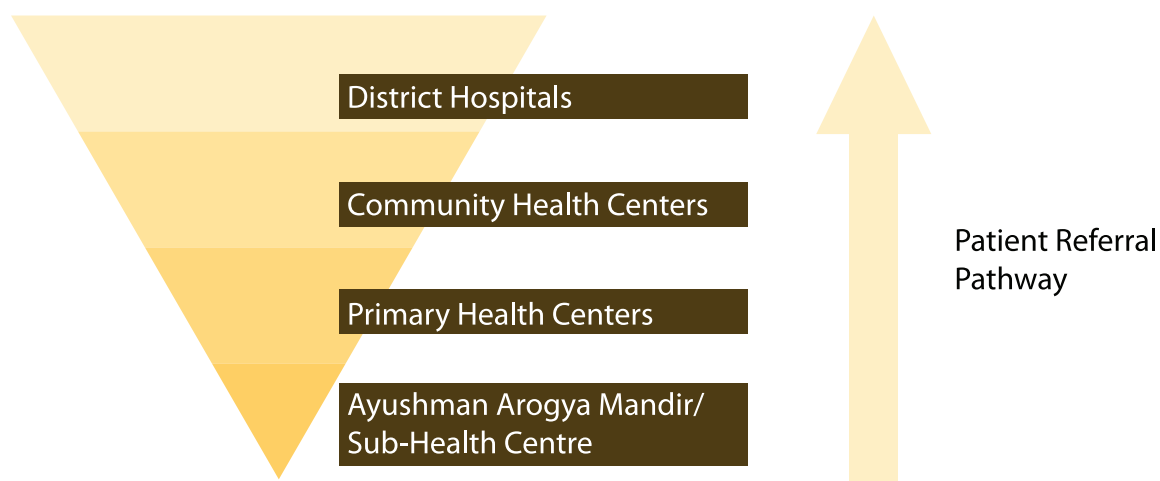


Figure 3.4.1 depicts the ideal patient referral pathway across health facilities. Basic tests should be available at the primary level of health care, with referral linkages to secondary and tertiary care facilities for advanced tests. In Rajasthan, direct referrals without any tracking mechanism are common when diagnostic tests are unavailable at the healthcare facility. This system directs patients, rather than their samples, to higher-level facilities for the necessary diagnostic services.

Madhya Pradesh

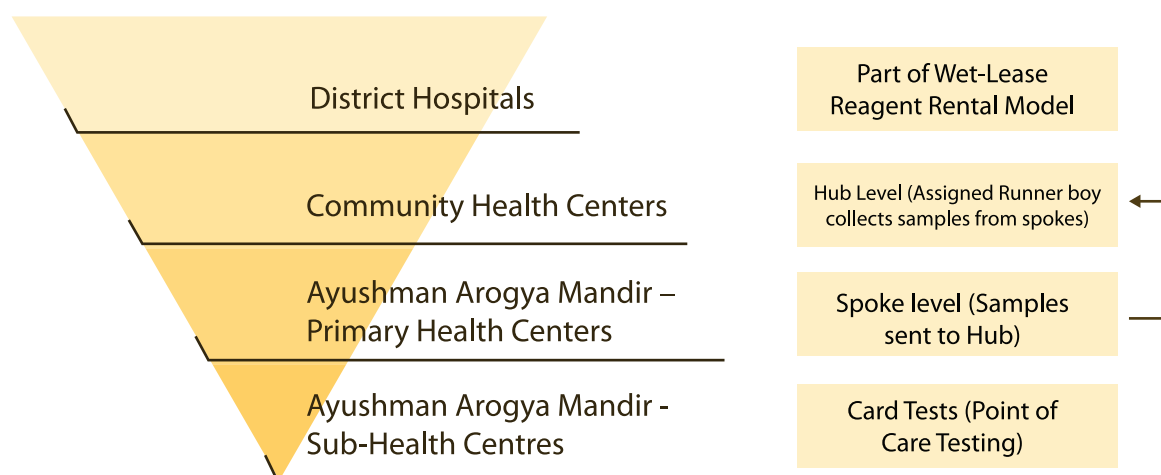
Madhya Pradesh has established referral linkages between health facilities, as outlined in Fig. 3.4.2. A comprehensive referral system operates under the Hub and Spoke model, where 1,610 Spokes are linked to 324 Hubs, encompassing Civil Hospitals, UHCs, UPHCs, CHCs, and AAM-PHCs. At the AAM-SHCs, only card tests are performed, which include Haemoglobin, Urine Pregnancy Rapid Test, Urine Dipstick (Urine Albumin and Sugar), Blood Glucose (Glucometer), Malaria Smear, Malaria Rapid Diagnostic Kit (RDK), Dengue RDK, Sickle Cell Rapid Test, and the Collection of Sputum Samples (AYUSHMAN BHARAT Comprehensive Primary Health Care through Health and Wellness Centers Operational Guidelines, 2021).

At the spoke facility (UPHC/CD/Sanjeevini clinic/ CH/CHC/ AAM-PHC), in addition to the 11 card-based tests carried out by government lab technicians, the private partner (Science House) conducts 34 additional tests by collecting samples for tests not available on-site and send them to the Hub facilities (UCHC/ UPHC/ UHCs/ CHC/ AAM-PHC). For tests that are unavailable at the hub level, samples are further referred to district-level Referral Labs, which function as central hubs for multiple CHCs. This system ensures a structured pathway for diagnostic testing, facilitating efficient sample collection, transportation, and processing across various levels of the healthcare system. In this system, patient samples are collected at the Spokes and transported to the Hubs by a runner in a cold box. Each district also has a Specialized Hub laboratory to handle tests not available at

the CHC level. For instance, at CHC Depalpur (Indore), samples for thyroid tests, Vitamin D, and Vitamin B-12 tests are sent to the Specialized Hub Malharganj in Indore.

Despite this structured system, District Hospitals in Madhya Pradesh do not – implement an inward and outward referral system for samples. For example, while District Hospitals in Sagar and Rewa refer patients to Medical College Hospitals and Laboratories, but they do not collect patients sample and transfer these samples to the higher centres, which limits the effectiveness of sample referral system. Additionally, these institutions do not maintain records of patient referrals.

Fig. 3.4.2: Referral System in Madhya Pradesh



3.5 To develop a comparative model of OOPE in public and private facilities at the district level.

3.5.1 Budget Allocation and Utilization

The status of Budget allocation and Utilization for Free Diagnostic Services in MP as shown in Table 3.5.1, from Financial Year 2019 to 2023 indicates a positive change. The Budgetary commitment for this important component of health care has steadily increased, with allocation increasing from 7,570 lakhs in FY 2019-20 to 12,487.5 Lakhs in FY 2022-23. This upward trajectory is also reflected in the utilization rates, from 20% utilization in FY 2019-20 to 99% utilization in FY 2022-23. These figures highlight the effectiveness of the strategic approach for providing Diagnostic Services to patients as well as the effective deployment of resources. FGDs and Exit interviews also reflected high awareness and knowledge of the program , program reach. Overall patients were satisfied with the quality of service delivery and cost effectiveness .

Table 3.5.1: Budget Status under Free Diagnostic Services in Madhya Pradesh (NHM PIP)

Financial Year	2019-20 (Crore)	2020-21 (Crore)	2021-22 (Crore)	2022-23 (Crore)
Budget allocated (in Crores)	75.7	77.21	77.51	124.88
Expenditure (in Crores)	15.14	34.74	75.96	123.63
Utilization (in %)	20%	45%	98%	99%

This increased budget utilization has not only maximized resource availability but has also resulted in tangible benefits for patients. The uptake of free diagnostic services in Madhya Pradesh is increasing, reflecting a significant increase in the number of patients benefiting from these services. Payment to the private partner in both Wet Lease Reagent Rental model and Hub-and-Spoke model is done after verification of services by facility, district and state level officials. With 99% of the budget allocated to free diagnostic services utilized, is clear evidence that higher volume of tests is being prescribed and conducted across all government healthcare centres, thus lowering the Out-of-Pocket Expenditure of patients on diagnostic services.

The healthcare landscape in Rajasthan underwent significant changes over the financial years FY 2019-20 to FY 2022-23, primarily influenced by the impact of the COVID-19 pandemic. In FY 2020-21, there was a noticeable decrease in the number of patients and tests, a phenomenon widely attributed to the disruptions caused by the pandemic. However, in subsequent years, FY 2021-22 and FY 2022-23, there was an evident increase in both the number of tests conducted and the patients served, indicative of the recovery from the pandemic's initial effects.

Surprisingly, the expenditure on the Mukhyamantri Nishulk Janch Yojana (MNJY) did not align proportionately with the surge in testing and patient numbers. The financial year FY 2021-22 saw a substantial increase in expenditure, reaching Rs. 345.33 Crores as shown in Table 3.5.2, which could be attributed to the heightened healthcare demands during the pandemic recovery phase. However, in FY 2022-23, there was a notable decrease in expenditure to Rs. 316.27 Crores despite sustained high testing and patient figures. But against the Budget amount, Expenditure was 86.73% in FY 2020-21, 94.77% in FY 2021-22 and 70% in Year FY 2022-23. The decrease in expenditure for FY 2022-23 is due to two main reason: funds allocated for the hub and spoke model remained unused because the implementation agency was not finalized, and some funds were kept reserved for regular staff positions at Laboratories, but these positions were not be filled.

Table 3.5.2: Budget Status under MNJY scheme in Rajasthan

Financial Year	Budget (in Crore)	Expenditure (in Crore)	Utilization (in %)
2019-20	275.38	253.40	92.02
2020-21	300.16	260.33	86.73
2021-22	364.40	345.33	94.77
2022-23	451.71	316.27	70.02

3.5.2 Comparison between Public and Private Expenditure on Diagnostic Tests

With an increasing budgetary allocation and subsequent utilization of funds, the government has made an effort to provide quality diagnostic services to the community. During the study, out of 259 individuals interviewed in Rajasthan across various health facility levels, 224 people (86.49%) responded indicated that they received all prescribed tests at the healthcare facility they visited. Compared to Rajasthan, 92.75% of respondents in MP (243 out of 262 patients) got their prescribed tests available at the health facility they visited.

When comparing public and private healthcare services, the issue of out-of-pocket expenditure becomes critical. With rising healthcare costs, the expenditure on diagnostic tests has also increased in recent years. This raises concerns about affordability, particularly for patients requiring extensive diagnostic services, which can lead to catastrophic healthcare expenditure. During the study, it was observed that certain tests were more frequently prescribed at specific levels of healthcare, resulting in patients undergoing these tests. Savings on diagnostics can be calculated as the money saved by patients on tests provided at government health facilities. The assumption is that if these tests were not available at government health facilities, patients would have gone to private laboratories and incurred out-of-pocket expenses (NHM Free Diagnostic Service Initiative Guidance Document for Implementing Laboratory Services in States, 2019). However this assumption also has some limitations, as this does not include some direct cost resulting in OOPE like transportation, accommodation, meals, and other informal payments and other indirect cost like loss of wages , productivity loss etc.

Table 3.5.3 presents an analysis of the costs of diagnostic test in Rajasthan, calculated based on the current average market price of a specific test in the state. For example, CBC, MP Slide, and SGOT were identified as the three most prescribed tests at the DH level in Rajasthan. If patients had availed these services at a private laboratory, they would have paid the amounts listed under the “Rate of Tests” column in Table 3.5.3. In our study, 90 out of 140 patients interviewed at the DH level were prescribed CBC, priced at Rs. 230. Therefore, the total funds saved amount to Rs. 20,700.

Table 3.5.3: Estimated Costs of the Three Most Prescribed Diagnostic Tests in Private Laboratories in Rajasthan

Rajasthan				
Facility	Tests	Number of Patients	Rate of Tests (Rs.)	Total Funds used (Rs.)
DH	CBC	90	230	20,700
	MP Slide	21	160	3,360
	SGOT	20	210	4,200
CHC	CBC	46	230	10,580
	MP Slide	16	160	2,560
	Hb	10	150	1,500
	RBS	10	150	1,500

Facility	Tests	Number of Patients	Rate of Tests (Rs.)	Total Funds used (Rs.)
AAM-PHC	Hb	17	150	2,550
	RBS	14	150	2,100
	MP Slide	10	160	1,600
AAM-SHC	Hb	8	150	1,200
	RBS	4	150	600
	MP Slide	2	160	320
	UPT	2	180	360
Total				Rs. 53,130

*MP Slide refers to Malaria Parasite Slide diagnostic test

Table 3.5.3 details the expenses patients would have incurred if they had undergone diagnostic tests at private laboratories in Rajasthan. It shows that in Rajasthan, for 270 tests conducted, resulting in savings exceeding Rs. 53,000 and thereby reducing out-of-pocket expenses (OOPE).

Similarly, Table 3.5.4 shows that patients in Madhya Pradesh also experienced reduced expenses by visiting government healthcare centres, compared to what they would have paid at private diagnostic facilities.

Table 3.5.4: Estimated Costs of the Three Most Prescribed Diagnostic Tests in Private Laboratories in Madhya Pradesh

Madhya Pradesh				
Facility	Tests	Number of Patients	Rate of Tests (Rs.)	Total Funds used (Rs.)
DH	CBC	98	230	22,540
	LFT	43	280	12,040
	RBS	39	150	5,850
	RFT	39	280	10,920
CHC	RBS	29	150	4,350
	CBC	28	230	6,440
	Hb	18	150	2,700
AAM-PHC	CBC	16	230	3,680
	RBS	16	150	2,400
	Hb	9	150	1,350
	Widal	7	220	1,540

Facility	Tests	Number of Patients	Rate of Tests (Rs.)	Total Funds used (Rs.)
AAM-SHC	RBS	9	150	1,350
	Hb	4	150	600
Total				75,760

Table 3.5.4 shows the amount the patients who had visited the healthcare facilities in Madhya Pradesh would have spent on getting these diagnostic tests conducted at any private laboratory in MP. This shows that in MP, 355 tests, resulted in savings of more than Rs. 75,000, resulting in lesser OOPE of patients. The test which was conducted the maximum number of times was Complete Blood Count (CBC), which has resulted in savings of Rs. 22,540 from 98 patients at the DH level.

3.5.3 Impact of Budget and FDI on Patients OOPE

The result of the continuous efforts made by the state governments in both the study states with an increasing amount of budget allocation over the years towards the Free Diagnostic Initiative, there has been a visible decline in patients' OOPE on healthcare, especially while availing diagnostic services.

When inquiring about the payments made by patients during their visits to health facilities, it was found that in Madhya Pradesh, all patients paid user charges for registration at the facility except at AAM. In Rajasthan, except 2 patients all reported not being paid anything at all levels of health facilities. This is shown in Table 3.5.5.

Table 3.5.5: Proportion of patients paid user charges at Health Facilities in Madhya Pradesh and Rajasthan (in %)

Health Facility (N)/State	MP	Rajasthan
DH (283)	100	0.71
CHC (140)	100	1.43
AAM-PHC (70)	100	0
AAM-SHC (28)	0	0
Total (N)=	248	2

Table 3.5.6 shows that in Madhya Pradesh, except for user charges, only one patient reported paying for medications, and another patient reported paying for a lab test at a private laboratory. In Rajasthan, two patients, one at DH and one at AAM-PHC, reported paying for medication.

Table 3.5.6: Proportion of Patients paid for Specific Services at Health Facilities in Madhya Pradesh and Rajasthan

Health Facility (N)/State	MP			Rajasthan		
	User Fee	Lab Tests	Medication	User Fee	Lab Tests	Medication
DH (144) MP-143, RJ-1	143	0	1	0	0	1
CHC (71) MP-70, RJ-1	70	0	0	0	0	1
AAM-PHC (35) MP-35	35	0	0	0	0	0
AAM-SHC (0)	0	0	0	0	0	0
Total (N)=	248	0	1	0	0	2

Table 3.5.7 depicts that at DH, one person spent approximately Rs 100 for medication, while rest of the patients reported spending Rs. 10 as user fee charges in MP. In Rajasthan, there are no user fees in place. However, patients who are not residents of Rajasthan are charged for medication and diagnostic tests.

Table 3.5.7: Amount spent by the patients at the facilities in Madhya Pradesh and Rajasthan (in %)

Health Facility (N)/State	MP				Rajasthan			
	0	Up to 10 (Rs.)	Up to 100 (Rs.)	Up to 1000 (Rs.)	0	Up to 10 (Rs.)	Up to 100 (Rs.)	Up to 1000 (Rs.)
DH (283)	0	100	0.70	0	99.29	0.71	0	0
CHC (138)	0	100	0	0	98.57	1.43	0	0
AAM-PHC (70)	0	100	0	0	100	0	0	0
AAM-SHC (28)	100	0	0	0	100	0	0	0
Total (N)=	14	248	1	0	257	2	0	0

The patients who incurred expenditure related to medical condition before this visit is depicted in Table 3.5.8.

Table 3.5.8: Expenses related to health condition prior to this visit to health facility in Madhya Pradesh and Rajasthan (in %)

Health Facility (N)/State	MP	Rajasthan
DH (283)	25.17	14.29
CHC (140)	22.86	11.43
AAM-PHC (70)	22.86	14.29
AAM-SHC (28)	14.29	7.14

In Madhya Pradesh, at District Hospitals (DH), 25.17% of patients reported having incurred prior medical expenses. At Community Health Centres (CHC), 22.86% of patients reported the same. Ayushman Arogya Mandir – Primary Health Centres (AAM-PHC) had a similar percentage of 22.86% and Ayushman Arogya Mandir – Sub Health Centre (AAM-SHC) had the lowest percentage at 14.29% who reported incurring expenditure related to health condition before this visit.

At District Hospitals (DH) in Rajasthan, 14.29% of patients reported incurring prior medical expenses, at Community Health Centres (CHC), 11.43% of patients reported the same. Ayushman Arogya Mandir – Primary Health Centres (AAM-PHC) had a percentage of 14.29%. and Ayushman Arogya Mandir – Sub Health Centre (AAM-SHC) had the lowest percentage at 7.14%. Overall, in both states, a portion of patients had incurred medical expenses, with slightly higher percentages in Madhya Pradesh compared to Rajasthan.

During exit interviews it was shared by patients that initially they try to seek treatment through neighbouring private health care provider over the counter treatment and only visit a health facility when they believe it is necessary. The prior expenditure may therefore be due to initial attempts to manage health conditions independently or through private healthcare providers before seeking more comprehensive care at higher-level health facilities.

Table 3.5.9: Medical Expenses incurred by patients in last month (in %)

Health Facility (N)/State	MP				Rajasthan			
	Below 1000 (Rs.)	1000-2000 (Rs.)	2000-5000 (Rs.)	Above 5000 (Rs.)	Below 1000 (Rs.)	1000-2000 (Rs.)	2000-5000 (Rs.)	Above 5000 (Rs.)
DH (56) MP-36, RJ-20	33.33	25	13.89	27.78	30	30	30	10
CHC (24) MP-16, RJ-8	43.75	25	12.5	18.75	37.5	50	0	12.5
AAM-PHC (13) MP-8, RJ-5	37.5	25	37.5	0	60	40	0	0
AAM-SHC (3) MP-2, RJ-1	100	0	0	0	0	0	0	100
Total (N)=	24	15	10	13	12	12	6	4

As shown in Table 3.5.9, at Community Health Centres (CHC) in MP, 43.75% of patients spent below Rs. 1,000. Meanwhile, 25% reported spending between Rs. 1,000 and 2,000. 12.5% spent between Rs. 2,000 and 5,000, and 18.75% spent above Rs. 5,000. At AAM-PHCs 37.5% of patients spent below Rs. 1,000, while 25% spent between Rs. 1,000 and 2,000, and another 37.5% reported expenses falling in the range of Rs. 2,000 to 5,000. None of the patients spent above 5,000 Rs. At Ayushman Arogya Mandir – Sub Health Centre (AAM-SHC), 2 patients reported expenses below Rs. 1,000 in the last month, and none reported expenses in the other categories.

In Rajasthan at District Hospitals (DH), 30% of patients spent below Rs. 1,000 on medical expenses, 30% spent between Rs. 1,000 and 2,000, and 30% reported expenses above Rs. 5,000 in the last month. None reported expenses in the Rs. 2,000-5,000 category. At Community Health Centres (CHC), 37.5% of patients spent below Rs. 1,000, 50% spent between Rs. 1,000 and 2,000, and none reported expenses in the Rs. 2,000-5,000 and above Rs. 5,000 categories, at Ayushman Arogya Mandir – Primary Health Centres (AAM-PHC), 60% of patients spent below Rs. 1,000 units, and the remaining 40% reported expenses in the Rs. 1,000-2,000 category. No expenses were reported in the other categories.

At Ayushman Arogya Mandir – Sub Health Centre (AAM-SHC) in Rajasthan, one patient spent above Rs. 5,000, and none reported expenses in the other categories. This implies that patients might have had to personally cover the costs when seeking healthcare from private providers, while their visits to public health facilities did not lead to substantial expenses during the same period.

Despite healthcare services being provided free of cost in Rajasthan and only nominal user fee being charged in MP, some of the patients still incurred medical expenses. This suggests that before accessing government facilities, some of the patients first seek treatment from nearby private providers. Patient opt for the private services to avoid long waiting times or limited availability of specific diagnostic test.

The data from Table 3.5.10 reveals that the Free Diagnostic Scheme (FDI) in both Madhya Pradesh (MP) and Rajasthan has been highly effective in reducing out-of-pocket expenditures for patients seeking healthcare services. When asked about the effect of FDI on lowering the OOPE across various types of health facilities, including District Hospitals (DH), Community Health Centres (CHC), Ayushman Arogya Mandir – Primary Health Centres (AAM-PHC), and Ayushman Arogya Mandir – Sub Health Centre (AAM-SHC), the vast majority of patients responded with “Yes,” indicating that they have experienced a significant reduction in out-of-pocket expenses due to the scheme.

Table 3.5.10: Patients’ perception on FDSI reducing OOPE on healthcare (in %)

Health Facility (N)/State	MP (Yes)	Rajasthan (Yes)
DH (283)	100	99.29
CHC (140)	100	100
AAM-PHC (70)	100	100
AAM-SHC (28)	100	100
Total (N)=	262	259

During Focus Group Discussions in both States, Participants highlighted the positive impact on economic aspects, emphasising the importance of timely diagnosis in preventing severe health issues. The number of tests, combined with ease of access of the government healthcare centres, have been the epicentre of the scheme which provides free diagnostic services to every patient, be it In-Patient or Out-Patient. In Rewa, one of the respondents quoted,

"A few years ago, when there was no free treatment here, we had to pay for everything. I remember, once I had to get tested for Dengue and Typhoid, and we had to pay for that. At that time, even ₹2000 was a big thing for us, but we had to pay for that. But when we compare it with today, we don't have to be afraid of rising costs, because of the government schemes."

This shows that ever since the scheme was set up, this has helped the common man to get medical services without thinking about the economic pressure it might put on their familial income. As a result, not only has the initiative successfully eliminated financial barriers to diagnostic services, but it has also sped up the process of diagnosis and service delivery, leading to a higher rate of recovery.

CHAPTER IV: DISCUSSION

Ensuring equal access, affordability, and appropriate use of high-quality diagnostic services is essential for informed decision-making among healthcare providers (ICMR, 2019). Diagnostic advancements, primarily centred in the US and Europe, have improved the ability to distinguish similar diseases, detect latent infections, and offer cost-effective monitoring. However, these benefits have not been fully realized in low- and middle-income countries, hindering the potential value for patients and healthcare systems (Engel, et al., 2016).

India through its public health system is committed to providing universal access to free healthcare. Substantial investments in the National Health Mission (NHM) have resulted in the improvement of access and coverage in public health facilities. However, diagnostic services are still largely unavailable in public health facilities hampering evidence-based care and delivery of essential and universal healthcare. Out-of-pocket expenditures on diagnostics continue to be high and are an area of concern.

The Free Diagnostics Service Initiative (FDSI) was launched by the Ministry of Health & Family Welfare, GoI in 2015 to address the high out-of-pocket expenditure (OOPE) on diagnostics. The out-of-pocket expenditure refers to the expenses that individuals pay directly for healthcare services, often without financial protection from insurance or government programs. In many countries, including India, high out-of-pocket expenses can pose a significant barrier to accessing healthcare, especially for low-income individuals and families. The FDSI aims to provide accessible, affordable, and quality diagnostic services in all public health facilities up to district hospitals.

The GoI under the National Health Mission launched the Free Essential Diagnostics Initiative to address the high out-of-pocket expenditure on diagnostics (10% OOPE on cost of diagnostics, 11% in OPD and 9.6% in IPD as per NSSO 71st round) and improve quality of healthcare services.

As per the Tanahashi model of health service coverage (Tanahashi, 1978), accessibility of services also includes the availability of services within reach of people in need. As per the findings of this study, in Rajasthan, despite all health facilities offering diagnostic care, the exclusive dependence on in-house capacity restricts the coverage of these services. The successful operationalization of the Hub and Spoke model in Madhya Pradesh stands as a positive example, addressing the shortage of lab technicians at the Primary Health Center (AAM--PHC) level and improving the accessibility of diagnostic services. The study suggests the positive impact of a hub model, increasing access to advance diagnostic and treatment services. The study findings resembled the model suggested to serve as a reliable national referral network, improving the overall quality of laboratory and diagnostic services and supporting other health system strengthening initiatives (Kiyaga, et al., 2013).

Ensuring the accessibility of diagnostic services hinges significantly on the availability of essential supplies such as rapid diagnostic kits and other consumables. However,

persistent challenges were identified during key informant interviews revealing that limited availability of supplies like rapid diagnostic kits and delays in local purchases, contributed to inconsistent access and operational delays. Another study also suggested the same which stated these are the barriers to improving accessibility of point-of-care testing (Kuupiel, Bawontuo, & Mashamba-Thompson, 2017). The study by Kuupiel et al. also highlighted that the essential diagnostics list offers countries a benchmark they can use to measure and improve diagnostic services.

The accessibility dimension of services has many components, distance and waiting time is one of the important components of accessibility of services (MacKinney, Visotcky, Tarima, & Whittle, 2013). In both the States, during exit interviews conducted during the study revealed that pregnant women seeking sonography services during Antenatal Care (ANC) are consistently referred to District Hospitals (DH) or Medical College hospitals. However, accessing these services at DH or Medical College necessitates extensive travel, and these tertiary care facilities often have prolonged waiting times. Consequently, patients opt to visit private diagnostic facilities for a more convenient and timely experience.

During the study, diagnostic testing availability at AAM-SHCs has been found limited in both the States, however point-of-care tests for maternal healthcare were available at Ayushman Arogya Mandir - Sub Health Centres and Ayushman Arogya Mandir - Primary Health Centers (AAM-PHCs), additionally, diagnostic care for HIV/AIDS, Tuberculosis, and malaria has been available at all the facilities visited.

The present study suggests that the absence of hub and spoke model, for diagnostics in Rajasthan pose a challenge for both service providers and patients. Patients are bypassing primary healthcare facilities and visiting secondary and tertiary-level hospitals for routine tests, contributing to overcrowding in facilities equipped with advanced diagnostic and treatment capabilities. This situation mirrors challenges identified in a West African study (Quao, Bonney, Forson, & Oduro, 2017), where slow or non-functioning referral systems resulted in overcrowding in higher-level healthcare facilities.

The present study highlights the unintended consequences of a free diagnostic scheme, including a surge in unnecessary diagnostic procedures as reported by officials at MP. This aligns with concerns raised in previous studies (Ambade, Sarwal, Mor, Kim, & Subramanian, 2022) about the link between increased out-of-pocket expenditure from diagnostic tests and wasteful routine tests. The present study also highlights that space constraints and poor availability of laboratory facilities & diagnostic equipment are prevalent issues in most of the Laboratories visited in Rajasthan except at DH Kotputli. Urgent attention is required to bolster diagnostic infrastructure and ensure equitable access to quality healthcare services, particularly in regions where health outcomes are adversely impacted, exacerbating burdens on marginalized communities (Adesina, et al., 2013).

Training and capacity building play a crucial role in ensuring the quality of care. The findings of the present study highlight a notable gap in the capacity building of laboratory staff. Facilities that are gearing up for the National Quality Assurance Standards (NQAS) assessment have conducted training sessions for laboratory staff, focusing on Bio-Medical Waste Management and Infection Prevention & Control. Periodic trainings are also being given under various national health programs. The findings very much resemble the study which highlighted that it is noteworthy that no specific training has been provided concerning laboratory safety and quality, which act as a major lacuna under the laboratory SOPs and Work Instructions as the accumulation of unsafe practices can prove to escalate

the accidental damage, if any (Aliyo & Edin, 2023).

The findings of this study stated that in Madhya Pradesh, the implementation of the Lab Management Information System (LIMS) has resulted in the streamlined provision of laboratory services, with all visited District Hospitals actively monitoring key performance indicators (KPIs). In contrast, the e-Aushadhi system in Rajasthan does not capture patient-wise information for laboratory services, and KPIs are only accessible at facilities preparing for the NQAS assessment. As a result, a robust and functional LIMS is required for better monitoring of FDI scheme in Rajasthan. This finding resembles the studies by Kumar et al., 2023, and Badrick et al., 2018 which emphasised that existing disparities in the quality and productivity of diagnostic laboratories in India, emphasizing the necessity for enhancements in computerization, equipment consolidation, and the systematic monitoring of key performance indicators (Kumar, et al., 2023) (Badrick, Gutscher, & Chin, 2018).

For the achievement of SDG 3 “Good Health and Well-Being”, it is imperative to focus on the three dimensions of Universal Health Coverage, viz. Coverage, Benefits and Financial Protection. By implementing the Free Diagnostic Initiative under the NHM, not only has the coverage increased in the rural areas of the states, but also the financial front of diagnosis has been taken care of. Free diagnosis in government healthcare facilities has decreased the time for diagnosis of the disease, and as a result, it has also improved the quality of care being provided to the common man. Regular follow-up by patients and grievance redressal has also kept a check on the providers, with online MIS and dashboard serving as a testimony to the efficiency of the scheme (Panda, 2019).

In conclusion, the study findings underscore the critical need for targeted interventions aimed at addressing core weaknesses in diagnostic service delivery models. Enhancing the quality and productivity of diagnostic services hinges on strengthening referral systems, improving laboratory infrastructure, and ensuring the efficiency of diagnostic laboratories. These measures are essential for promoting equitable access to diagnostic services, thereby contributing to improved healthcare outcomes and reducing individual out-of-pocket expenditures

CHAPTER V: CONCLUSION & RECOMMENDATIONS

Based on a review of secondary data and analysis of data collected through Key Informant Interviews (KIIs), Focus Group Discussions (FGDs), and exit interviews with key stakeholders, the following objective-wise conclusions and recommendations are suggested for consideration by the Ministry of Health and Family Welfare (MoHFW), State Governments, and the National Health Systems Resource Centre (NHSRC). These recommendations aim to strengthen institutional mechanisms for the effective implementation of free diagnostic initiatives and reduce out-of-pocket expenditures:

1. Review of Institutional Mechanisms for Effective Implementation of FDI

Conclusion

The assessment of Free Diagnostic Scheme in Rajasthan and Madhya Pradesh offers important insights into the healthcare delivery system's advantages and shortcomings. The FDSI was started by both states; while Rajasthan chose an in-house approach, Madhya Pradesh uses the Hub-and-Spoke model at CHC and AAM-PHC and the Wet Lease Reagent Rental model at District and Civil Hospitals.

Madhya Pradesh employs a hybrid model (PPP + in-house)

- Madhya Pradesh's utilization of a public-private partnership (PPP) model has significantly expanded diagnostic service coverage via the wet lease reagent rental model and the establishment of multiple hub laboratories and spoke centres. This innovative hub-and-spoke approach has effectively extended diagnostic services to remote tribal areas, ensuring broad accessibility across the region.
- The state's commitment to providing test results within 24 hours, and monitoring of TAT by state level, reflects dedication to timely patient care.
- The implementation of an External Quality Assurance Scheme (EQAS) and the appointment of a Quality Assurance Officer have improved the quality and reliability of diagnostic services.

Rajasthan employs a traditional in-house model

Significant progress has been made in providing free diagnostic tests across the state, with standardized templates for investigation lists, requisition forms, and report forms and Guidelines for display boards, laboratory design, and layout to ensure uniformity across the state.

Recommendations

- Madhya Pradesh should urgently address delays in sample transportation, aggravated by shortage of human resources. One effective strategy could involve hiring additional runners or implement streamlined method of sample collection and transportation.
- Adherence to stringent safety protocols and real-time temperature monitoring during sample transportation are critical steps to ensure the integrity of diagnostic processes. Integrating the real-time temperature monitoring data from transportation phases into the Laboratory Information Management System (LIMS) enhances quality control measures, thereby bolstering the reliability and accuracy of diagnostic results
- Rajasthan should focus on continuous monitoring of turnaround time, and implementing robust feedback mechanism from healthcare providers and patients are essential for enhancing health care service quality.
- Rajasthan has established infrastructure across health facilities to facilitate cost-effective, high-volume testing. However, for specialized tests requiring equipment, human resources, or infrastructure not locally available, outsourcing mechanisms are considered viable alternatives.

Rajasthan should address infrastructure limitations and expand the scope of available tests to enhance the coverage of Free Diagnostic Services by implementing the Hub and Spoke Model.

Rajasthan should prioritize the process of agency finalization for implementing Hub and Spoke model in the State. This model will ensure increased coverage and access to quality diagnostic services through partnership with private provider.

- Rajasthan needs State-level and District-level Diagnostic Teams to oversee and implement the Free Diagnostics Initiative effectively.
- Addressing the gap between sanctioned positions and the actual availability of Laboratory Staff is crucial to ensure adequate coverage and quality of diagnostic services. Rational deployment of staff should be done after assessing the workload and patient load at each healthcare facility.
- Prioritize training and capacity-building of laboratory staff on SOPs, equipment maintenance, and documentation to improve service delivery consistency. Regular capacity building will not only support professional development but also strengthen overall diagnostic service capabilities promoting consistent and high-quality service delivery.
- Considering the shortage of human resources at Ayushman Arogya Mandir – Sub Health Centre, and Primary Healthcare Centres, it is recommended to implement task sharing among existing staff such as Auxiliary Nurse Midwives (ANMs) and multi-Purpose Workers (MPWs). Beyond their primary responsibilities of sample collection, processing, and report generation, these staff members could undertake additional tasks including maintenance of sterile environments, inventory management, record maintenance, and crowd management.

2. Accessibility and Availability of FDI Services in Public Health Facilities

Conclusion

- Both MP and Rajasthan have made substantial strides in expanding the coverage of free diagnostic services. The provision of these services at various levels-from District Hospitals (DH) to Ayushman Arogya Mandir – Primary Health Centres (AAM-PHC) and even Ayushman Arogya Mandir -Sub Health Centres (AAM-SHC)-has contributed to increased patient footfall and utilization rates.
- Data on the total number of tests conducted, and the number of beneficiaries revealed that there has been a significant increase in both the total number of tests conducted and the total number of beneficiaries who benefited from the scheme over the three financial years in both the studied states, which demonstrate increased access to free diagnostic services accessibility and availability in health care facility for a larger population in both the state over last three financial years.
- In both the states, majority of the people were aware of free diagnostic services. The same has been seconded during Focus Group Discussions with the community members at the village, sector, and block levels. Community members had awareness of the availability of Free Diagnostic Services at all government health Facilities; the Majority of them availed of these services and they expected to get all specialized tests including Sonography and CT at the AAM-PHC/ CHC level.
- All the Public Health Care Facilities in Rural and Urban areas are Providing Free Diagnostic Services across both States. However, the analysis reveals some disparities in the availability of prescribed tests, particularly in Community Health Centres (CHCs).
- An average of more than five tests was prescribed for 58.67% of patients in Madhya Pradesh and 40% of patients in Rajasthan, thus establishing that there is an increased access and availability of tests in the government healthcare centres under FDI.

Recommendations

- Enhance the diagnostic capacity of health care facilities by upgrading infrastructure , increasing the number of diagnostic test, and equipping them with essential diagnostic tools and resources. Ensure that even the most remote and underserved areas have access to necessary diagnostic services.
- Deploy mobile diagnostic units to serve rural and remote areas where access to healthcare facilities may be limited. These units can provide basic diagnostic services on a regular basis, ensuring the patients in underserved areas have access to essential diagnostics.
- To ensure the consistent availability of diagnostic tests across all levels of healthcare facilities. States should Implement rigorous monitoring mechanisms to track test availability and address shortages promptly.
- Continue and expand community awareness programs to maintain and enhance public knowledge about the range of free diagnostic services available at public health facilities. Empower patients to make informed decisions and utilize healthcare services effectively

- States should establish clear and standardized referral protocols that health care worker follow at lower level facilities (such as AAM-SC, AAM-PHC and CHCs) must follow when a patient requires diagnostic services beyond the facility's capability .
- Regular evaluations of the Free Diagnostic Scheme should be conducted to assess its impact, identify challenges, and make necessary adjustments to optimize healthcare service delivery.
- Govt should strengthen the data collection and analysis capabilities to monitor service utilization trends, patient satisfaction levels, and operational challenges. Data insights should be used to make informed policy decisions and operational improvements.

3. Assess the quality of Diagnostic/ Lab services at Public Health Facilities

Conclusion

- In Madhya Pradesh, there is generally better equipment availability and maintenance, while Rajasthan faces challenges such as limited diagnostic tests and critical staffing shortages. Both states have made strides in implementing quality control measures, though inconsistencies in training and accreditation remain.
- The absence of a comprehensive training program for laboratory staff in both Madhya Pradesh and Rajasthan is a notable gap. This deficiency should be addressed to enhance the competency of personnel and, subsequently, the quality of diagnostic services.
- The presence of Laboratory Information Management Systems (LIMS) in Madhya Pradesh ensures efficient data capture, transmission, and online reporting, contributing to a streamlined service delivery process. In contrast, Rajasthan's reliance on manual processes and lacks infrastructure for real-time data dissemination, affecting service efficiency and patient satisfaction. Record maintenance practices are also inconsistent in the state.
- Quality assurance procedures, both internal and external, exhibit variations between both the studied states. At Madhya Pradesh facilities demonstrate a commitment to quality through proper documentation and participation in external quality assurance programs, while Rajasthan lags in these aspects. The equipment Maintenance program is in place in both States.
- The absence of internal and external audits for quality assurance in both states highlights a critical area for improvement.
- Quality Assurance for diagnostics would include Standard Operating Procedures for conducting tests and appropriate Bio-Safety procedures, effective monitoring systems, and mechanisms to ensure maintenance of high-cost equipment. A system of periodic calibration of all laboratory equipment needs to be ensured. In MP, where the Biomedical Maintenance programme is operational under PPP/outsourcing mode, responsibility for such calibration services should be the obligation of the maintenance service provider

Recommendations

- States should develop comprehensive training plans for laboratory staff in both states to enhance their skills to ensure delivery of high-quality diagnostic service. Regular induction, orientation, and refresher training sessions should be organized to keep staff updated with evolving healthcare standards and technologies. Madhya Pradesh should also train its govt. appointed laboratory technicians on operating the equipment/machines installed by private service provider. This will ensure that the services continue smoothly even when the staff appointed by the private service provider is unavailable.
- To ensure consistency and accountability of the Diagnostic process, health facilities in Rajasthan should be encouraged to establish documentation Procedures for Internal Quality Assurance, besides participation in EQAS Facilitate the accreditation process for laboratories in Rajasthan by providing technical support, training, and financial incentives where necessary.
- Both the states should establish robust quality assurance mechanisms with regular Internal and external audits, feedback loops and benchmarking against national and international standards.
- Rajasthan should invest in Laboratories Information Management System (LIMS) and other digital solutions to streamline turnaround time, ensure timely delivery of diagnostic reports to patients' online inventory system .
- States should develop and implement mechanism for conducting regular clinical audits to monitor the appropriateness of test prescriptions by clinicians. Evidence-based practices should be promoted to avoid unnecessary tests and optimize resource utilization.
- Need to strengthen comprehensive state-level and district-level monitoring mechanisms in Rajasthan to ensure adherence to quality service based on testing protocols as per the latest public health guidelines. **The system / practice of incident reporting is recommended for both the states to improve governance and quality of care.**

4. Referral mechanism between public health facilities for facilitating free diagnostic service to patients

Conclusion

- In Rajasthan, the referral system primarily relies on patient-direct referrals rather than sample transfer . This approach often leads to delays and inefficiencies, particularly evident in cases like ultrasound services at Zenana Hospital, Ajmer, where long waiting times prompt patients to seek private alternative. Additionally, the absence of tracking mechanism and proper documentation for patient referrals, weakens effectiveness of referral linkages.
- Madhya Pradesh employs a more structured Hub and Spoke model, ensuring systematic sample collection, transportation, and processing across various healthcare levels. Samples of patients are collected at the Spokes and are taken to the Hub by a runner in a cold box.

Recommendations

- Strengthen the referral mechanism in both States by ensuring proper documentation of referred patients and samples, facilitating improved coordination between health facilities. Madhya Pradesh can further strengthen its referral system with the introduction of linkage between District Hospital and Medical colleges laboratories, enabling the seamless transfer of sample for testing .
- Rajasthan should invest in enhancing diagnostic capabilities at primary healthcare centres (AAM-PHCs) to reduce the burden on higher-level facilities. This could include equipping AAM-PHCs with basic diagnostic equipment and training healthcare staff adequately.
- Both states should explore the integration of technology for smoother sample tracking and management. Implementing electronic health records (EHRs) and telemedicine solutions can improve communication between healthcare facilities and ensure timely access to diagnostic services.
- Encourage partnerships with private diagnostic centres to alleviate the burden on public facilities, especially in Rajasthan where patients often resort to private sonography centres due to long wait times. This collaboration can supplement public services and reduce patient out-of-pocket expenses.
- Establish a robust monitoring and evaluation system to assess the effectiveness of the referral systems regularly. This should include metrics such as referral completion rates, patient satisfaction, and turnaround times for diagnostic services.
- Promote community awareness about the referral process, available services, and benefits of using public healthcare facilities through targeted campaigns. Empowering patients with knowledge can encourage them to utilize the formal referral system effectively.

5. Comparative Model of OOPE at Public and Private Health Facilities at the District Level

Conclusion

- Madhya Pradesh has demonstrated a commendable increase in budget allocation for free diagnostic services, from 75.7 crores in 2019-20 to 124.88 crores in 2022-23. This upward trend in allocation has corresponded with a substantial increase in utilization rates, reaching 99% in 2022-23. Such efficient utilization indicates improved resource management and enhanced service delivery, benefiting a larger number of patients without imposing financial burdens.
- Rajasthan's Mukhyamantri Nishulk Janch Yojana (MNJY) also saw increased allocations yet faced challenges in expenditure alignment despite high testing and patient figures. The varying expenditure patterns across financial years highlight the need for better financial planning and utilization strategies to optimize budgetary resources effectively.
- The study indicates that patients in both states benefited significantly from accessing diagnostic tests at government healthcare facilities, leading to substantial savings compared to private laboratories.

- The Free Diagnostic Initiative (FDI) has notably reduced patients' out-of-pocket expenses in both states. This reduction is evident across various healthcare facility levels, including District Hospitals, Community Health Centres, Primary Health Centres, and Ayushman Arogya Mandir. The initiative has not only eliminated financial barriers but also ensured timely diagnosis and treatment, thereby enhancing overall health outcomes and patient satisfaction.

Recommendations

- Both Madhya Pradesh and Rajasthan should focus on aligning budget allocations more closely with actual expenditure needs. This can be achieved through continuous monitoring, evaluation, and adjustment of budgetary frameworks to optimize resource utilization effectively.
- Given the increased expenditure and success of the free diagnostic scheme in reducing out of pocket expenditure in MP and Rajasthan, it is recommended to expand these services. Investment should be done towards increasing reach and accessibility of diagnostic service across all health facilities by fostering collaboration between the public and private sectors to leverage their respective strength
- Establish robust mechanisms for monitoring patient satisfaction with free diagnostic services. Regular feedback from patients can provide valuable insights into service quality and help in refining service delivery strategies
- Addressing regional disparities in healthcare infrastructure and service availability by prioritizing underserved areas for infrastructure development and resource allocation will further support the goal of reducing OOPE and improving equitable access to quality healthcare services.

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