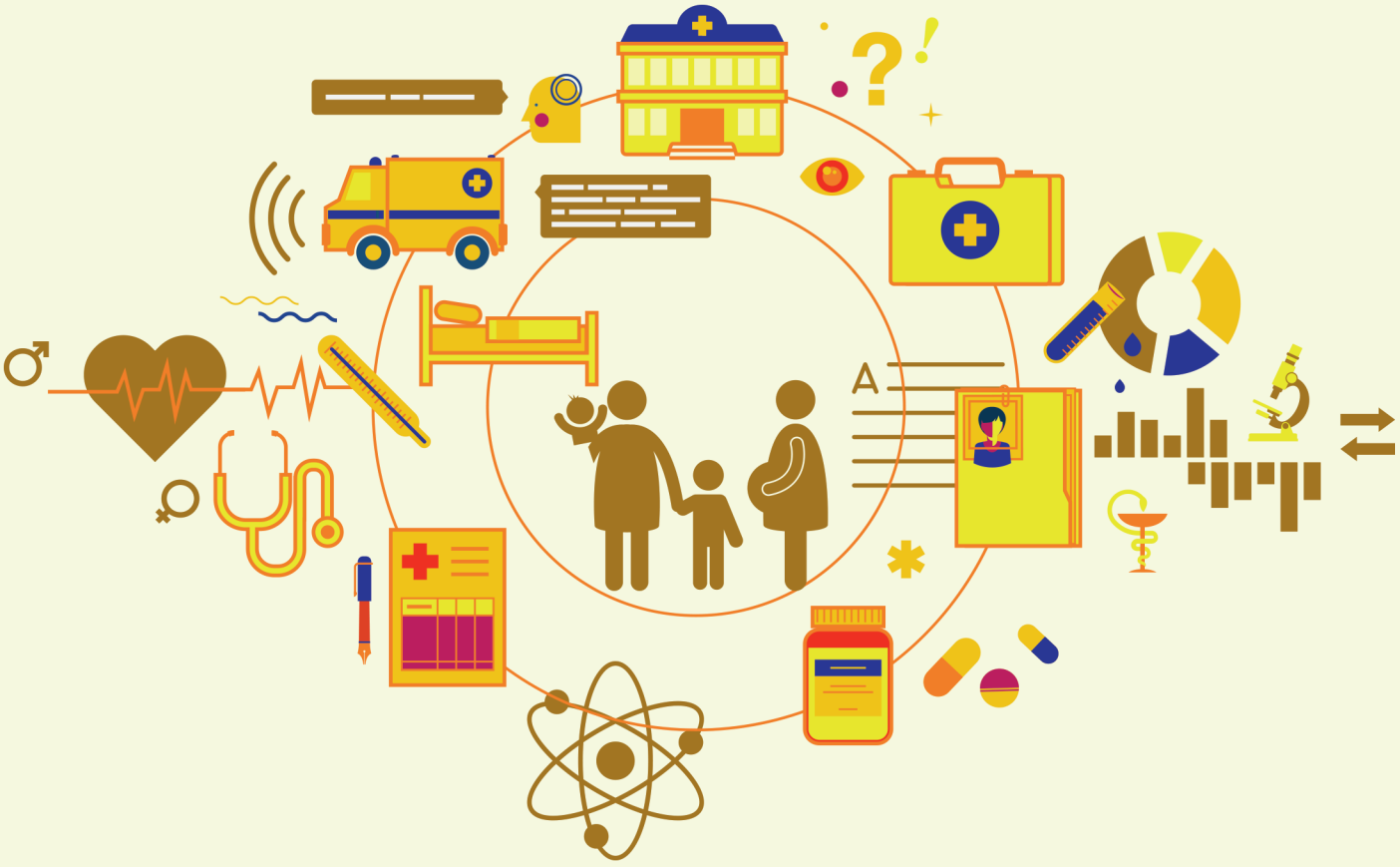
Health Facilities Profile and Performance, and Patient Perspectives

The Access, Capacity, Cost of Care and Outputs Study of the Public Health Care Delivery Systems in Four Districts of Bihar



Centre for Health Policy, Asian Development Research Institute
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This report was prepared by the Centre for Health Policy (CHP), Asian Development Research Institute and Public Health Foundation of India (PHFI). This work is intended to help policymakers understand the costs of health service delivery and health facility performance in the state of Bihar, India. The estimates may change following peer review. The contents of this publication may not be reproduced in whole or in part without permission from CHP and PHFI. The study was financed out of a grant from the Bill and Melinda Gates Foundation.

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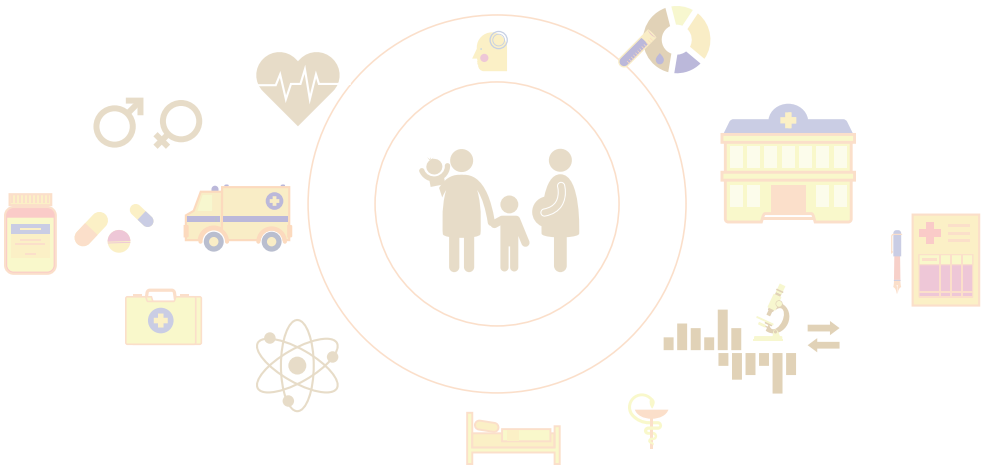

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About Centre for Health Policy

The Centre for Health Policy (CHP) at Asian Development Research Institute (ADRI), Patna is a think tank set up to provide evidence-based policy support to Government of Bihar for strengthening and re-designing health and nutrition systems in the state. CHP is engaged in rigorous analysis of the health and nutrition sector with a multi-dimensional and multi-disciplinary approach. CHP acts as a knowledge hub for the larger technical and implementation work that is ongoing through several partners in Bihar. The core principles of CHP are research and analytics, informing policymakers on existing health systems, broader dissemination and outreach, and collaboration. CHP is initially funded by a grant from the Bill & Melinda Gates Foundation.

About Public Health Foundation of India

The Public Health Foundation of India (PHFI) is a public private initiative to build institutional capacity in India for strengthening training, research and policy development for public health in India. PHFI adopts a broad, integrative approach to public health, tailoring its endeavors to Indian conditions and bearing relevance to countries facing similar challenges and concerns. PHFI engages with various dimensions of public health that encompass promotive, preventive and therapeutic services, many of which are often lost sight of in policy planning as well as in popular understanding.

About this Report

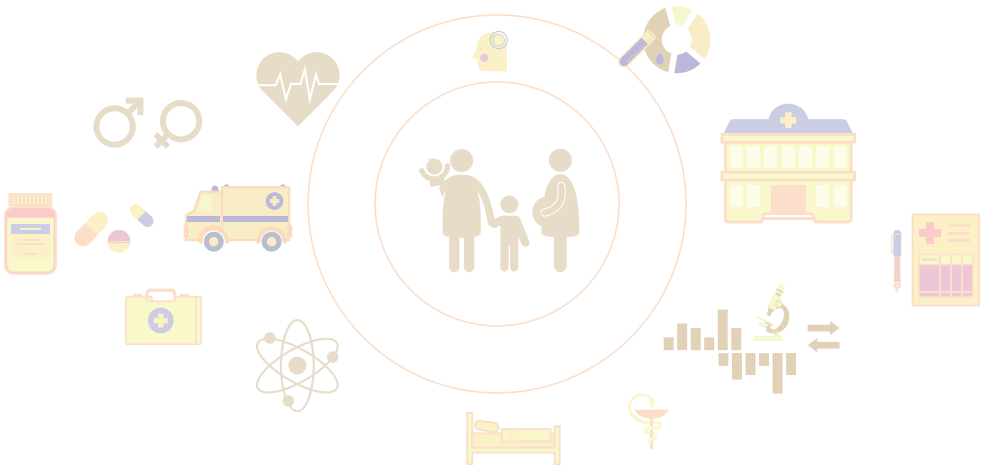
This report prepared under the Access, Capacity, Cost of care and Outputs Study of the public health care delivery systems in four districts of Bihar (ACCO study) provides a comprehensive assessment of public health facility performance in four districts of Bihar, including facility capacity for service delivery, profile of human resources, efficiency of service delivery, and patient perspectives on the service they received. Findings presented in this report were produced with the aim to collate and generate the evidence base for improving the cost-effectiveness and equity of health system.

Acknowledgments

Approvals and support were received from the Department of Health, Government of Bihar district officials in all the study districts.

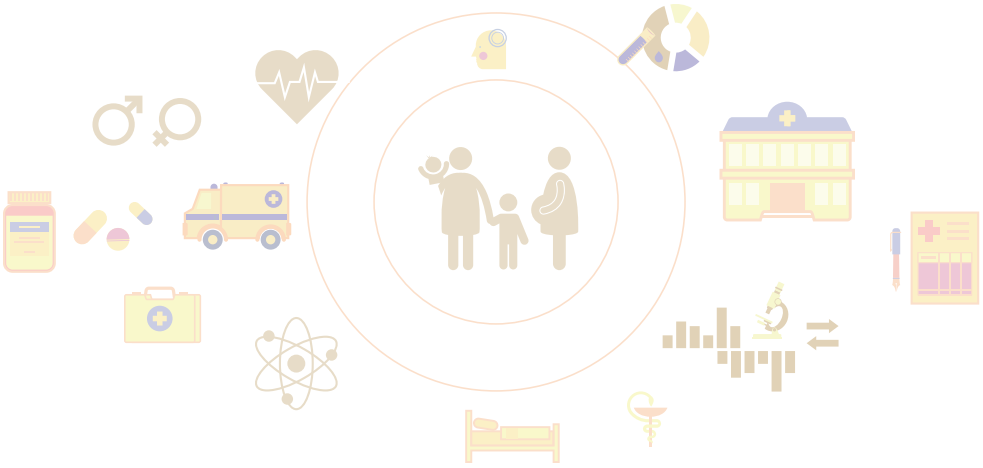
We especially thank the health facilities staff who generously gave of their time and facilitated the sharing of facility data that made this study possible. We are most appreciative of the patients of the facilities who participated in this work for their time and sharing their experiences with the field research team.

This report was drafted by Prof. Rakhi Dandona and Dr G. Anil Kumar of PHFI with support from Dr Vikas Keshri of CHP, Mr Sibin George, Ms Moutushi Majumder and Mr Md. Akbar of PHFI, and Dr Nutan Shashi Tigga and Dr Navneet Anand of CHP. We are thankful to Mr Debarshi Bhattacharya of the Bill and Melinda Gates Foundation, India Office for his valuable inputs. We also acknowledge the contribution of Dr Shaibal Gupta, Prof. Prabhat P Ghosh, and Rajesh Jha from ADRI in this study.



Acronyms

ABCE	Access, Bottlenecks, Costs, and Equity
ACCO	Access, Capacity, Costs of Care and Outputs
ANM	Auxiliary Nurse Midwife
APHC	Additional Primary Health Centre
CHC	Community Health Centre
CI	Confidence Interval
DALYs	Disability-Adjusted-Life-Years
DEA	Data Envelopment Analysis
DH	District Hospital
ECG	Electrocardiogram
GBD Study	Global Burden of Disease Study
HMIS	Health Management Information System
IPHS	Indian Public Health Standards
NCD	Non-communicable Diseases
NRHM	National Rural Health Mission
OR	Odds Ratio
PHC	Primary Health Centre
PHFI	Public Health Foundation of India
RKS	Rogi Kalyan Samiti (Patient Welfare Committee)
RH	Referral Hospital
SDH	Sub- divisional Hospital
SFA	Stochastic Frontier Analysis
SC	Sub Centre
USG	Ultrasonography
WHO	World Health Organization



Terms and Definitions

Definitions presented for key technical terms used in the report

Additional Primary Health Centre: This facility is meant to serve as a primary health care delivery centre, and is a first contact point between community and a qualified doctor. There are generally 2 to 5 additional primary health centres in the catchment area of one community/primary health centre, and generally caters to a population of 20,000 to 50,000. Some of these facilities are also designated as level 1 maternal and child health service point.

Community Health Centre: This facility constitutes the secondary level of health care, and are designed to provide referral as well as specialist health care to the rural population. It acts as the block level health facility and as the gatekeeper for referrals to higher level facilities. A typical block CHC covers a population of around 200,000 in Bihar.

Constraint: a factor that facilitates or hinders the provision of or access to health services. Constraints exist as both "supply-side," or the capacity of a health facility to provide services, and "demand-side," or patient-based factors that affect health-seeking behaviors (e.g., distance to the nearest health facility, perceived quality of care received by providers).

Data Envelopment Analysis: an econometric analytic approach used to estimate the efficiency levels of health facilities.

District hospital: This facility is the secondary referral level for a given district with the objective to provide comprehensive secondary health care services to the district's population. These are sized according to the size of the district population.

Efficiency: a measure that reflects the degree to which health facilities are maximizing the use of the resources available in producing services.

Facility sampling frame: the list of health facilities from which the study sample was drawn. This list was based on 766 public health facilities in four sampled districts listed in the Health Management Information System data portal of the Government of India.

Health facility: a place where health services are delivered.

Inpatient visit: a visit in which a patient has been admitted to a facility. An inpatient visit generally involves at least one night spent at the facility, but the metric of a visit does not reflect the duration of stay.

Inputs: tangible items that are needed to provide health services, including facility infrastructure and utilities, medical supplies and equipment, and personnel.

Outpatient visit: a visit at which a patient receives care at a facility without being admitted.

Outputs: volumes of services provided, patients seen, and procedures conducted, including outpatient and inpatient care, laboratory and diagnostic tests, and medications.

Platform: level of health service delivery.

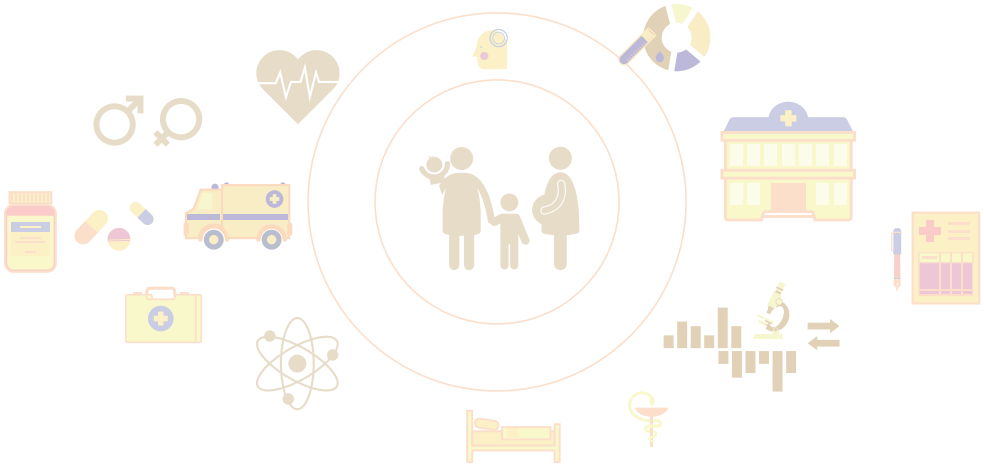
Primary Health Centre: This facility serves as referral unit for primary health care. Depending on the needs of the region, it may be upgraded to provide 24-hour emergency hospital care. A typical block primary health centre covers a population of around 200,000 in Bihar.

Referral hospital: This facility is between the district hospital and block level facilities. As First Referral Units, it provides emergency obstetric care and neonatal care; and serve population of 500,000 to 600,000 people in Bihar.

Sub Centre: This facility provides interface with the community for primary health care. It typically provides selected outpatient care, immunization, and referral services.

Sub-divisional hospital: Similar to the referral hospital, this facility is also below the district hospital and above the block level facilities. As First Referral Unit, it provides emergency obstetric care and neonatal care; and serve populations of 500,000 to 600,000 people in Bihar.

Stochastic Frontier Analysis: an econometric analytic approach used to estimate the efficiency levels of health facilities.



Executive Summary

With increased focus on the provision of universal health coverage, efficiency in health care sector has attracted significant interest in the recent decades due to escalating health care costs. Globally, there is ample evidence to suggest that inefficiency is a major problem in most health systems. Better understanding of health facility efficiency is important for ensuring effective use of health care resources, especially in countries with involvement of government in health care provision. Since public sector health facilities, in many cases, do not compete in the marketplace, alternative strategies must be devised for improving efficiency of resource use.

In 2018, the Government of India announced *Ayushman Bharat* to achieve universal health coverage. Under this program, Health and Wellness Centres are being developed to increase accessibility, availability and affordability of health services for the full range of conditions across India, and 500 million poor population will be covered for their medical and hospitalisation expenses. To achieve good quality health coverage for the population and to track the progress under this programme, the inadequacies and inefficiencies within the public sector health system will have to be addressed urgently.

However, very limited work has been done in India to document efficiency of the health system. The most recent attempt at understanding efficiency of the health system in India using primary data across multiple states was the Access, Bottlenecks, Costs, and Equity (ABCE) project in India. With an estimated population of 107 million in 2019, Bihar is home to 9.2% of India's population. With such large population, the health status and drivers of health loss in Bihar have significant implications on the health status and drivers of health loss in India. Utilising the ABCE project approach, we conducted the Access, Capacity, Cost of care and Outputs Study of the public health care delivery systems in four districts of Bihar - Aurangabad, East Champaran, Purnea, and Samastipur.

Led by the Centre for Health Policy (CHP), Asian Development Research Institute and Public Health Foundation of India (PHFI), the findings of the ACCO study presented in this report provide the government, international agencies, and development partners alike with actionable information that can help identify areas of success and targets for improving efficiency in health

service provision in public sector facilities. The main topical areas covered in this report quantify the services provided by facilities and the efficiency with which these operate, tracking facility expenditures, and compare patient perspectives of the care they received across different types of facility. Further, we provide an in-depth examination and comparison of facility-level outputs, human resources for health, efficiency and patient experiences. It is with this information that we strive to provide the most relevant and actionable information for health system programming and resource allocation in Bihar.

Capacity for Service Provision

While most facilities report providing key health services, significant gaps in capacity were identified between reported and functional capacity for care.

- The availability of a subset of services including routine delivery, antenatal care, general gynecological and pediatric medicine, internal medicine, minor surgical services, dentistry, TB services, and pharmacy was generally high across the platforms in the four districts assessed, reflecting the expansion of these services throughout these districts.
- However, among the facilities reporting availability of antenatal care, routine delivery and major surgical services, substantial gaps in equipment were identified in the capacity to actually deliver reasonable quality of these services.
- The services for addressing chronic diseases, such as cardiology, orthopedics, ophthalmology, mental health and cancer, and blood bank/storage unit were predominantly limited to district hospitals.
- The extremely limited capacity of the current health system to address chronic diseases is a major concern. Chronic diseases currently are the leading cause of death and disability for adults in Bihar, and are projected to increase further during the next 25 years.
- None of the facilities except one reported service provision through alternative medicine. Importantly, there were AYUSH trained doctors available at some of the facilities but they were practicing allopathic medicine.

In addition to continued focus on maternal and child care, service provision for chronic diseases needs to be addressed urgently to move towards universal health care.

- Quality of maternal and child health service provision in addition to coverage of service provision needs focus to address maternal and neonatal mortality in the state.
- Better understanding of issues related to implementation of the current national programmes on chronic diseases in the state is a must to highlight the gaps that need attention.
- The state level health system and human resources policies should clearly address how the chronic diseases will be dealt with. The sub-divisional and referral hospitals could be considered as points of service for chronic diseases instead of burdening the district hospitals.
- Availability of required drugs for AYUSH practitioners to prescribe alternative medicine drugs needs attention.

Human Resources for Health (HRH)

Shortage, sub-optimal skill mix, and lower levels of satisfaction with salary and opportunities is common.

- Provision of health services needs a mix of all cadres to varying degrees and not only doctors and nurses/ANMs. By including a variety of cadres in this study, a more comprehensive assessment of HRH is provided.
- Less availability of staff as against the number of positions sanctioned was documented across all the platforms, and this was the worst at the district and sub-divisional hospitals.
- Across platforms, a little over half of the doctors and nurses/ANMs, and 62% of the pharmacists were aged 45 or more. Also, a significantly higher proportion of these staff were trained 20 years ago or more. This highlights that these staff may not be sufficiently trained to practice currently relevant patient care guidelines.
- There was very poor representation of women across all cadres other than nursing/ANM, reflecting the opportunities available to them.
- Those belonging to the other backward caste and general category accounted for 70% of the health facility staff in these facilities.
- Nearly 40% of the staff reported to be contractual employees, with the least contractual employment documented for the nurses/ANMs.
- The most striking finding from assessment of satisfaction among the staff was the similarity across the cadres, type of employment, platforms, and districts. The themes of job, team work and miscellaneous had reasonably high levels of satisfaction; whereas the salary and opportunity related themes highlighted significant dissatisfaction among the staff.

It is imperative for the HRH policy-making in Bihar to broaden the perspective beyond the doctors and nurses/ANMs to be more inclusive of the variety of health workers who play a role in health service provision.

- The HRH strategy should be coherent with the national/state health policy to achieve universal health coverage.
- A comprehensive training strategy under which the medical and paramedical staff are provided requisite training to provide up-to-date clinical care and management would be useful for the state to consider.
- Caste has been and remains integral to the political discourse in the state, and the mix seen at health facilities is a reflection of the Bihar's society and opportunities. Affirmative action may be necessary to address the gender and caste mix but it cannot be in isolation to social development, and hence, may be beyond the scope of health system.
- Much is known about the core issues of HRH in Bihar, and in-depth work is currently ongoing to facilitate solutions to address these issues. The interpretation of the findings of this study should be seen within this context as we highlight only issues that were directly assessed in this study. The manner in which the Bihar government will recognise and address the HRH related issues will decide how much of universal health coverage and the SDGs it is likely to meet for its population.

Technical Efficiency of Facilities

Only 25% of all the facilities assessed across the four districts had an efficiency score of >70%.

- The efficiency score reflects the relationship between the facility-based resources and the facility's total patient volume in the years of this assessment.
- No district hospital had technical efficiency >50%. In general, the districts wherein the technical efficiency of the district hospital was lower, it was higher for the sub-divisional and referral hospitals.
- Only half of the community health centres had a technical efficiency score of >50%, whereas 78% of the primary health centres had scored >50%.
- The expenditure documentation had the most bottlenecks with these data spread across various sources for a given facility. The most limited capacity was to capture the expenditure on what was directly spent by the state for a facility on pharmaceuticals, medical consumables and supplies.
- We found a pattern between the neonatal and under-5 mortality rates at the district level with that of the average efficiency score of the facilities in a district.

Performance of a facility should be assessed to reflect "how efficiently the inputs are utilised to provide outputs" rather than "simply based on outputs".

- With the currently available inputs, we estimated that the facilities could substantially increase the number of patients seen and services provided – on an average by 1.3 times for all platforms together.
- The government should consider tracking all expenditure by facility to have robust estimates of how much money across which component is being spent on a given facility.
- Linking patient data across multiple departments is an important prerequisite to improve efficiency.
- Improvement in the availability and accountability of staff for patient care services to optimise service provision will facilitate improvements in efficiency.

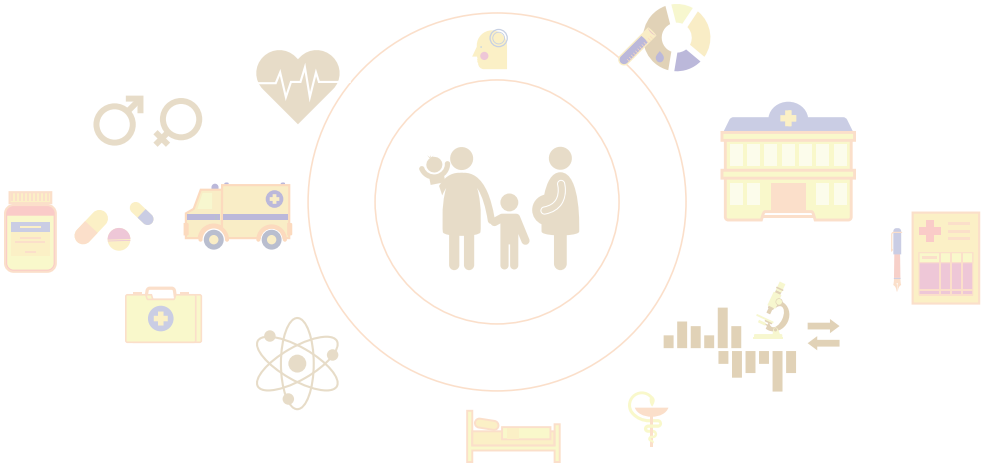
Patient perspectives

Satisfaction with doctor but not with infrastructure of the facility.

- Patients were generally satisfied with the doctor who treated them but the satisfaction was lower with the facility infrastructure as many were not satisfied with the cleanliness or privacy provisions at the facility they visited.
- The overall patient satisfaction score of the patients with the facility was lower than that with the medical doctor.
- The patients were satisfied with the respect provided by the doctor during their interaction but indicated that the doctors could do better with the clarity of explanations that they provide and the time they give to the patients to ask questions.
- No demographic factors were determinants of a higher level of patient satisfaction.

This study was designed to provide policymakers with new insights into the efficiency of the public health system in four districts of Bihar.

We hope that these insights into the efficiency of the public health system in four districts of Bihar will not only prove useful to policymaking, but will also inform broader efforts to mitigate factors that impede the efficiency of the delivery of health services in the state. Analyses that take into account a broader set of the state's facilities, including private facilities, may offer an even clearer picture of the levels and trends in capacity, efficiency, and costs.



CHAPTER 1

Introduction

The fundamental goal of health systems is to improve the health of the population. As part of this, they are concerned with the distribution of health in the population—for example, with health equity—and they strive to be responsive to the needs of the population and to deliver services efficiently.[1] An effective health system is one that meets these objectives by providing equitable access to affordable, high-quality health care—including treatment and curative services as well as health promotion, prevention, and rehabilitation services—to the entire population. Unfortunately, most countries lack health systems that meet this standard. Shortfalls in access, quality, efficiency, and equity have been documented extensively, both in low- and middle-income countries and in some high-income countries.[2] In addition, in many countries, households routinely face catastrophic or impoverishing health expenditure when seeking acute or chronic disease care.[3-13] These financial risks can result in further health loss and reduced economic prosperity of households and populations.

The current universal health coverage movement emerged in response to a growing awareness of the worldwide problems of low access to health services, low quality of care, and high levels of financial risk.[14-23] Universal health coverage is now a core tenet of the United Nations Sustainable Development Goal 3.[24] With increased focus on the provision of universal health coverage, efficiency in health care sector has attracted significant interest in the recent decades due to escalating health care costs. Globally, there is ample evidence to suggest that inefficiency is a major problem in most health systems.[25-50] Inefficient use of health system resources poses serious concerns, for a number of reasons:[51]

- By consuming more resources than needed, inefficient treatment and preventive care may deny this to other patients who could have benefited had resources been used more efficiently.
- It may limit health gains for patients who have received treatment, because they do not receive the best possible care available within the health system's resource limits.
- Inefficient use of resources in the health sector may sacrifice consumption opportunities elsewhere in the economy, such as education.

- Particularly in public sector facilities, suboptimal use of resources may reduce society's willingness to contribute to the funding of health services, thereby harming social solidarity, health system benefits and social welfare.

Better understanding of health facility efficiency is important for ensuring effective use of health care resources, especially in countries with involvement of government in health care provision. Since public sector health facilities, in many cases, do not compete in the marketplace, alternative strategies must be devised for improving efficiency of resource use.

Remarkable progress has been made in the health system and health outcomes have improved in India over the last many years. However, the health gains have not been similar across the different states and union territories of India. A recent report estimating the trends of disease burden and risk factors over the last 25 years across India highlighted the huge disparities across states and union territories.[52] The health outcomes of some states are comparable to that of some upper middle- and high-income countries, while some other states have health outcomes similar to that in the poorest countries in the world. Furthermore, disparities are also seen in the Health Index, which was launched by NITI Aayog, to measure the performance of states and union territories.[53] Among the larger states, the overall Health Index score of the best-performing state was more than two-and-a-half times of the overall score of the least-performing state, and only about half of the states and Union Territories had an improvement in the overall score between 2015-16 and 2017-18.[53]

The Government of India announced in 2018 the National Health Protection Mission (Ayushman Bharat) to achieve universal health coverage. Under this program, Health and Wellness Centres are being developed to increase accessibility, availability and affordability of health services for the full range of conditions across India, and 500 million poor population will be covered for their medical and hospitalisation expenses. This programme has received unprecedented attention and is being attributed to have placed health higher on the political agenda. To achieve good quality health coverage for the population and to track the progress under this programme, the inadequacies and inefficiencies within the public sector health system will have to be addressed urgently.

Very limited work has been done in India to document efficiency of the health system.[54-57] The most recent attempt at understanding efficiency of the health system in India using primary data across multiple states was the Access, Bottlenecks, Costs, and Equity (ABCE) project in India.[58-62] The ABCE project sought to generate an evidence base that would support decision-making for improving the cost-effectiveness and equity of health service. It was carried out across six states that were selected to represent a variety of public health system in India – Andhra Pradesh, Gujarat, Madhya Pradesh, Odisha, Tamil Nadu, and Telangana. Importantly, the technical efficiency analysis for nearly 700 public sector facilities across the states showed that these facilities were capable of higher outputs with the current resources. This finding was particularly important in light of financial pressures and concerns over the long-term financial sustainability of public health systems, as decision-makers seek to ensure and demonstrate that health care resources are put to good use. Identifying variability in efficiency is therefore of great importance, and becomes increasingly relevant to health systems grappling with resource constraints. In addition, tackling inefficiency has an important accountability value—to reassure tax payers that their money is being spent wisely, and to reassure patients, caregivers and the general population that their claims on the health system are being treated fairly and consistently.

With an estimated population of 107 million in 2019, Bihar is home to 9.2% of India's population.[63] With such large population, the health status and drivers of health loss in Bihar have significant

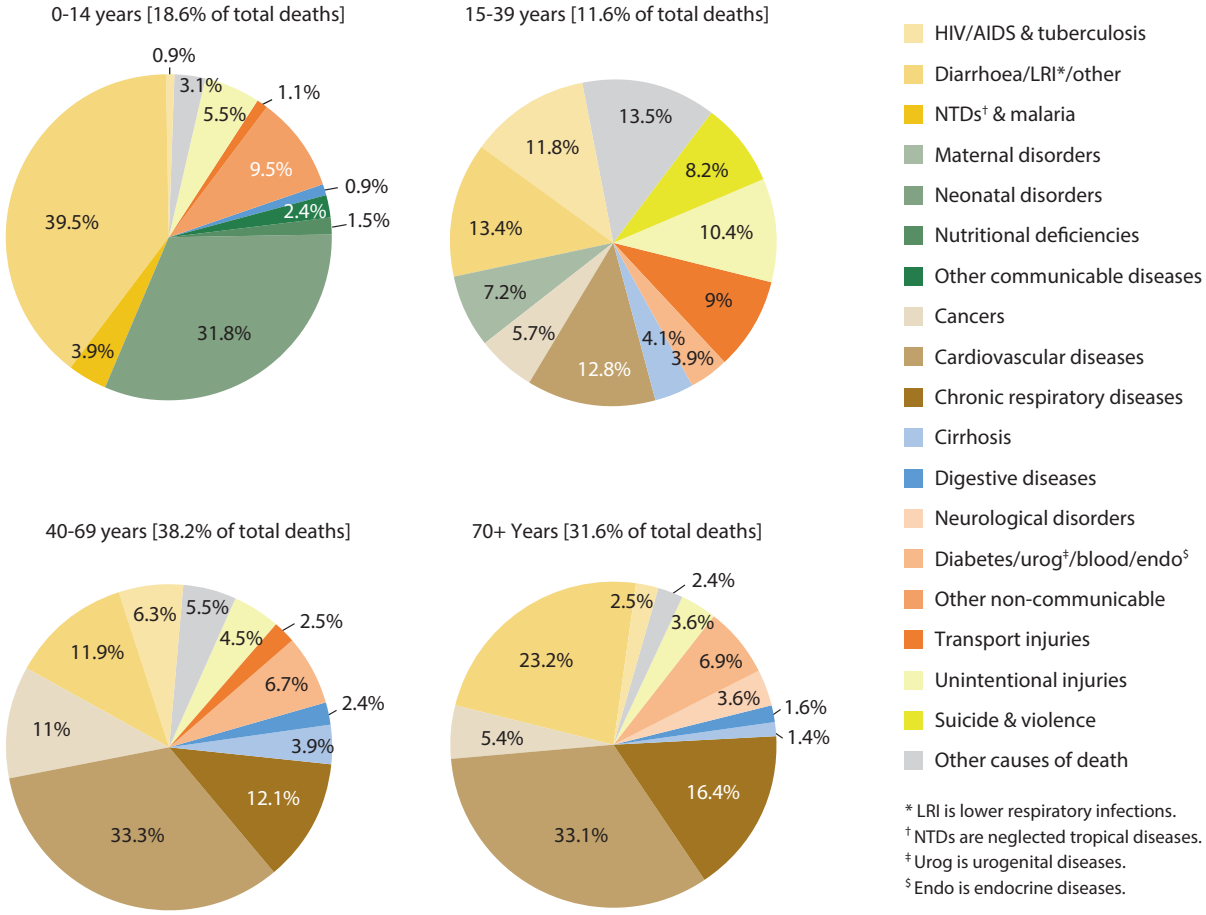
implications on the health status and drivers of health loss in India. We utilized the ABCE project approach in Bihar to estimate the technical efficiency of public health system in four districts.

Health Status of Bihar

One of the simplest measures of understanding overall health outcomes is life expectancy at birth as if the state/country is generally expanding its longevity, it usually means that people are dying prematurely at lower rates. In 1990, the life expectancy at birth for India was 58.3 years for males and 59.7 years for females, which increased to 66.9 years for males and 70.3 years for females in 2016.[52] Bihar has made substantial progress in life expectancy at birth from 58.9 years to 67.7 years for males and 57.9 years to 67.7 years for females from 1990 to 2016.[52]

The disease/conditions for life and health loss in Bihar have changed substantially over time with increasing contribution of non-communicable diseases to the disease burden. Communicable diseases account for 42.6%, non-communicable diseases 47.6% and injuries 9.8% of the total disease burden in Bihar in 2016.[52] The current pattern of mortality disease/conditions by age group in Bihar shows that the communicable diseases account for most mortality burden in under-15 age group with non-communicable diseases accounting for most mortality burden in the remaining age groups (Figure 1).

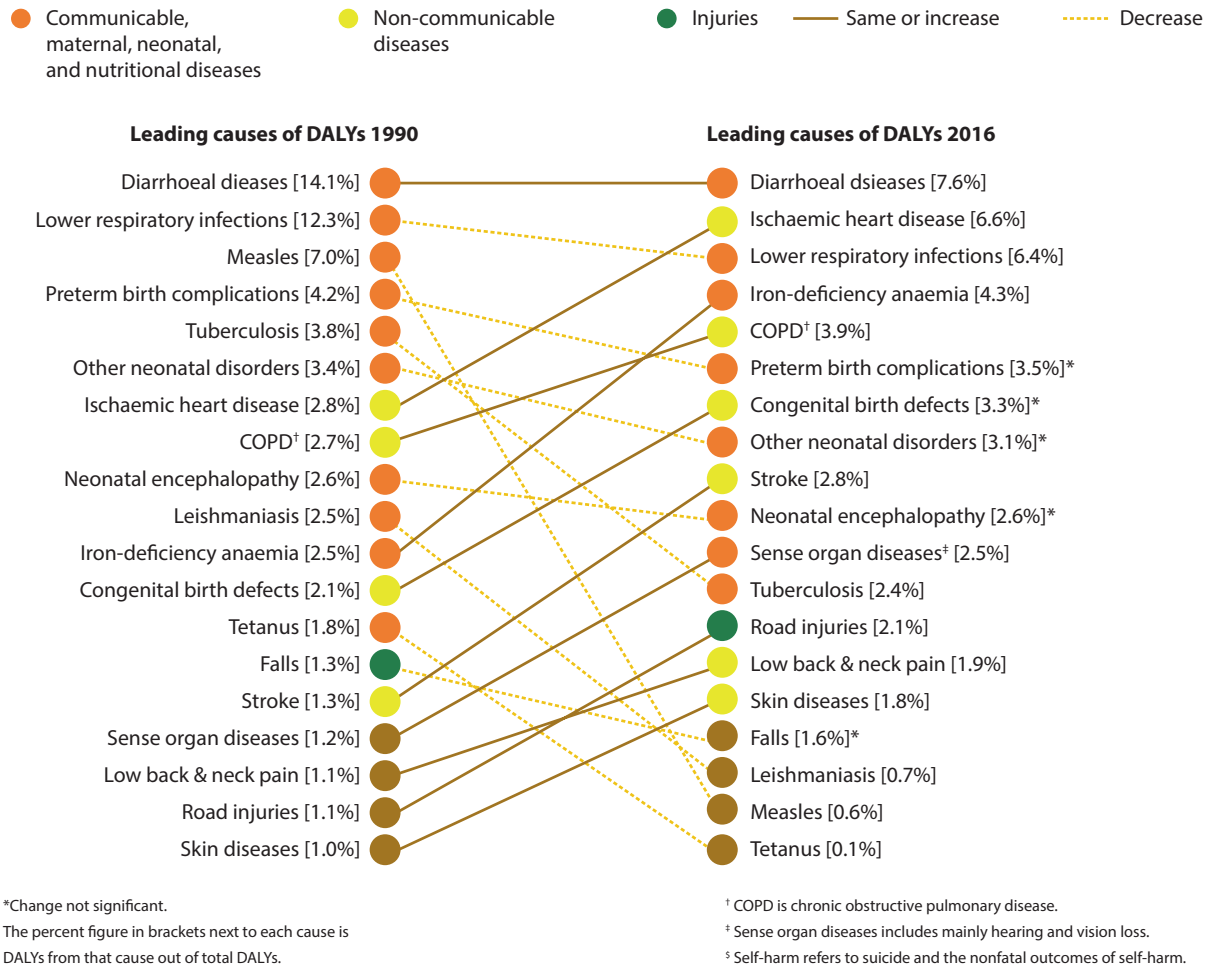
Figure 1: Percent contribution of top 10 causes of death in Bihar, by age group in 2016



* LRI is lower respiratory infections.
† NTDs are neglected tropical diseases.
‡ Urog is urogenital diseases.
$ Endo is endocrine diseases.

Though diarrhoeal diseases and lower respiratory infections continue to be in the top 3 leading causes of Disability-Adjusted-Life-Years in 2016, the proportion of these causes has reduced significantly from 1990 to 2016 (Figure 2). The ranking of ischemic heart disease, chronic obstructive pulmonary disease and iron-deficiency anemia has gone up between the two years.

Figure 2: Change in top 15 leading causes of Disability-Adjusted-Life-Years in Bihar for both sexes combined from 1990 to 2016



*Change not significant.
The percent figure in brackets next to each cause is DALYs from that cause out of total DALYs.

† COPD is chronic obstructive pulmonary disease.
‡ Sense organ diseases includes mainly hearing and vision loss.
§ Self-harm refers to suicide and the nonfatal outcomes of self-harm.

The most recent health and health system related indicators for the state available through the government data sources are shown in Figure 3.[53] It is important to note that much more needs to be done in the state on the governance and key processes as shown in the Figure 3.

Structure of Health System in Bihar

India's Public Health System has been developed over the years as a 3-tier system, namely primary, secondary and tertiary level of health care.[64] Bihar state also has similar to the recommended structure of the public health system with some variation, in particular at the community and primary health centres – both of which in practice function more or less at similar levels. In addition, the state has

Figure 3: Key health and health system indicators for the state of Bihar[53]

Indicator (Source of Data)		Overall Indicator Performance[#] (2017-18)
Health outcomes domain		
1.1.1	Neonatal Mortality Rate (SRS)	27
1.1.2	Under Five Mortality Rate (SRS)	43
1.1.3	Total Fertility Rate (SRS)	3.3
1.1.4	Proportion Low Birth Weight (LBW) among newborns (HMIS)	9.23
1.1.5	Sex Ratio at Birth (SRS)	908
1.2.1	Full immunization coverage (HMIS)	89.74
1.2.2	Proportion of institutional deliveries (HMIS)	56.01
1.2.3	Total case notification rate of Tuberculosis (RNTCP MIS)	82
1.2.4	Treatment success rate of new microbiologically confirmed TB cases (RNTCP MIS)	71.90
1.2.5	Proportion of people living with HIV on antiretroviral therapy (Central MoHFW data)	37.18
Governance and information domain		
2.1.1.a	Data integrity Measure - Percent deviation of HMIS reported data from NFHS for institutional deliveries (NFHS 4 & HMIS)	18.21
2.1.1.b	Data Integrity Measure - Percent deviation of HMIS reported data from NFHS for NAC registered within lst trimester (NFHS 4 & HMIS)	16.33
2.2.1	Average occupancy of an officer (in months) for 3 key State posts for last 3 years (State Report)	18.98
2.2.2	Average Occupancy of aDistrict Chief Medical officer (in months) for last 3 years (State Report)	13.25
Key inputs/processes domain		
3.1.1.a	Proportion of ANMs positions vacant at Sub Centers (State Report)	59.45
3.1.1.b	Proportion of Staff Nurses Positions vacant at PHCs and CHCs (State Report)	50.74
3.1.1.c	Proportion of MO positions vacant at PHCs (State Report)	34.08
3.1.1.d	Proportion of Specialist positions vacant at District Hospitals (State Report)	59.72
3.1.2	Proportion of total staff (regular and contractual) with e-pay slip generated in the IT enabled Human Resources Management Information system (State Report)	0.00
3.1.3.a	Proportion of facilities functional as FRUs (one FRU per 5,00,000 population) (State Report & MoHFW Data)	15.38
3.1.3.b	Proportion of facilities functional as 24x7 PHCs (one 24x7 PHC per 1,00,000 population) (State Report & MoHFW data)	53.79
3.1.4	Functional Cardiac Care Units per District per 100 (State Report)	5.26
3.1.5	Proportion of ANCs registered within first trimester (HMIS)	61.75
3.1.6	Level of birth registration (CRS)	60.70

Indicator (Source of Data)		Overall Indicator Performance[#] (2017-18)
3.1.7.a	Completeness of IDSP Reporting of P form (Central IDSP, MoHFW data)	84
3.1.7.b	Completeness of IDSP Reporting of L form (Central IDSP, MoHFW data)	84
3.1.8	Proportion of CHCs with grading 4 points or above (HMIS)	19.05
3.1.9.a	Proportion of DH/SDH with Quality Accreditation Certificates (State Report)	0.00
3.1.9.b	Proportion of CHC/PHCs with Quality Accreditation Certificates (State Report)	0.00
3.1.10	Average number of days for transfer of Central NHM fund to implementation agency (Central NHM Finance Data)	191

Overall Indicator Performance	Front Runners	Achievers	Aspirants

referral hospitals which serve as First Referral Units between the district and block level facilities. The current status of public health infrastructure in Bihar state is shown in Table 1 below.[65]

Table 1: Current status of public health facilities in the state of Bihar[65]

Public health facility	Required	Current status		Gap
		Sanctioned	Functional	
District Hospital	38	36	36	2
Sub-divisional Hospital	63	55	38	8
Referral Hospital and Community Health Centre	865	466	67	399
Primary Health Centre	–	534	–	–
Additional Primary Health Centre	3,460	2,792	–	668
Health Sub Centre	20,760	18,992	–	1,768

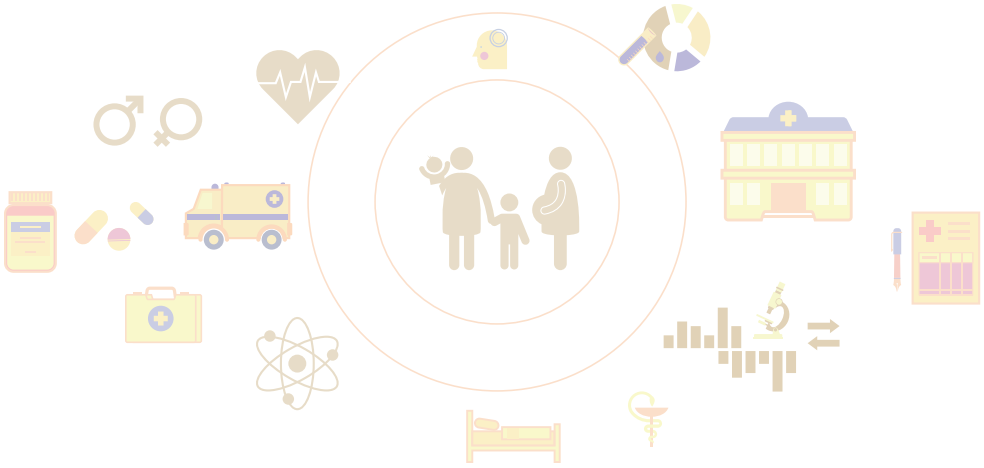
Context of this Report

As the public health care system consists of many different levels of facilities, system-wide measurement of efficiency often requires estimation of efficiency across the major types of facilities. We focus on the facility because health facilities are the main point through which most individuals interact with Bihar's health system. Understanding the capacities and efficiencies within and across different types of health facilities unveils the differences in health system performance at the level most critical to patients—the facility level. We believe that this information could be immensely valuable to governments and development partners.

In this report, we examine facility capacity across platforms (levels of services) as well as the efficiencies associated with service provision for each type of facility. We present details on human resources in terms of their numbers and functioning, and the opportunities and challenges related to human resources documented through interviews. Based on the patient exit interviews, we consider the factors that affect patient perceptions of and experiences with Bihar's health system. The findings are organized as follows:

- **Health facility profile:** This section provides an in-depth examination of health facility capacity across different platforms, specifically covering topics on infrastructure and equipment, service availability, human resources, patient volume, and facility costs associated with service provision.
- **Health facility efficiency:** This section provides estimation of facility-based efficiency using the data captured under the health profile.
- **Patient perspectives:** This section details findings as captured by the patient exit interviews serving as information on the demand-side factors of health service delivery.

The results discussed in this report are far from exhaustive; rather, they align with identified priorities for health service provision, address explicit goals set forth by national strategic plans, and aim to answer questions about the costs and efficiency of public sector health system in Bihar.



CHAPTER 2

ACCO Study Design

For this study in Bihar, we collected any relevant data that existed in the state's health system and conducted primary data collection through a three-pronged approach:

1. **Facility Survey:** A comprehensive facility survey was administered to a representative sample of health facilities in the four selected districts of Bihar.
2. **Human Resource (HR) Survey:** The medical and non-medical personnel of the sampled health facilities were interviewed.
3. **Patient's Exit Survey (PES):** Interviews were conducted with patients as they exited the sampled health facilities after receiving health care on the day of interview.

Here we provide an overview of ACCO study design and primary data collection mechanisms.

ACCO Facility Survey

Through the ACCO Facility Survey, direct data collection was conducted from district representative sample of health facilities and captured the information on the following indicators:

- **Inputs:** the availability of tangible items that are needed to provide health services, including infrastructure and utilities, medical supplies and equipment, pharmaceuticals, human resources, and non-medical services.
- **Finances:** expenses incurred, including spending on infrastructure and administration, medical supplies and equipment, pharmaceuticals including vaccines, and personnel. Facility funding from different sources (e.g., central and state governments) and revenue from service provision were also captured.
- **Outputs:** volume of services and procedures produced, including outpatient and inpatient care, emergency care, and laboratory and diagnostic tests.
- **Supply-side constraints and bottlenecks:** factors that affected the ease or difficulty with which patients received services they sought, including bed, personnel, and service availability.

Sample Design

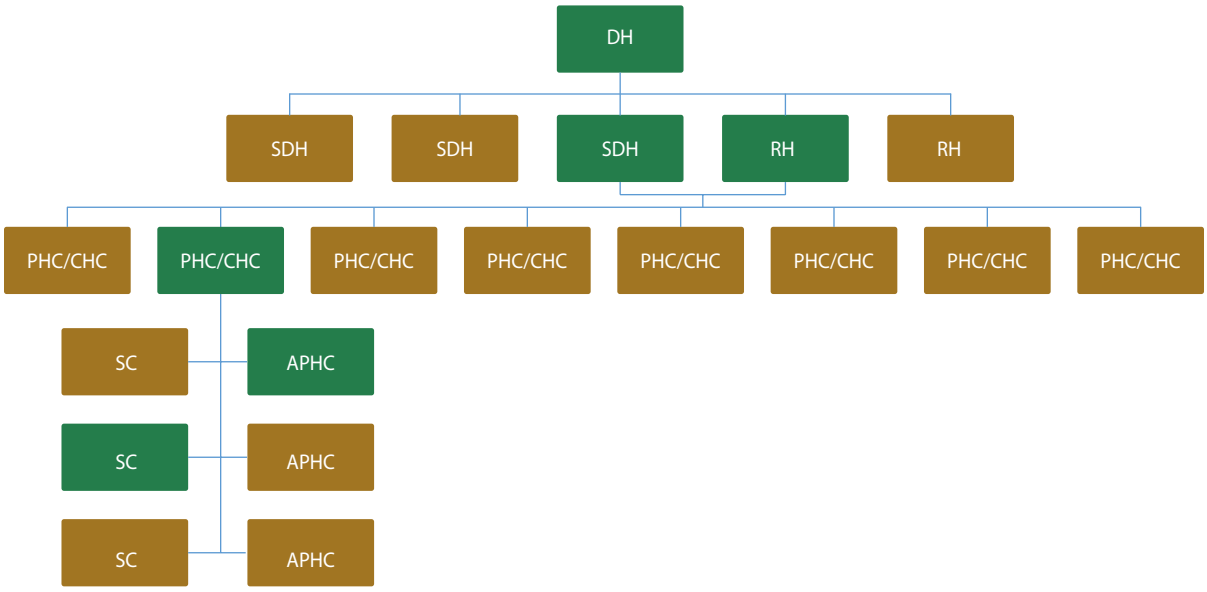
To construct a district representative sample of health facilities, we used a two-step stratified random sampling process. Two indicators were used to sample the required number of four districts. These were - coverage of full immunization in children aged 12-23 months (as an indicator of preventive health services) and coverage of safe delivery defined as institutional delivery or home delivery assisted by skilled birth attendant (as an indicator of facility-based health services). Data for these two indicators were drawn from the most recent National Family Heath Survey-4.[66] Districts, from which facilities would be drawn, were grouped into two categories – low and high – based on coverage of each of the two indicators with cut-off as the median coverage value for that indicator. The details of these indicators are shown in **Annexure 1**. We aimed to sample one district each from the four combinations of indicators shown below. The districts were sampled randomly until a reasonable geographic spread of districts was attained (Figure 4). The sampled districts are:

- Low proportion of safe delivery and low proportion of immunization - *East Champaran*
- Low proportion of safe delivery and high proportion of immunization - *Purnea*
- High proportion of safe delivery and low proportion of immunization - *Samastipur*
- High proportion of safe delivery and high proportion of immunization - *Aurangabad*

Figure 4: Sampled districts for ACCO study in Bihar

The second step, which entailed sampling facilities from each selected district, took place across the range of platforms in Bihar. For the ACCO study, a "platform" was defined as a channel or mechanism by which health services are delivered. In Bihar, sampled health facilities included district hospital (DH); sub-divisional and referral hospital (SDH and RH from a total of 3 to 4) for each sampled DH; one primary/community health centre (PHC/CHC one per block); and one additional PHC (APHC, 3-4 per block) and sub centre (SC, from a total or 15 to 19 per PHC) for each sampled PHC/CHC were randomly selected for the study (Figure 5). The facility sampling frame used for the ACCO study was based on the 766 public health facilities in four sampled districts listed in the Health Management Information System (HMIS) data portal of the Government of India.

Figure 5: Sampling strategy for health facilities in a district in the ACCO study



Selected facilities are in green.
DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre; SC: Sub centre

A total of 84 health facilities were sampled from 4 districts in Bihar (Table 2) using the sampling approach described above. Sampled facilities were replaced, if necessary, based on pre-defined criteria detailed in **Annexure 2.**

Table 2: Facility sample, by platform

Facility type	Available for sampling	Sampled for the study
District hospital	4	4
Sub-divisional hospital	11	4
Referral hospital	6	4
Community health centre/primary health centre	72	15/9
Additional primary health centre	86	24
Sub centre	587	24
Total health facilities	**766**	**84**

Human Resources Survey

All medical and non-medical personnel present in the health facility on the days of data collection were sampled for human resource profile assessment. The medical and para-medical personnel included medical doctor, nurse/ANM, laboratory technician, diagnostic technician and pharmacist. The administrative personnel of interest included were the facility manager and the accountant.

The medical doctors and facility administrators were given self-administered questionnaire to complete, and rest were interviewed by a trained interviewer. We chose self-administered questionnaires for the medical doctors and facility administrators keeping in mind the socio-cultural construct of the facilities and Bihar. Table 3 provides more information on the specific indicators included in the HR survey.

Table 3: Questions included in the HR Survey

Themes	Types of key questions
Demography	Age, caste, marital status, spouse and parent occupation
Training	Type of training, years since pre-service training, in-service training
Employment	Employment with Government of Bihar, employment with private sector
Satisfaction	Job satisfaction, salary satisfaction, opportunity of growth, team work

Patient Exit Interviews

A fixed number of patients or attendants of patients were interviewed at each sampled health facility unto primary health centre, based on the expected outpatient numbers for the facility. A target of 90 patients were interviewed at district hospitals, 40 each at sub-divisional and referral hospitals, and 35 at community and primary health centres. Patient selection was based on a convenience sample from the outpatients and emergency patients who visited the health facility on a given day to seek health care services.

The main purpose of the Patient Exit Interview was to collect information on patient perceptions of the health services they received and other aspects of their facility visit. This information fed into quantifying the "demand-side" constraints to receiving care. Table 4 provides more information on the specific indicators included in the exit interview. Eligibility for participation in the exit interviews was determined by age (presence of attendant for patients <15 years of age) and responsiveness (whether the patient or attendant was able to respond to questions). All data collected were kept confidential and was not shared with the health facility.

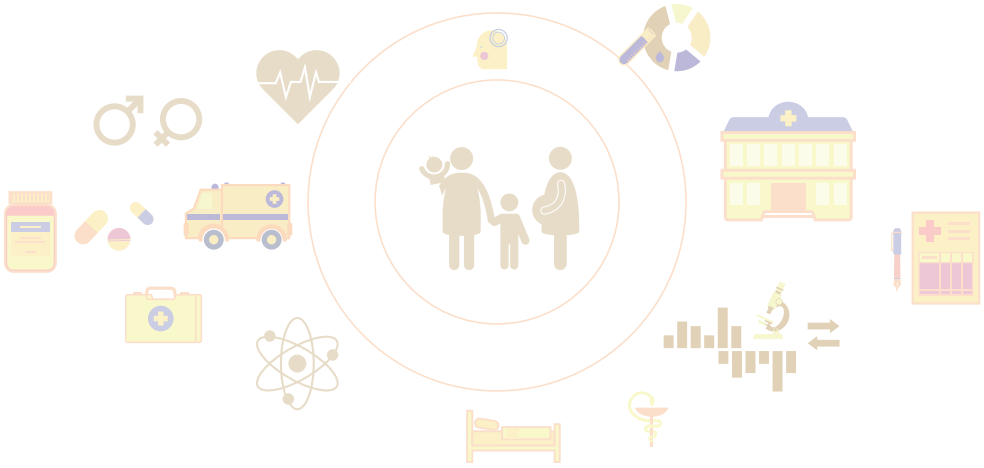
Table 4: Types of questions included in the Patient Exit Interview Survey

Themes	Types of key questions and response options
Demography	Age, gender, caste, religion, level of education
Accessibility, reasons for opting the facility	Circumstances and reasons for facility visit, travel time to facility, mode of transportation
Satisfaction with services	Satisfaction with medical provider, privacy during examination and treatment, space in waiting rooms, cleanliness of toilets in the facility
Cost of care	User fees, cost of medications, transportation, tests, procedures and tips

Data Collection for ACCO Study in Bihar

Data collection was done from December 2018 to February 2019. Prior to data collection, CHP and PHFI hosted a two-week training workshop for 21 interviewers and supervisors, where they received training on Bihar health system's organization, the electronic data collection software, the survey instruments, and interviewing techniques. Following this workshop, a one-week pilot of all survey instruments took place at the health facilities outside of the ACCO sample. Ongoing training occurred on an as-needed basis throughout the course of data collection.

All collected data went through a thorough verification process between PHFI, CHP and the field team. Following data collection, the data were methodically cleaned and re-verified, and securely stored in databases hosted at CHP and PHFI.



CHAPTER 3

Health Facilities Profile

The delivery of facility-based health services requires a complex combination of resources ranging from personnel to physical infrastructure, that vary in relative importance and costs to the facilities. Determining the factors that support the provision of services at lower costs and higher levels of efficiency at the facilities is crucial information to policymakers, especially to consider how to expand health system coverage and functions within constrained resources.

Using the ACCO facility sample, we analyzed five critical drivers of health facility service provision at facilities:

- Facility-based resources (for example, infrastructure, equipment, personnel, etc), which are often referred to as inputs.
- Patient volumes and services provided at facilities (for example, outpatient visits, inpatient visits, deliveries, immunization doses, etc), which are also known as outputs.
- Facility expenditures (production costs) for service delivery.
- Facility alignment of resources and service production, which reflects efficiency.
- Patient-reported experiences capturing demand-side factors of health service delivery.

These components build upon each other to create a comprehensive understanding of health facilities in Bihar, highlighting areas of high performance and areas for improvement.

Infrastructure, Equipment and Services

Health service provision depends on the availability of adequate facility infrastructure, equipment, and supplies (physical capital). In this report, we focus on essential components of physical capital - electricity, water, transportation, inpatient beds, and medical equipment (laboratory, imaging, and other medical equipment). Table 5 illustrates the range of physical capital, excluding medical equipment, available across the platforms. Of all the facilities surveyed, 16.8% of the additional primary health centres and 37.5% of sub-centres were functioning in a rented building. All the other facilities were functioning in owned government buildings.

Table 5: Availability of physical capital, by platform, 2017-18

		DH (N=4)	SDH (N=4)	RH (N=4)	CHC (N=15)	PHC (N=9)	APHC (N=24)	SC (N=24)
Power supply	Functional electricity 24x7	100%	100%	100%	100%	100%	54%	25%
Water	Piped water	100%	100%	100%	93%	100%	42%	17%
Transportation	Public transportation service within 0.5 kms of this facility	100%	50%	100%	93%	100%	54%	50%
	Access to ambulance services	100%	100%	100%	100%	100%	NA	NA
Inpatient beds	Total sanctioned beds	1,600	295	120	450	54	NA	NA
	% beds available out of sanctioned N (%)	766 (47.9%)	133 (45.1%)	100 (83.3%)	454 (100.9%)	104 (192.6%)	NA	NA
	% beds in-use for inpatients of the available beds N (%)	735 (96.0%)	123 (92.5%)	100 (100.0%)	458 (100.9%)	101 (97.1%)	NA	NA

DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre; APHC: Additional primary health centre; SC: sub-centre

Note: Values represent the percentage of facilities, by platform that had a given type of physical capital.

NA: Not applicable for this platform.

Lowest availability *Highest availability*

Power supply: All platforms until primary health centre reported 100% access to a functional electrical supply, which meant that these facilities had 24x7 availability of electricity irrespective of source. Half of the additional primary health centres and three-fourth of the sub-centres lacked functional electricity. This inadequate access to consistent electric power could have implications for health service provision at these lower levels of health platforms.

Water: Availability of piped water was nearly universal until the community health centres. Piped water was far less in the additional primary health centres (42%) and only 17% of the sub-centres reported such an access. The major other source of water in additional primary health centres (42%) and sub-centres (61%) was hand pump and through water tanker. This finding is worrisome as it suggests that adequate sanitation practices may be difficult for these facilities to implement.

Transportation: A good access to the health facility was considered if a public transport could get patients within 0.5km of the health facility. All district and referral hospitals, and primary health centres, and nearly all community health centres had good access. The platforms that are meant to be closer to the community, this access was poorer with only 54% and 50% of the additional primary health centres and sub-centres having good access, respectively. The availability of an ambulance service irrespective of ownership was universal up to the primary health centre.

Inpatient beds: The district hospitals, sub-divisional hospitals and referral hospitals reported a lower availability of inpatient beds as compared to the total number sanctioned, whereas the community and primary health centres reported a higher number against the sanctioned. All types of facilities reported nearly 100% inpatient beds being in use on a routine basis.

Equipment: We used the WHO's Service Availability and Readiness Assessment framework as guideline for what types of equipment should be available across the platforms. For the three main types of facility equipment—medical, laboratory, and imaging equipment—clear differences emerged across the levels of health service provision, with Table 6 summarizing the availability of functional equipment by platform. The availability of basic medical equipment such as weighing scale and blood pressure apparatus was not universal across the platforms. Only half of the district hospitals reported an incubator availability for neonatal health. Microscopes and corresponding components were largely available among all facilities based on the guidelines by platform. Additional testing capacity was reasonable in all hospitals and community and primary health centres. Most facilities had glucometers than the test strips essential for carrying out the test. X-ray machine was available in all district hospitals but the other equipment had varying availability. Only 50% district hospitals reported having an ultrasonography (USG) machine and 75% reported having ECG. No facility below district hospital reported the availability of ECG and USG machines, except one primary health centre. No hospital reported availability of CT-Scan machine.

Table 6: Availability of functional equipment, by platform

	DH (N=4)	SDH (N=4)	RH (N=4)	CHC (N=15)	PHC (N=9)	APHC (N=24)	SC (N=24)
Basic medical equipment							
Adult Weighing Scale	100%	75%	100%	93%	78%	58%	71%
Child Weighing Scale	100%	100%	75%	80%	100%	79%	63%
Blood Pressure Apparatus (digital or manual with cuff)	100%	100%	100%	100%	100%	92%	88%
Stethoscope	100%	100%	100%	100%	100%	92%	79%
Incubator	50%	25%	0%	27%	56%	17%	NA
Laboratory equipment							
Glucometer	75%	75%	100%	80%	67%	17%	4%
Blood glucose test strips (for use with glucometer)	25%	75%	50%	47%	22%	4%	0%
Hematologic cell counter/ analyzer	75%	100%	100%	93%	89%	NA	NA
Blood chemistry analyzer	100%	100%	100%	93%	89%	NA	NA
Centrifuge	100%	100%	100%	80%	78%	NA	NA
Microscope	100%	100%	75%	93%	67%	8%	NA
Slides	100%	100%	100%	93%	78%	13%	NA
Imaging equipment							
X-ray Machine	100%	50%	25%	40%	56%	NA	NA
ECG	75%	0%	0%	7%	0%	4%	NA
Ultrasound	50%	NA	NA	NA	11%	NA	NA
CT scan	NA	NA	NA	NA	NA	NA	NA

DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre; APHC: Additional primary health centre; SC: sub-centre

Note: Availability of a particular piece of equipment was determined based availability on the day of visit. Data on the number of items present in a facility were not collected. All values represent the percentage of facilities, by platform, that had a given piece of equipment; NA: Not applicable to this platform according to standards.

Lowest availability *Highest availability*

Service provision

We documented the availability of service provision for health facilities, which was defined as facility reporting availability of a given service at least one day a week. Across and within the platforms in Bihar (Table 7), several notable findings emerged for facility-based health service provision. While fundamental services such as routine deliveries, general medicine, immunization, and pharmacy were nearly universally available until the community health centres, services for non-communicable diseases were predominantly available only at the district hospitals. All district hospitals reported a wide range of services such as orthopedics, ophthalmology, dermatology, surgical services, dentistry but the emergency obstetrics, cardiology, mental health and cancer related services were not reported at all district hospitals. Sub-divisional hospitals generally offered fewer services and the referral hospitals even fewer than the district hospitals.

Table 7: Availability of services in health facilities, by platform

Service	DH (N=4)	SDH (N=4)	RH (N=4)	CHC (N=15)	PHC (N=9)	APHC (N=24)
Routine delivery	100%	100%	100%	100%	100%	29%
Basic Emergency obstetrics Care (BEmOC)	100%	100%	100%	100%	100%	17%
Comprehensive Emergency obstetrics Care (CEmoC)	100%	50%	0%	NA	NA	NA
General gynecological services	100%	100%	100%	100%	100%	67%
General pediatrics Services	100%	100%	100%	100%	100%	67%
Immunisation	100%	100%	100%	100%	100%	83%
General anesthesiology	75%	75%	25%	NA	NA	NA
Major surgical	100%	25%	0%	NA	NA	NA
Minor surgical	100%	100%	100%	100%	100%	NA
24x7 - Accident and emergency services	100%	100%	100%	100%	100%	NA
Orthopedics	100%	0%	0%	0%	0%	NA
Ophthalmology*	100%	0%	25%	0%	0%	NA
Basic Cardiology	75%	0%	0%	0%	0%	NA
Internal medicine	100%	100%	100%	100%	100%	88%
Primary Burn Care	75%	25%	50%	7%	11%	NA
Dentistry	100%	100%	100%	93%	89%	NA
Mental health	75%	0%	0%	NA	NA	NA
Cancer Screening or treatment	50%	0%	0%	0%	NA	NA
General Dermatology	100%	75%	25%	47%	56%	46%
TB treatment#	75%	75%	100%	100%	100%	8%
STI/HIV	100%	100%	100%	73%	78%	NA

Service	DH (N=4)	SDH (N=4)	RH (N=4)	CHC (N=15)	PHC (N=9)	APHC (N=24)
Alternative medicine	0%	0%	0%	0%	0%	4%
Pharmacy[$]	100%	100%	100%	100%	100%	96%
Blood bank/Blood Storage Unit	75%	25%	0%	0%	0%	0%
Radiological and Imaging Services Diagnostic	100%	50%	25%	33%	56%	0%
Pathological Laboratory	100%	100%	100%	100%	89%	0%
Mortuary	100%	0%	0%	0%	0%	0%

DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre; APHC: Additional primary health centre

Note: All values represent the percentage of facilities, by platform that reported offering a given service at least one day during a typical week.

*NA: Not applicable to this platform according to standards; * Includes ophthalmic technician availability*

[#] TB centre in DH Purnea is working separately outside the DH premises; [$] Considered service available if drugs were distributed to patients

Lowest availability *Highest availability*

We further examined facility capacity for a subset of specific services – antenatal care, routine delivery, and general surgery. For these analyses of service provision, we only included facilities that reported providing a specific service, excluding facilities that were potentially supposed to provide a given service but did not report providing it. Thus, our findings reflect more of a service capacity "ceiling" across platforms, as we are not reporting on the facilities that likely should provide a given service but have indicated otherwise.

Antenatal care services

According to the National Family Health Survey-4, only 14% of women had at least four or more antenatal care (ANC) visits during their last pregnancy in Bihar.[66] This is a low level of coverage, and neither reflects what services were actually provided nor the quality of care received. Through the ACCO Facility Survey, we estimated the proportion of facilities that stocked the range of tests and medical equipment to conduct a routine ANC visit. It is important to note that this list was not exhaustive but represented a number of relevant basic supplies necessary for the provision of ANC.

Across the levels of care, we found gaps between facility-reported capacity for ANC provision and the facility capacity to deliver ANC care (Table 8). While all facilities reported providing ANC services, only 25% of districts hospitals, 50% each of sub-divisional and referral hospitals, 33% of community health centres and 11% of primary health centres were adequately equipped with basic laboratory and medical equipment to provide ANC services. This service-capacity gap meant that many facilities, from district hospitals to the lower levels of care, lacked at least one of the functional equipment needed to optimally address the range of patient needs during an ANC visit. Lack of simple tests or material for tests (such as glucometer and test strips) prevented most facilities from being listed as fully equipped to provide ANC services. These findings do not suggest that these platforms are entirely unable to provide adequate ANC services; it simply means that the vast majority of facilities did not have the recommended diagnostics and medical equipment necessary for ANC service provision.

Table 8: Availability of tests and functional equipment to perform routine antenatal care services, by platform

	DH	SDH	RH	CHC	PHC	APHC	SC
Testing availability							
Hematologic counter/ analyser	75%	100%	100%	93%	89%	NA	NA
Glucometer	75%	75%	100%	80%	67%	17%	4%
Blood glucose test strips (for use with glucometer)	25%	75%	50%	47%	22%	4%	0%
Functional equipment							
Blood Pressure Apparatus (digital or manual with cuff)	100%	100%	100%	100%	100%	92%	88%
Adult weighing Scale	100%	75%	100%	93%	78%	58%	71%
Ultrasound	50%	NA	NA	NA	11%	NA	NA
Service summary							
Facilities reporting ANC services	100%	100%	100%	100%	100%	100%	100%
Facilities have basic equipment for ANC provision based on above tests and equipment availability	25%	50%	50%	33%	11%	0%	0%

DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre; APHC: Additional primary health centre; SC: sub-centre

Note: Availability of a given ANC item was determined by its availability at a facility on the day of visit. All values represent the percentage of facilities, by platform that had the given ANC item. NA: Not applicable to this platform according to standards.

Lowest availability *Highest availability*

Delivery care services

In Bihar, 63.8% of deliveries are in health facility according to the NFHS-4 survey (2015-16).[66] Availability of essential equipment is necessary for providing high-quality delivery care; these results are presented in Table 9. Availability was generally the highest in district hospitals, with some decline at lower levels with notable gaps among additional primary health centres. An ultrasound machine was available only in 50% of the district hospitals and none in sub-divisional and referral hospitals despite it being an essential item for service provision. The most gap was noticed in the availability of vacuum extractor and dilation and curettage kit. Again, we found gap between the proportion of facilities, across platforms, that reported providing routine delivery services and those that were fully equipped for their provision.

Table 9: Availability of blood tests and functional equipment to perform routine delivery care, by platform

	DH	SDH	RH	CHC	PHC	APHC
Testing availability						
Hematologic counter/analyzer	75%	100%	100%	93%	89%	NA
Glucometer	75%	75%	100%	80%	67%	17%
Blood glucose test strips (for use with glucometer)	25%	75%	50%	47%	22%	4%
Medical equipment						
Blood Pressure Apparatus (digital or manual with cuff)	100%	100%	100%	100%	100%	92%
IV Catheters	100%	100%	100%	93%	100%	38%
Gowns	100%	100%	100%	93%	89%	33%
Measuring tape	100%	75%	100%	93%	89%	83%
Masks	100%	100%	100%	93%	89%	42%
Sterilization equipment (dry heat sterilizer)/Autoclave	100%	100%	100%	93%	78%	38%
Adult bag-valve-mask (AMBU Bag)	100%	75%	50%	40%	56%	17%
Ultrasound	50%	NA	NA	NA	11%	NA
Delivery Equipment						
Infant Scale (weight graduation min 100 grams)/Digital weighing scale	100%	75%	100%	100%	100%	33%
Needle driver/holder	100%	100%	100%	100%	100%	38%
Speculum (Sim's)	100%	75%	100%	100%	100%	17%
Dilation & Curettage Kit (or equivalent equipment)	50%	75%	75%	40%	44%	13%
Neonatal bag-valve- mask (AMBU Bag)	100%	100%	100%	100%	100%	50%
Vacuum extractor	50%	50%	75%	53%	33%	NA
Newborn care corner	100%	100%	100%	87%	78%	17%
Service summary						
Facilities reporting delivery services	100%	100%	100%	100%	100%	100%
Facilities have basic equipment for delivery services based on above tests and equipment availability	25%	25%	25%	7%	0%	0%

DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre; APHC: Additional primary health centre

Note: Availability of a given delivery item was determined by its availability at a facility on the day of visit. All values represent the percentage of facilities, by platform, that had the given delivery item. NA: Not applicable to this platform according to standards.

Lowest availability *Highest availability*

Major surgery services

Availability of essential laboratory tests and equipment for major surgical services is presented in Table 10 for district and sub-divisional hospitals as only these facilities provide this service. None of the district hospitals and sub-divisional hospitals were fully equipped with all basic equipment required for major surgical services.

Table 10: Availability of blood tests and functional equipment to perform major surgery, by platform

	District Hospital	Sub-divisional Hospital
Testing availability		
Hematologic counter/analyser	75%	100%
Medical equipment		
Blood Pressure Apparatus (digital or manual with cuff)	100%	100%
IV Catheters	100%	100%
Sterilization equipment (dry heat sterilizer)/Autoclave	100%	100%
Gowns	100%	100%
Masks	100%	100%
Adult bag-valve-mask (AMBU Bag)	100%	75%
Surgical equipment		
Thermometer for measuring human temperature	75%*	100%
General anesthesia equipment	75%	50%
Scalpel	100%	50%
Suction apparatus	75%	100%
Surgical Retractors (hand or self-retaining)	75%	75%
Nasogastric tube	75%	100%
Blood bank or Blood storage unit	50%	50%
Intubation equipment	25%	25%
Service summary		
Facilities reporting major surgical services	100%	25%
Facilities fully equipped for major surgical services based on above tests and equipment availability	0%	0%

Note: Availability of a given surgery item was determined by its availability at a facility on the day of visit. All values represent the percentage of facilities, by platform, that had the given surgery item. NA: Not applicable to this platform according to standards.

** Data not available for one district hospital*

Lowest availability *Highest availability*

Overview by district

Using the availability of basic functional equipment for provision of ANC, delivery and major surgical services documented above, Table 11 below shows these availabilities by district. For the higher level platform, the referral hospital in Aurangabad, the district hospital in Purnea, and the sub-divisional hospital in Samastipur district were fully equipped to deliver ANC and delivery services. The sub-divisional and referral hospitals in East Champaran were fully equipped to deliver ANC but not delivery services. The proportion of community and primary health centers that were fully equipped to deliver ANC and delivery services was very low.

Table 11: Overview of facilities fully equipped by district, by platform

District/Platform	Aurangabad	Purnea	Samastipur	East Champaran
ANC services				
District Hospital	0%	100%	0%	0%
Sub-divisional Hospital	0%	0%	100%	100%
Referral Hospital	100%	0%	0%	100%
Community Health Centres	40%	0%	33%	40%
Primary Health Centres	0%	25%	0%	0%
Additional Primary Health Centres	0%	0%	0%	0%
Sub Centre	0%	0%	0%	0%
Delivery services				
District Hospital	0%	100%	0%	0%
Sub-divisional Hospital	0%	0%	100%	0%
Referral Hospital	100%	0%	0%	0%
Community Health Centres	0%	0%	33%	0%
Primary Health Centres	0%	0%	0%	0%
Additional Primary Health Centres	0%	0%	0%	0%
Major surgery				
District Hospital	0%	0%	0%	0%
Sub-divisional Hospital	0%	0%	0%	0%

Human Resources for Health

Bihar has had challenge of having enough skilled personnel and ensuring their equitable distribution to both urban and rural areas.[67, 68] The availability of staff, its size and composition can directly affect the type, extent and quality of service provision for a given facility. In this section, we describe the current scenario with human resources in the sampled ACCO health facilities.

Availability

Table 12 shows the current strength of personnel against the number sanctioned by platform and cadre. The highest proportion of filled posts were seen at the referral hospitals (77.2%), and the least proportion of positions were filled at the district (28.7%) and sub-divisional hospitals (29%). By cadre, the highest proportion of filled posts were documented for paramedical staff at the primary health centres (92.4%). It is important to note that some filled posts also included staff on deputation.

Table 12: Strength of staff at health facility, by cadre and platform

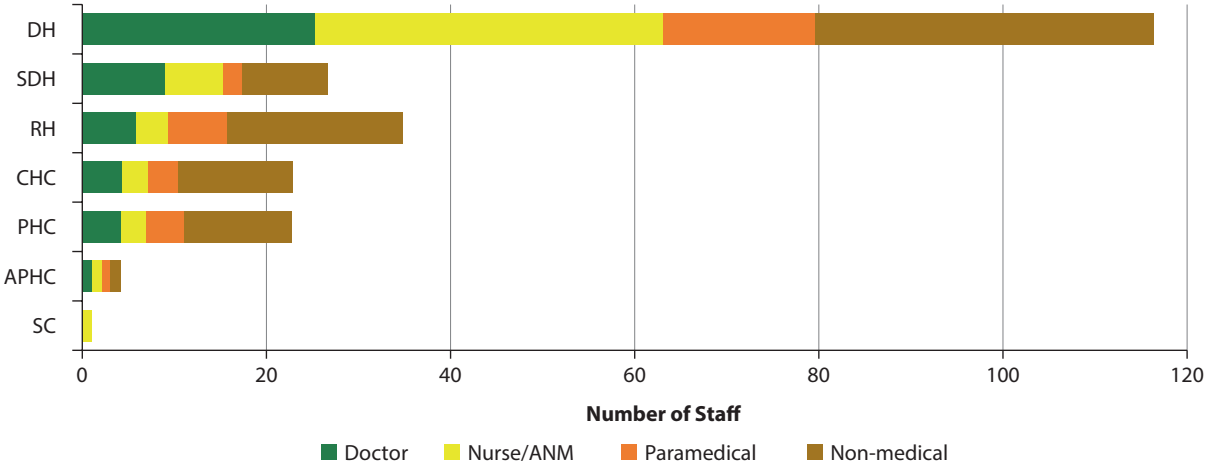
		Doctors	Nurses/ ANM	Paramedical staff	Non-medical staff	All staff
District Hospital	Sanctioned	282	626	254	461	1,623
	Filled/posted against sanctioned N (%)	101 (35.8)	151 (24.1)	66 (26.0)	147 (31.9)	465 (28.7)
Sub-divisional Hospital	Sanctioned	92	137	65	79	373
	Filled/posted against sanctioned N (%)	36 (39.1)	25 (18.2)	8 (12.3)	39 (49.4)	108 (29.0)
Referral Hospital	Sanctioned	34	18	36	92	180
	Filled/posted against sanctioned N (%)	23 (67.6)	14 (77.8)	26 (72.2)	76 (82.6)	139 (77.2)
Community Health Centre	Sanctioned	141	283	147	239	810
	Filled/posted against sanctioned N (%)	64 (45.4)	186 (65.7)	44 (29.9)	46 (19.2)	340 (42.0)
Primary Health Centre	Sanctioned	94	199	79	141	513
	Filled/posted against sanctioned N (%)	57 (60.6)	117 (58.8)	73 (92.4)	41 (29.1)	288 (56.1)

Composition

As expected, the highest total number of staff are concentrated at the district hospitals. Additional primary health centres maintained a smaller body of health workers, average total of 4.1 staff per facility. Community health centres reported an average of 22.8 staff per facility in total, and 12.4 of whom were non-medical staff. Primary health centres reported an average of 22.7 staff per facility in total, most of which were also non-medical staff. Finally, as expected, the sub centres reported the lowest number of staff, with only 1 nurse/ANM per facility.

Considering the average number of staff, heterogeneity was found across facility types in Bihar (Figure 6). Overall, the most common staff at district hospitals were nurses/ANMs (37.8), the non-medical staff (36.8) followed by doctors (25.3). On the other hand, non-medical staff (12.0) out-numbered both the doctors (4.2) and nurses/ANMs (5.6) at primary and community health centres.

Figure 6: Composition of facility personnel, by platform



The comparison of staff for each sampled facility by sanctioned number and available number is shown in **Annexure 3.**

We compared the ratio of nurses/ANMs to doctors, and the ratio of nurses/ANMs and doctors combined to the other staff found in the sampled facilities with that recommended in the respective Indian Public Health System (IPHS) guidelines.[64] All the district, sub-divisional and referral hospitals except one sub-divisional hospital had less than the recommended ratio for the nurse to doctor ratio (Figure 7) and the nurses/ANMs and doctors combined to the other staff ratio (Figure 8). Overall, in these hospitals, the difference with the recommended ratio was more pronounced for the nurse to doctor ratio than the nurses/ANMs and doctors combined to the other staff ratio; and the district hospitals had the worst ratio for the nurse to doctor as compared with the recommended guidelines. The nurse to doctor ratio in one sub-divisional hospital was 9 times higher than the recommended guidelines.

Figure 7: Difference in the nurse to doctor ratio in the sampled district, sub-divisional and referral hospitals as compared with the recommendations in the respective IPHS guidelines

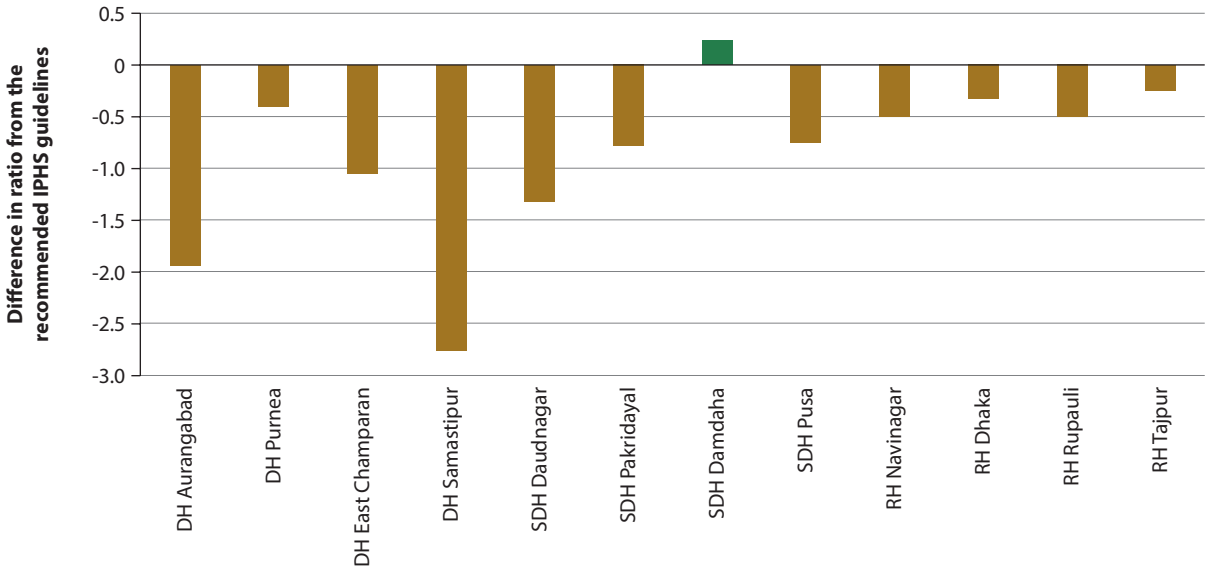
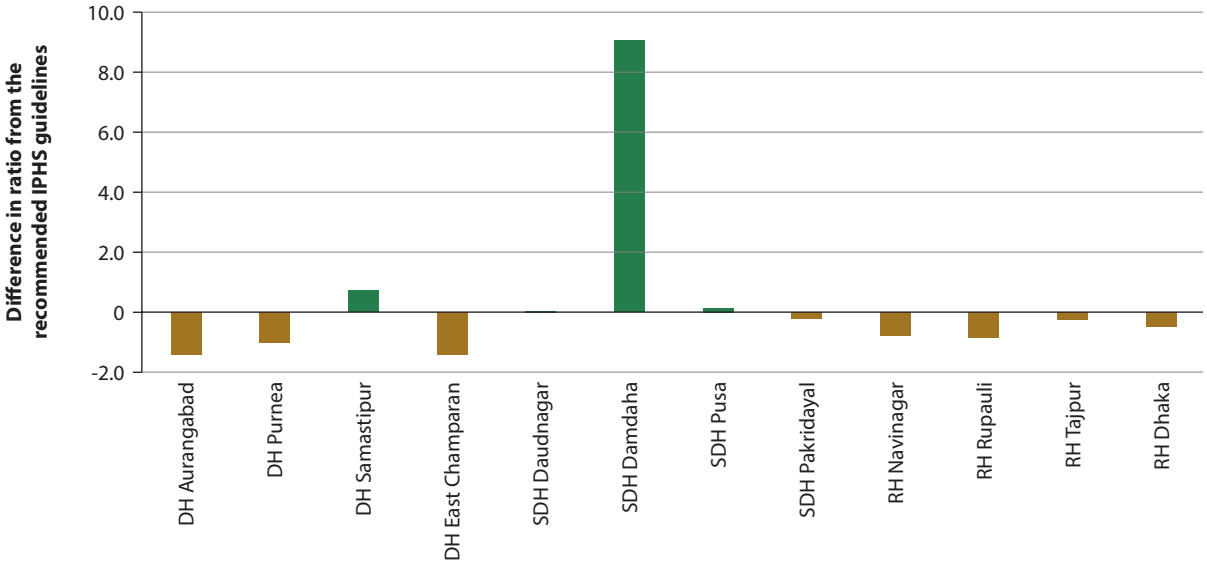


Figure 8: Difference in the nurses/ANMs and doctors combined to the other staff ratio in the sampled district, sub-divisional and referral hospitals as compared with the recommendations in the respective IPHS guidelines



Considering the community and primary health centres, all except 5 community health centres had less than the recommended nurse to doctor ratio, and difference from the recommended guidelines was more pronounced for the primary health centres (Figure 9). On the other hand, all except one primary health centre had less than the recommended ratio for the nurses/ANMs and doctors to the other staff, and difference from the recommended guidelines was more pronounced for the community health centres (Figure 10).

Figure 9: Difference in the nurse to doctor ratio in the sampled community and primary health centres as compared with the recommendations in the respective IPHS guidelines

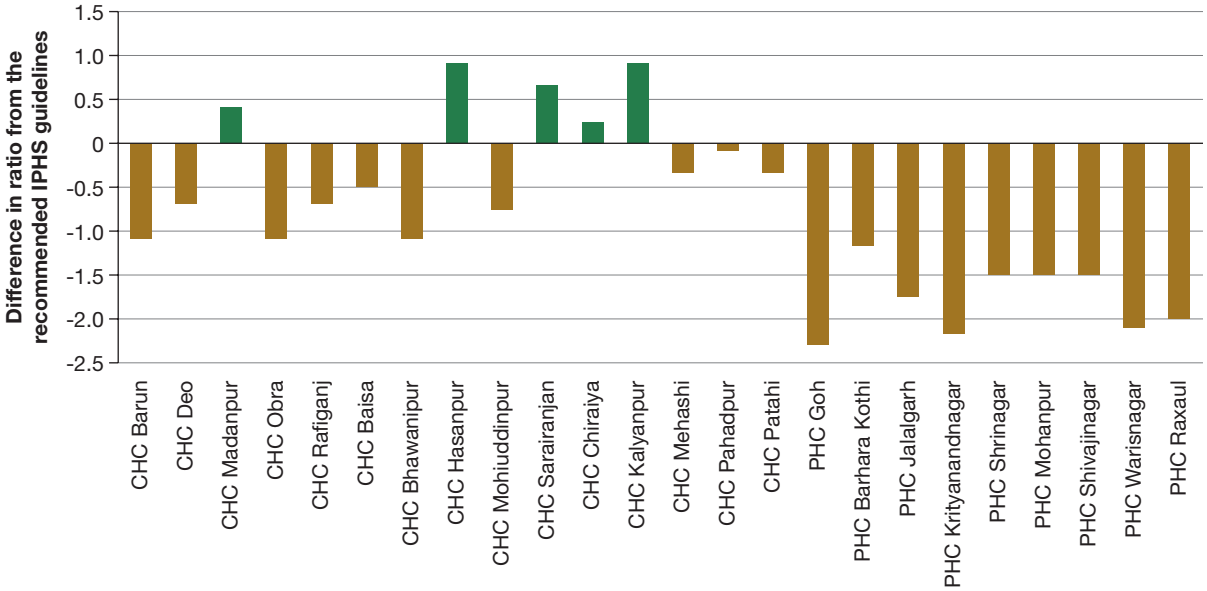
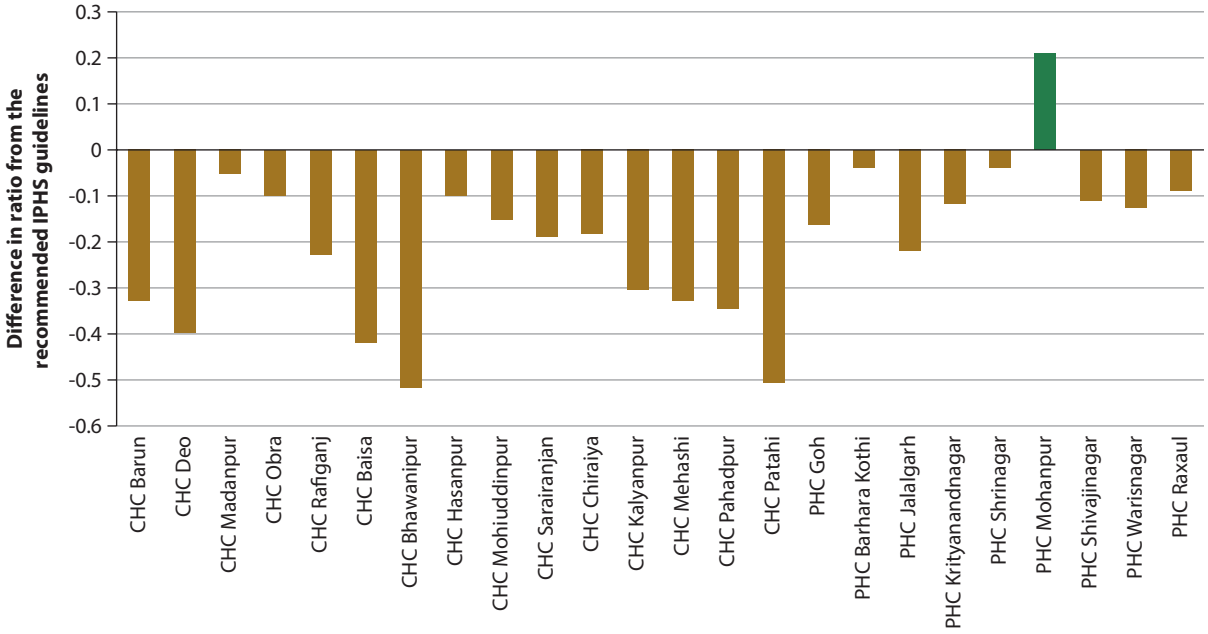
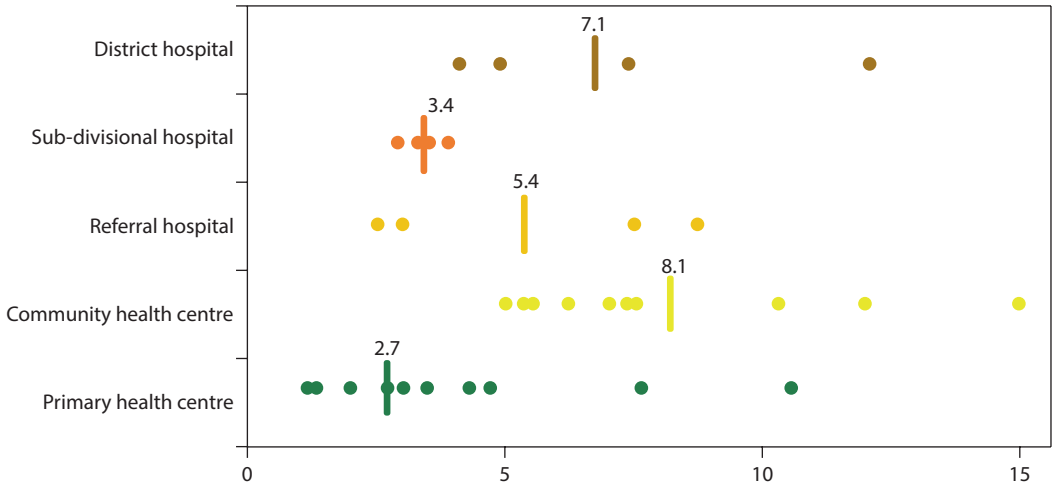


Figure 10: Difference in the nurses/ANMs and doctors to the other staff ratio in the sampled community and primary health centres as compared with the recommendations in the respective IPHS guidelines



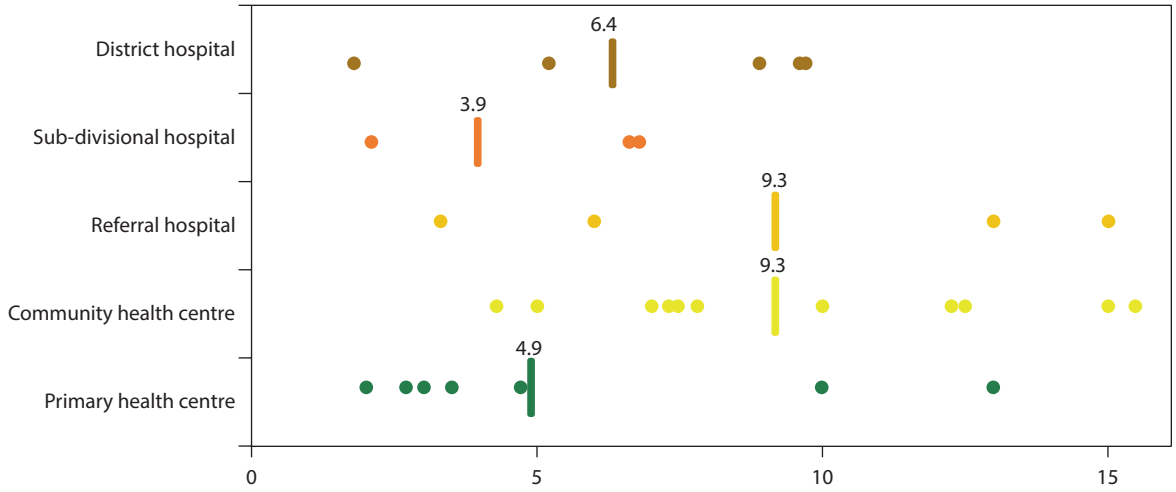
The ratio of number of beds to number of doctors is presented in Figure 11. The ratio of beds to doctors was the highest for the community health centres (8.1), followed by district hospitals (7.1). The ratio of beds to doctors was most heterogeneous for community health centres, ranging from 5.0 to 15.0.

Figure 11: Ratio of beds to doctors by platform. Vertical bars represent the platform average ratio



The ratio of number of beds to number of nurses is presented in Figure 12. This ratio was the highest for community health centres (mean 9.1, ranging from 4.3 to 15.5). The ratio for district hospitals was 6.4 and was 3.9 for sub-divisional hospitals. The range of this ratio for the primary health centres was 2 to 13.

Figure 12: Ratio of beds to nurses by platform. Vertical bars represent the platform average ratio



In isolation, facility staffing numbers are less meaningful without considering a facility's overall patient volume and production of specific services. Further, some facilities may have much smaller patient volumes than others, and thus "achieving" staffing targets could leave them with an excess of personnel given patient loads. While an overstaffed facility has a different set of challenges than an understaffed one, each reflects a poor alignment of facility resources and patient needs. An overstaffed facility has a different set of challenges than an understaffed one and each of these reflects a poor alignment of facility resources and patient load. To better understand bottlenecks in service delivery and areas to improve costs, it is important to assess a facility's capacity (inputs) in the context of its patient volume and services (outputs). We further explore these findings in the "Efficiency" section. As part of the ACCO study, we compare levels of facility-based staffing with the production of outputs. In this report, we primarily focus on the delivery of health services by skilled medical personnel, which include doctors, nurses, and other paramedical staff. It is possible that non-medical staff also contribute to service provision, especially at lower levels of care, but the ACCO study is not currently positioned to analyze these scenarios.

Demography

Using data collected from the individual interviews of staff in the sampled facilities, we examined the demographic characteristics of certain cadre of staff. The six cadres included - medical doctor, nurse/ANM, diagnostic technician, pharmacist, accountant, and the health facility manager. A total of 723 staff were interviewed across all the sampled facilities (Table 13), of whom 49.4% were women. By cadre, the proportion of women interviewed was 11.1%, 100%, 5.9%, 5.4%, 12.1% and 4.7% among the doctors, nurses/ANM, diagnostic technicians, pharmacist, manager and accountant, respectively.

Table 13: Cadre distribution of the staff interviewed, by platform

	District Hospital	Sub-divisional Hospital	Referral Hospital	Community Health Centre	Primary Health Centre	Additional Primary Health Centre	Sub Centre	Total
	N=196 (%)	N=77 (%)	N=60 (%)	N=125 (%)	N=184 (%)	N=57 (%)	N=24 (%)	N=723 (%)
Percent of women	115 (58.7%)	41 (53.3%)	23 (38.3%)	69 (37.5%)	55 (44.0%)	30 (52.6%)	24 (100%)	357 (49.4%)
Medical doctors	50 (25.5%)	17 (22.1%)	19 (31.7%)	48 (26.1%)	24 (19.2%)	23 (40.4%)	NA	181 (25.0%)
Nurses/ANM	104 (53.1%)	36 (46.8%)	19 (31.7%)	64 (34.8%)	51 (40.8%)	25 (43.9%)	24 (100.0%)	323 (44.7%)
Diagnostic technician*	19 (9.7%)	9 (11.7%)	10 (16.7%)	27 (14.7%)	15 (12.0%)	5 (8.8%)	NA	85 (11.8%)
Pharmacist	11 (5.6%)	5 (6.5%)	2 (3.3%)	7 (3.8%)	9 (7.2%)	3 (5.3%)	NA	37 (5.1%)
Manager	3 (1.5%)	3 (3.9%)	4 (6.7%)	15 (8.2%)	8 (6.4%)	NA	NA	33 (4.6%)
Accountant	9 (4.6%)	7 (9.1%)	6 (10.0%)	23 (12.5%)	18 (14.4%)	1 (1.8%)	NA	64 (8.9%)

** 90.6% of them were laboratory technicians; NA: not applicable*

In this section, we detail the age and caste distribution, education and training, and employment history of human resources.

Age

Figure 13 shows the age distribution of the staff by cadre. Overall, 28.6% of all staff interviewed were 50 years of age or more. The proportion of those 50 years or more was the highest among medical doctors (43.1%) followed by the pharmacist (32.4%). The facility managers and accountants were relatively younger than the other cadres. **Annexure 4** documents the age distribution of staff by cadre for each platform.

Caste

People belonging to the other backward caste (38.7%) and general category (32.1%) accounted for most of the health facility staff (Figure 14). Nearly half of the doctors (46.4%) and 39.4% of the managers belonged to the general category, and nurses/ANMs (47.1%), pharmacist (56.8%) and diagnostic technicians (41.2%) were more likely to belong to the Other backward caste. Among the 90 (12.5%) staff who belonged to Scheduled Caste, 39% of them were nurses/ANMs. For the Scheduled Tribe group, 81% of them were employed as nurses/ANMs. **Annexure 5** documents caste distribution of staff across platforms by cadre.

Figure 13: Age distribution of staff, by cadre

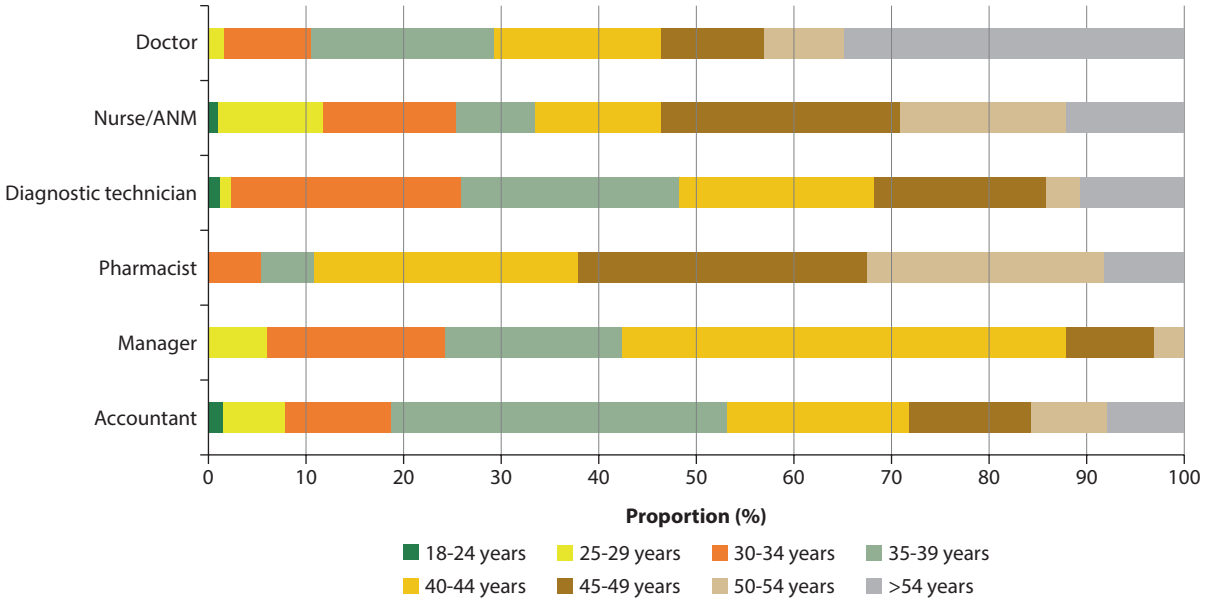
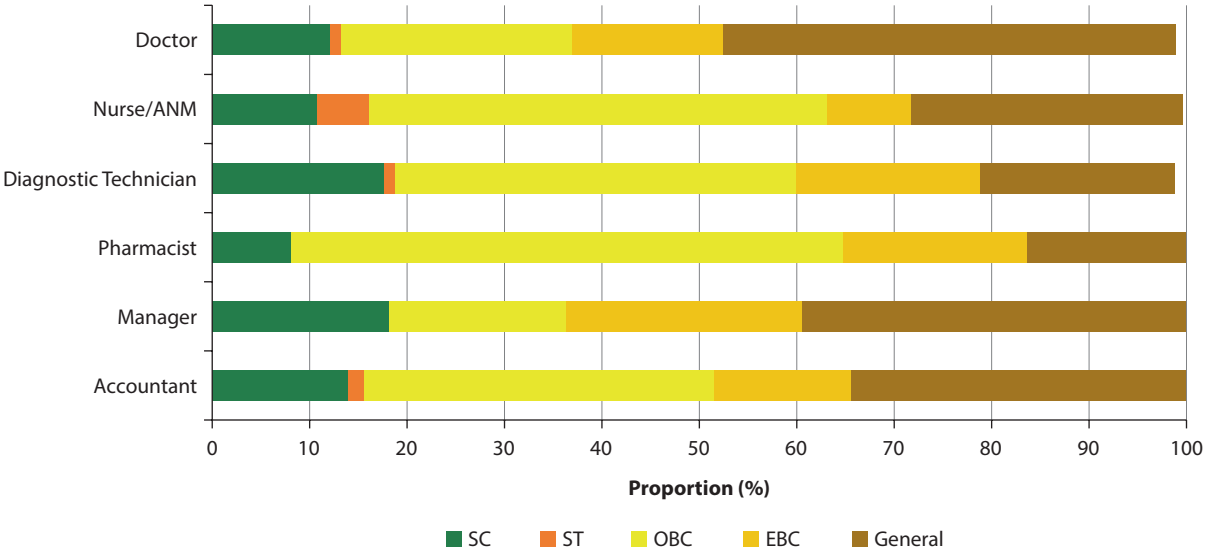


Figure 14: Caste distribution of staff, by cadre



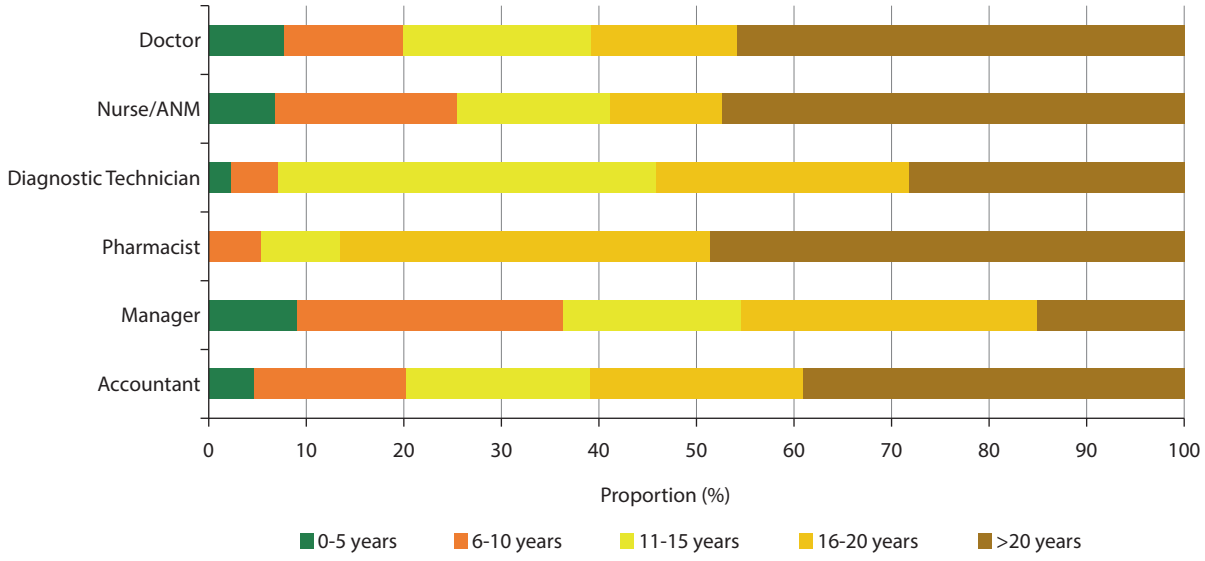
SC: Schedule caste; ST: Schedule tribe; OBC: Other backward caste; EBC: Extremely backward caste

Education and training

Pre-service training

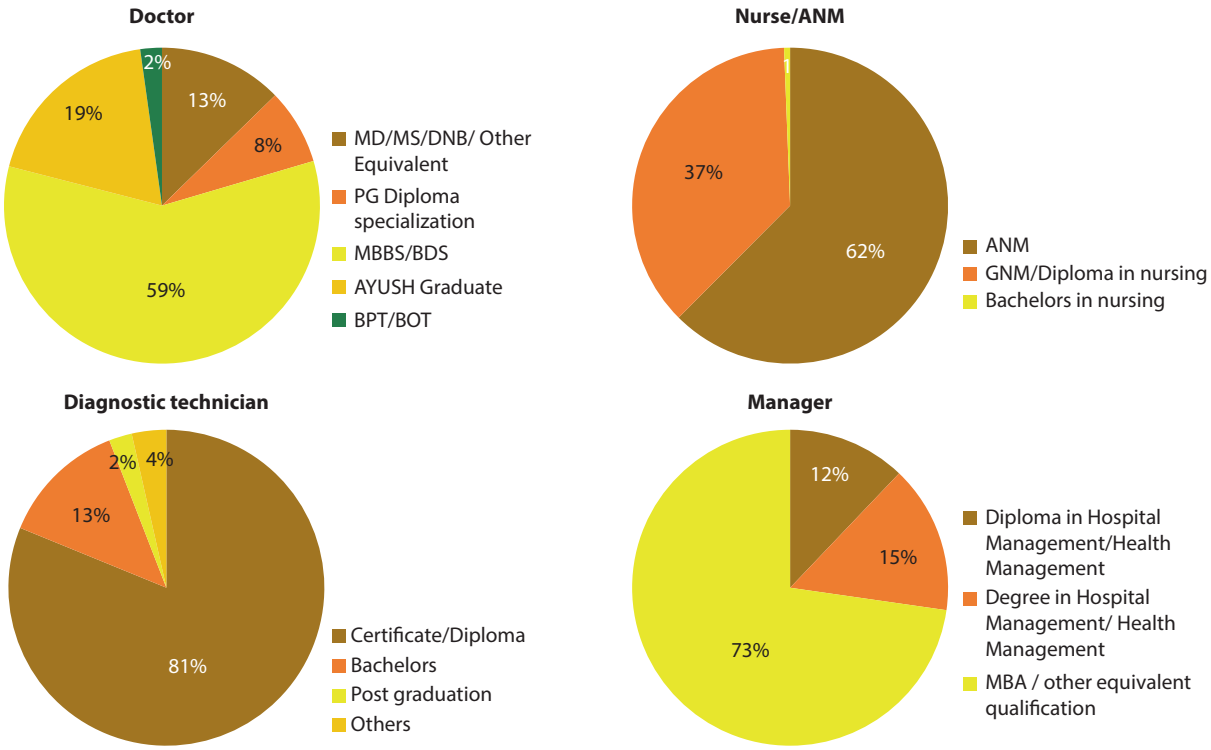
Irrespective of the staff category, 78.6% of them had received their pre-service training in Bihar and an additional 8.6% in Jharkhand. More than 40% of doctors, nurses/ANMs and pharmacist had received their pre-service training more than 20 years ago. Overall, around 60% of these staff had received their pre-service training more than 15 years ago (Figure 15).

Figure 15: Years since pre-service education, by cadre



Majority of the doctors reported bachelor in medicine or dentistry (59%) as their pre-service education, followed by 21% with postgraduate degree or diploma in specialized medical/dental sciences (Figure 16). Of all doctors interviewed, 19% were graduates of Indian systems or Medicine (AYUSH)[1] and 2% were graduate in physiotherapy or occupational therapy (BPT/BOT) (Figure 16).

Figure 16: Distribution of pre-service education of doctors, nurse/ANM, diagnostic technicians and managers, proportions



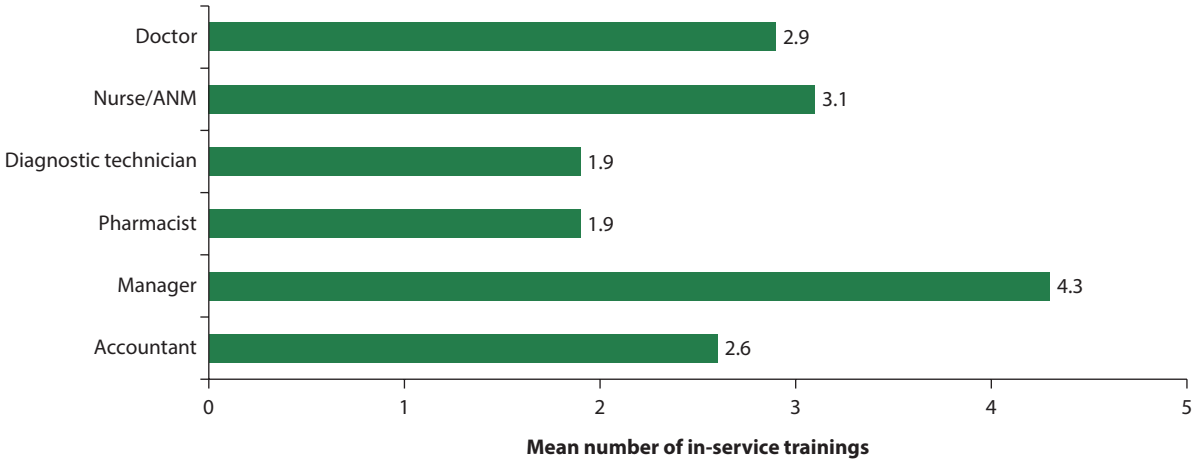
1 Ayurveda, Unani, Siddha, Homeopathy.

Among the interviewed nurses/ANMs, 62% had completed ANM training and 37% had completed GNM training. Majority of the interviewed diagnostic staff (81%) had completed a certificate or diploma course in diagnostic, while only 13% and 2% had a Bachelors or Master's degree, respectively. Among hospital or health managers however, a higher proportion had an MBA degree, compared to those having a diploma or degree in Health or Hospital Management.

In-service training

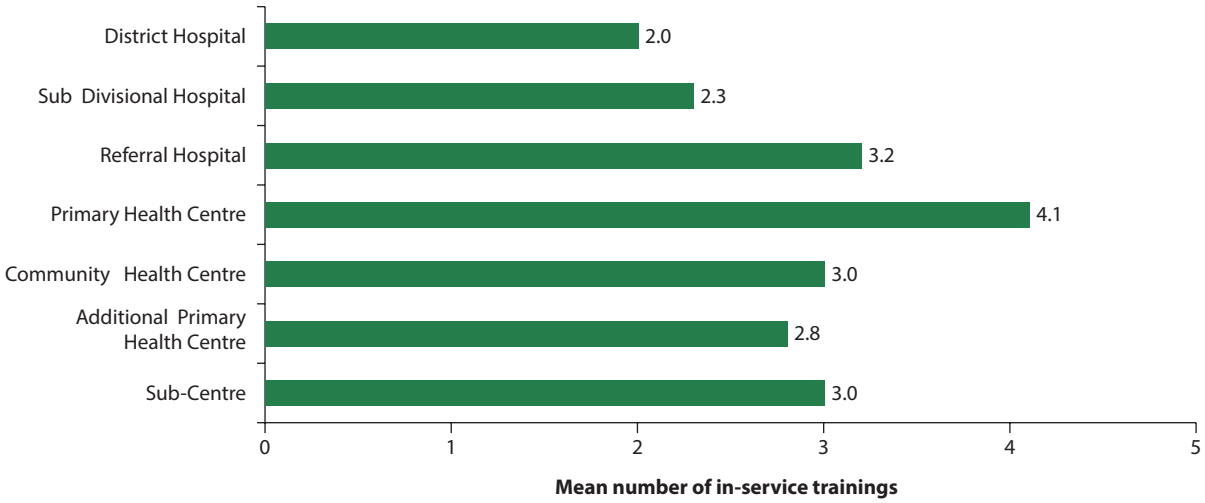
The number of in-service training received since the year 2016 across the cadre ranged from 0 to 24. The highest mean number of trainings received were reported by the managers (4.3) and the least by diagnostic technicians and pharmacists (Figure 17). Most of the staff (71.9%) had received the last in-service training within the last one year.

Figure 17: Mean number of in-service training since 2016, by cadre



By platform, the mean number of in-service trainings was the highest for the primary health centres (4.1) and the least for staff at district hospitals (Figure 18).

Figure 18: Mean number of in-service training since 2016, by platform

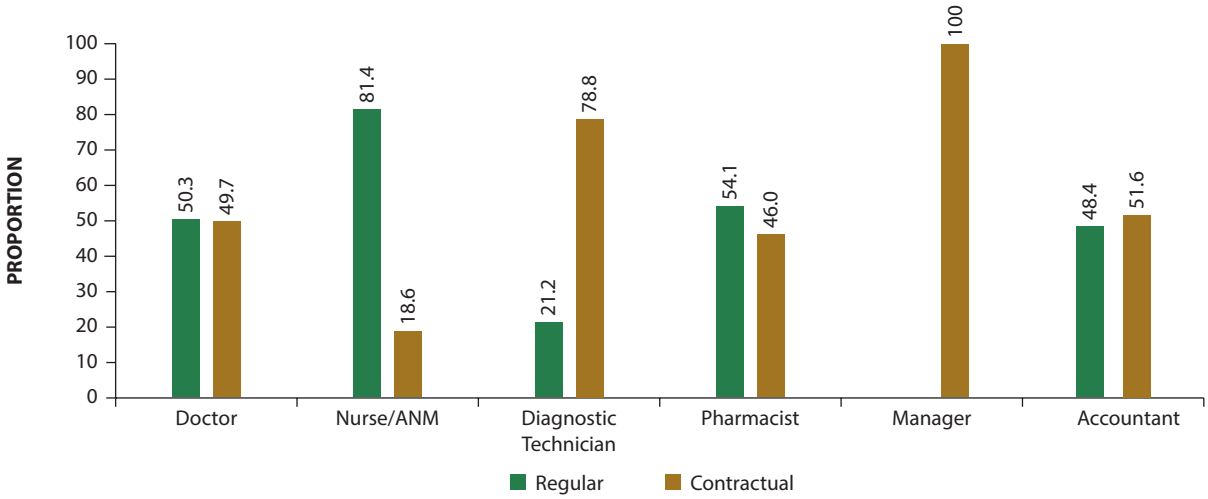


Employment characteristics

Type of employment

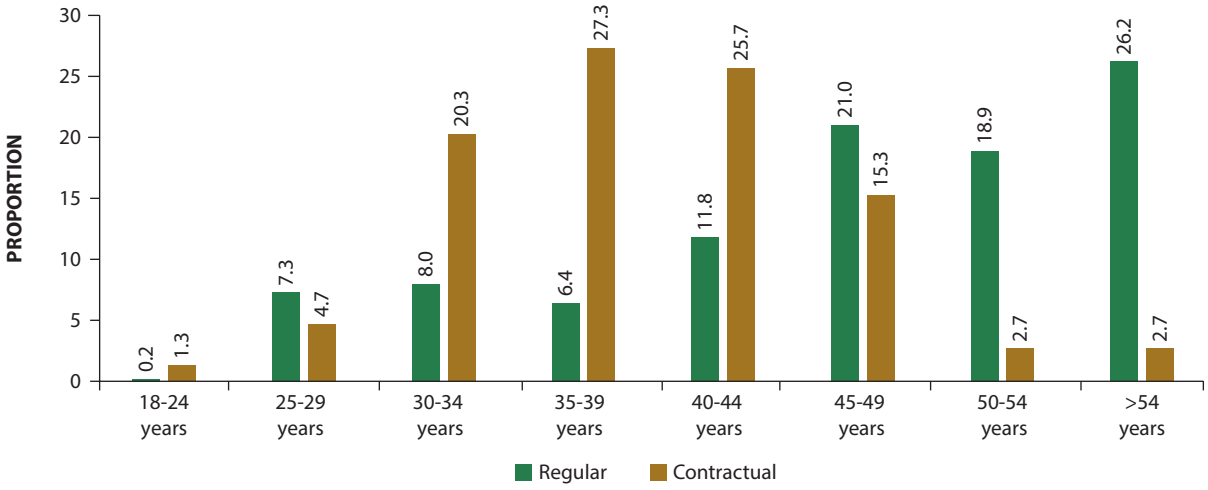
Considering all the facilities together, nearly 60% of the staff reported to be regular employees and the remaining as contractual. The nurses/ANMs were more likely to be regular (81.4%) whereas all of the managers were contractual and 78.8% of the diagnostic technicians were also contractual (Figure 19). The remaining cadres included a nearly equal split between regular and contractual employment. Mean age for staff in regular positions is 47.2 years and that for contractual staff is 38.9 years.

Figure 19: Type of employment, by cadre



Variations were seen though no pattern emerged in the distribution of type of employment by cadre across the platforms (**Annexure 6**). It was interesting to note that within the contractual employees, the proportion of those in 30-49 years age group was higher whereas the proportion of those >45 years of age was higher within the regular employees (Figure 20).

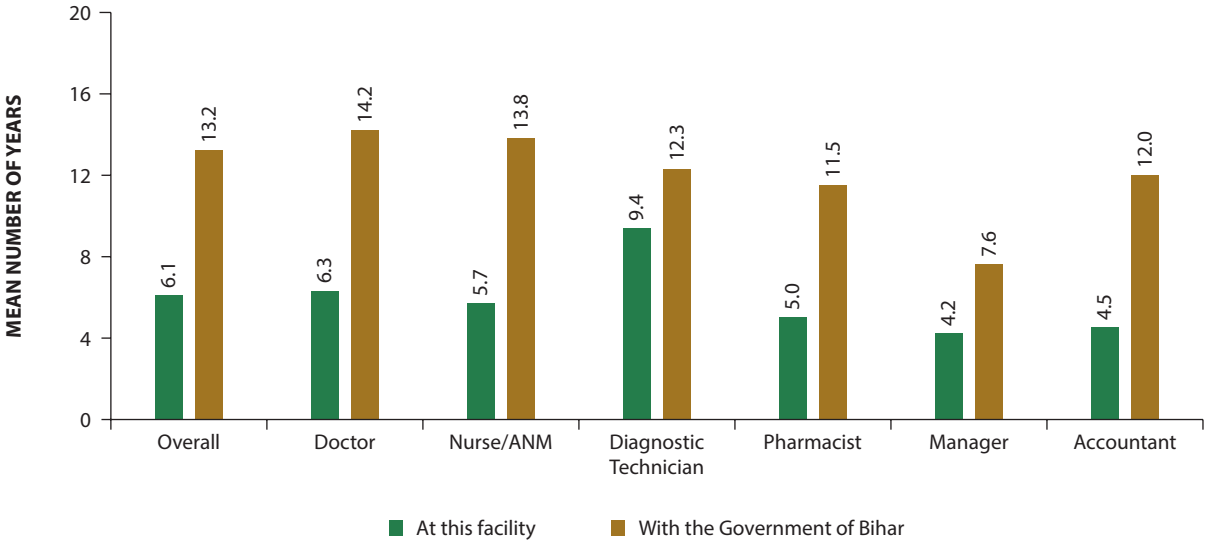
Figure 20: Type of employment, by age



Mean years of employment

The diagnostic technician (9.4 years) and medical doctor (6.3 years) reported the highest number of mean years as working in the current facility (Figure 21). For the other cadres, they had served at more than one health facility as their number of mean years with the Government of Bihar are higher than the number of mean years at the current facility.

Figure 21: Mean number of employment years, by cadre

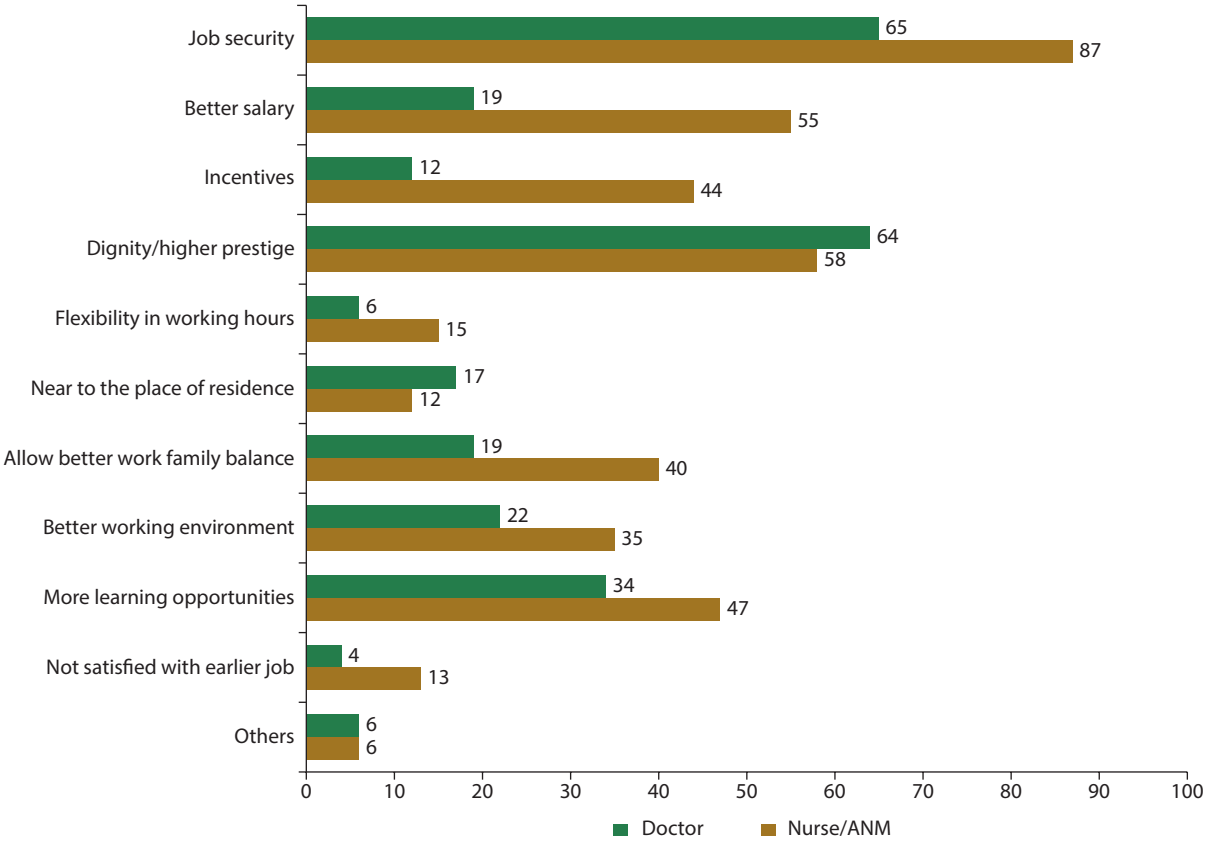


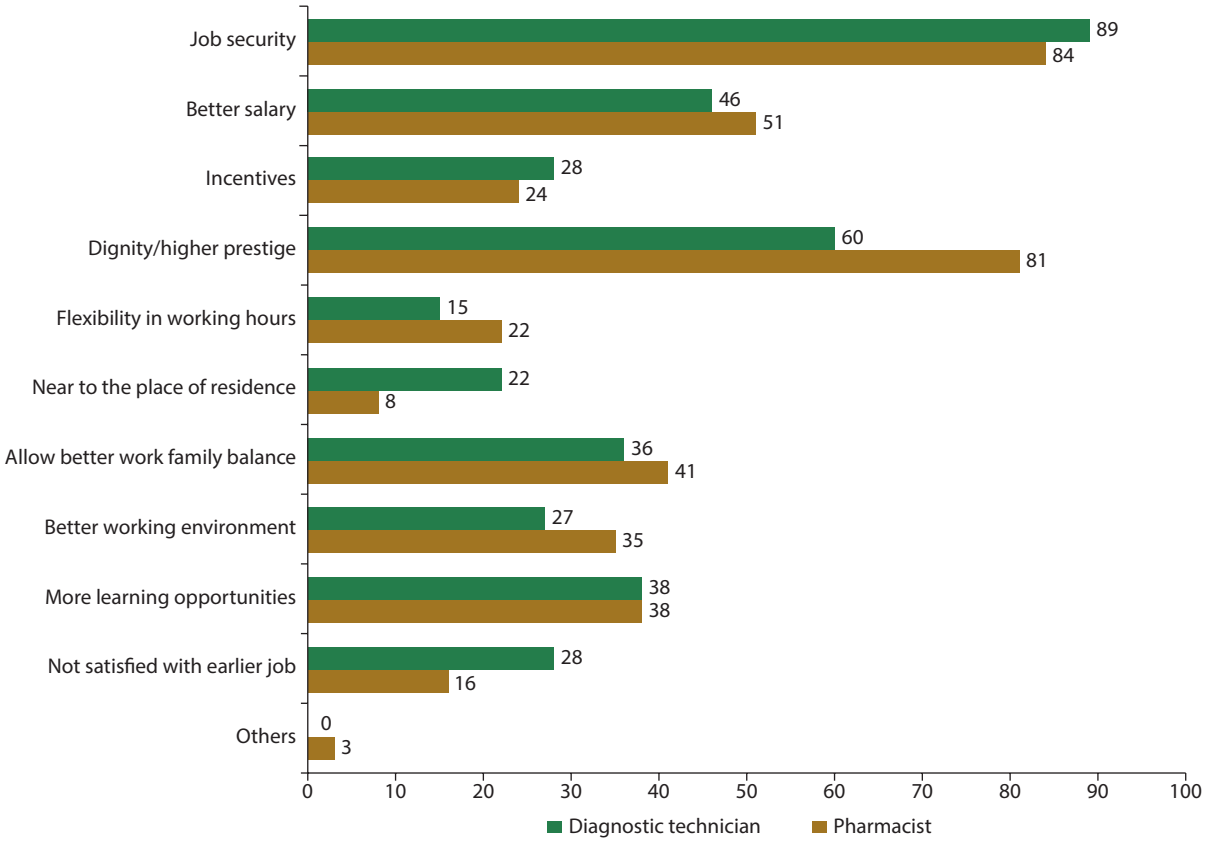
Overwhelmingly large proportion of staff (93.5%) reported not having received even one promotion since the start of their employment with the Government of Bihar. Among the 47 staff who reported promotion (6.5%), 40 (83%) were doctors and one-third of them were currently working at district hospitals. The last reported promotion was 4 years ago or more for 69.2% of these doctors who reported promotion.

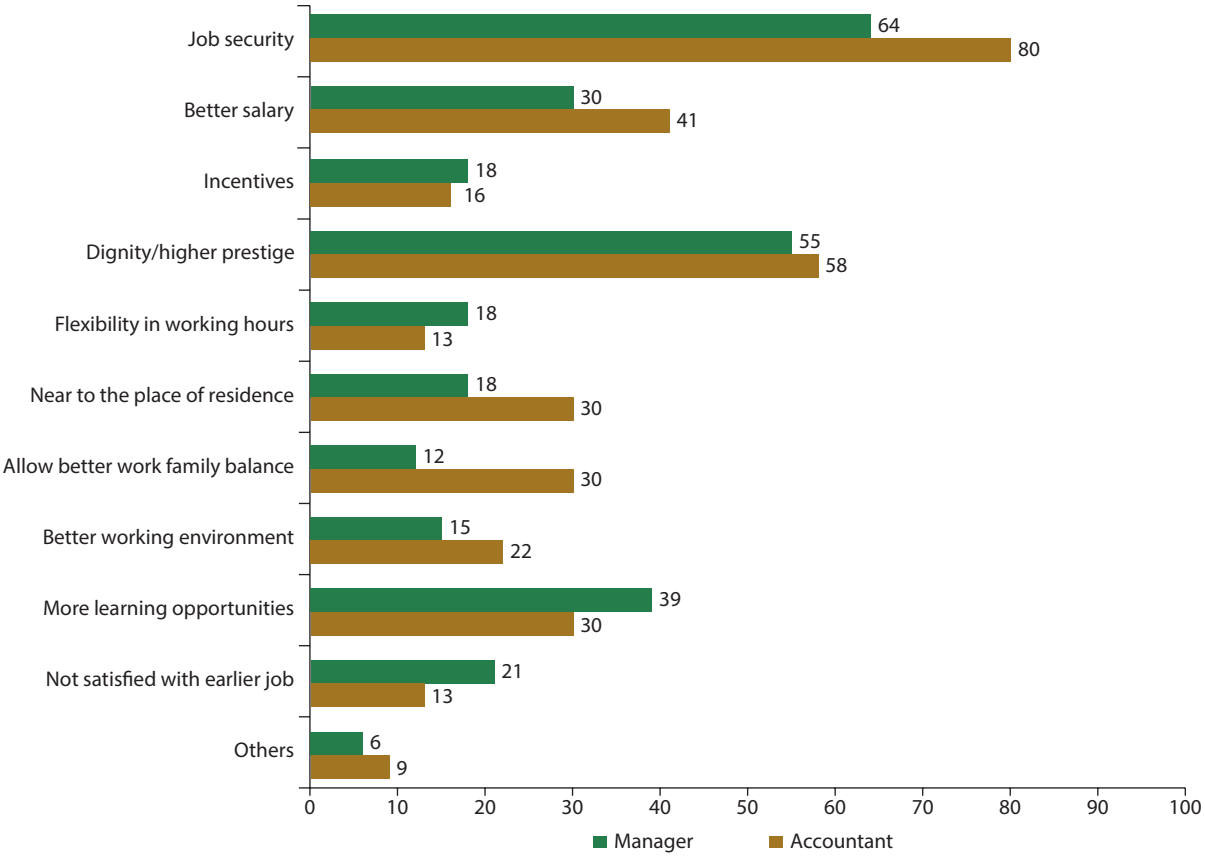
Reasons for joining service with the Government of Bihar

Across the cadres, the prime reason for joining the service was job security, followed by dignity and higher prestige (Figure 22). All the six categories of HR interviewed accorded higher significance to more learning opportunities as a reason for joining services compared to other reasons, particularly by nurses. Incentives as one of the reasons was cited by a higher proportion of nurses/ANMs compared to other cadres. The doctors attributed less significance to the flexibility in working hours than the others. A higher proportion of pharmacists cited dissatisfaction in the previous job as one of the reasons for joining the government service.

Figure 22: Reasons for joining service with the Government of Bihar, not mutually exclusive, %

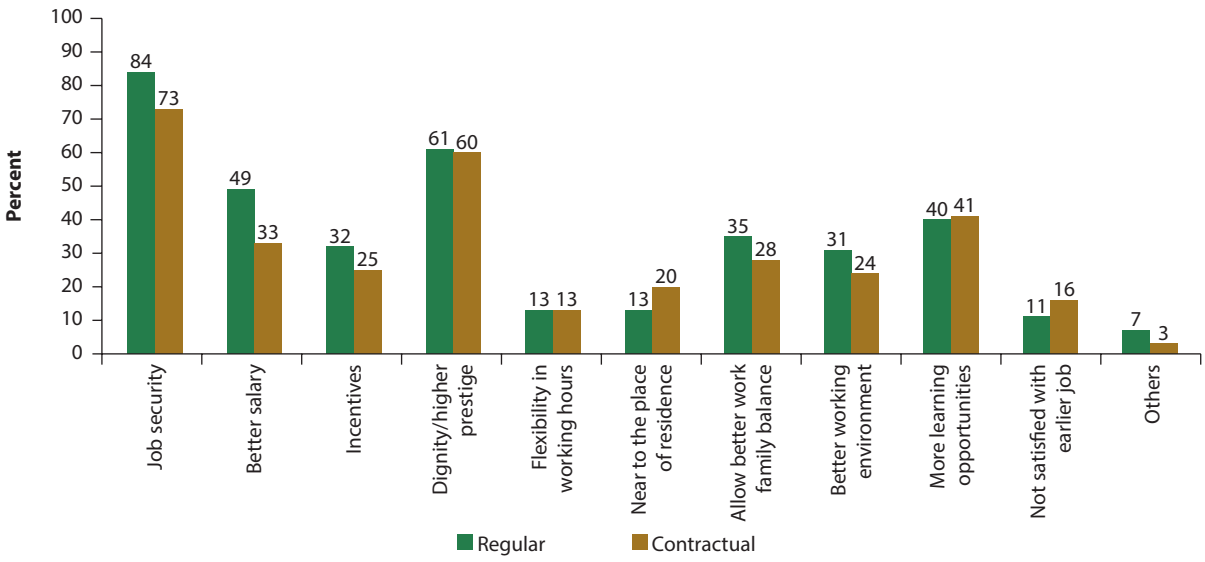






The reasons for choosing service with the Government of Bihar showed little variation across the regular and contractual staff (Figure 23). The two prime reasons cited by them was job security and dignity or higher prestige compared to other reasons.

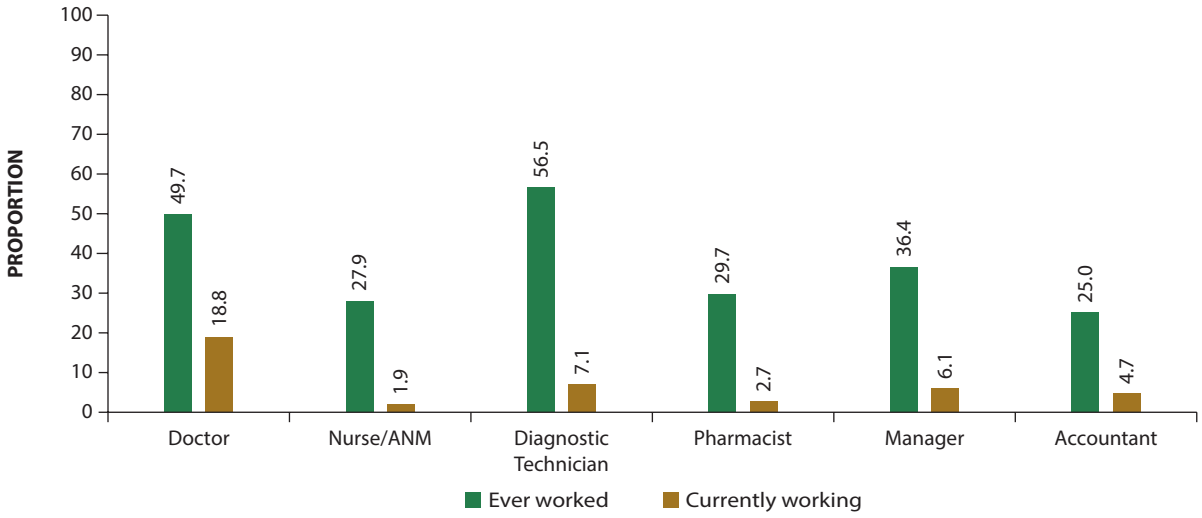
Figure 23: Reasons for joining service with the Government of Bihar, by type of employment, not mutually exclusive, %



Employment with private sector

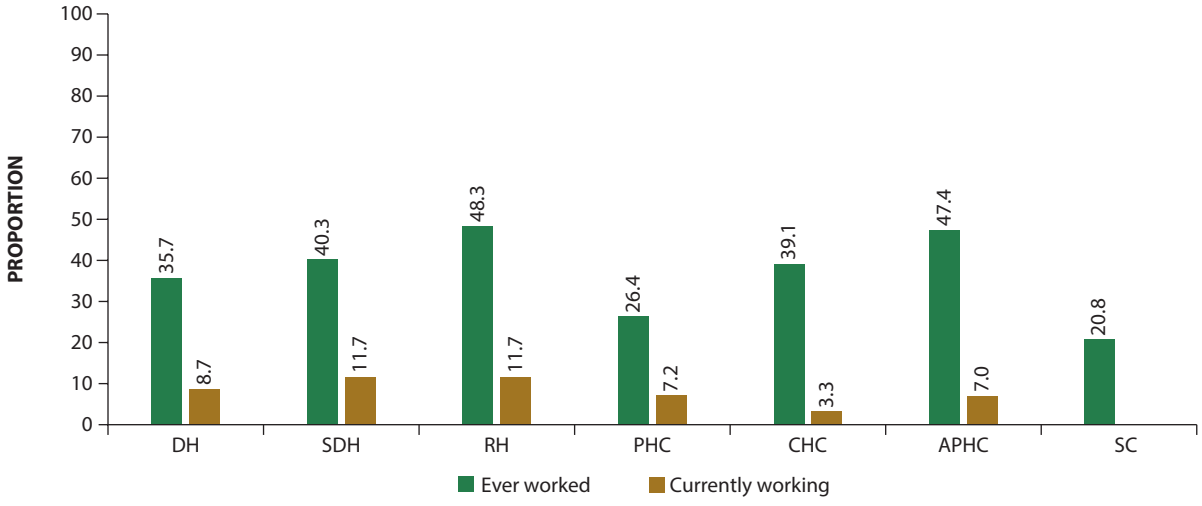
A little over one-third of the staff reported as ever worked in private sector (36.9%), and higher proportions were reported by the doctors (49.7%) and diagnostic technicians (56.5%) as shown in Figure 24. Current work in private sector was reported pre-dominantly by doctors (18.8%).

Figure 24: Employment with private sector/private professional practice, by cadre



The staff at referral hospital (48.3%) and additional primary health centres (47.4%) reported a higher proportion of ever employed with the private sector, and the proportion of current employment with private sector was higher for staff at the sub-divisional and referral hospital (11.7% each) as compared with the other platforms (Figure 25).

Figure 25: Employment with private sector, by platform



DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre; APHC: Additional primary health centre; SC: Sub centre

Level of satisfaction

The staff responded to a set of statements that covered their levels of satisfaction with job, salary, opportunity, team work, and miscellaneous. The response for each statement was documented using a 5-point Likert scale, with 5 being the highest level of satisfaction. The job-related theme had 9 statements, salary, opportunity and miscellaneous themes had 3 statements each, and team theme had 5 statements.

Overall satisfaction

Table 14 shows the scores for each theme and for each statement for all the staff across the platforms. Overall, the mean satisfaction score was higher among regular staff (75) as compared to contractual staffs (67). On comparing the scores between the themes, the mean scores of satisfaction for those in contractual employment were half for salary than those in the regular employment. The other themes did not show much difference by the type of employment. Overall, the satisfaction level was least for salary and opportunity themes.

Table 14: Mean satisfaction score, by theme and type of employment

Theme/statement (max score possible for theme)*	Mean scores by type of employment	
	Regular	Contractual
Overall (105)	**75**	**67**
Job (45)	**35**	**33**
I am satisfied with my job in general	4	4
My job definition and my tasks are consistent	4	4
My tasks are compatible with my knowledge and skills	4	4
I don't complain of my work load	3	3
I have no difficulty to procure needed material for my services	3	3
Conduct of the patients and their relatives is mostly positive towards me	4	4
The service I provide to the users is satisfactory	4	4
Provisional duties do not affect my individual life	2	2
Job security is the main reason keeping me in government service	5	4
Salary (15)	**8**	**4**
I have no fear of salary cut during my leave of absence	2	2
My wage is acceptable when compared with other sectors	3	1
My salary is in line with my expectation	3	1
Opportunity (15)	**7**	**5**
I have fair opportunity of getting promotion	2	1
I can get support for additional training and education	2	2
I will leave my job if a better job opportunity is proposed	3	2

Theme/statement (max score possible for theme)*	Mean scores by type of employment	
	Regular	Contractual
Team work (25)	**22**	**21**
Task distribution is fair within the team	4	4
When I am in leave of absence, I am replaced by a colleague	4	4
I feel comfortable here	4	4
I am respected and appreciated by my superiors	5	4
I am respected by my colleagues	5	5
Miscellaneous (15)	**12**	**13**
This facility is in a convenient location for staff	4	4
This facility is in a convenient location for patients	4	4
Patients do not pay extra money to get work done	4	4

Satisfaction by thematic area

Under the job satisfaction theme, the mean scores were similar across the cadres for the statements considered and was the lowest for "provisional duties do not affect my individual life" (Table 15). The salary satisfaction score was low for all the statements considered (Table 16). The fear of salary cut during absence, wage not comparable with other sectors, and mismatch between the salary expectation and actual salary were all scored low. Similarly, the mean score was comparatively lower for the statements under the opportunity theme reflecting dissatisfaction with the options available for promotion and training (Table 16). Importantly, the team work thematic area had very high scores across the cadre for all the statements considered (Table 17).

Table 15: Mean satisfaction score for the theme job, by cadre

Statement	Doctor	Nurse/ ANM	Diagnostic technician	Pharmacist	Manager	Accountant
I am satisfied with my job in general	4	5	4	4	4	4
My job definition and my tasks are consistent	4	4	4	4	4	4
My tasks are compatible with my knowledge and skills	4	4	4	4	4	4
I don't complain of my work load	4	3	3	4	3	2
I have no difficulty to procure needed material for my services	3	3	3	3	3	4
Conduct of the patients and their relatives is mostly positive towards me	4	4	4	4	4	3
The service I provide to the users is satisfactory	5	4	4	4	5	3
Provisional duties do not affect my individual life	3	2	3	3	2	2
Job security is the main reason keeping me in government service	4	5	4	4	4	4

Table 16: Mean satisfaction score for the themes salary and opportunities, by cadre

Statement	Doctor	Nurse/ ANM	Diagnostic technician	Pharmacist	Manager	Accountant
Salary						
I have no fear of salary cut during my leave of absence	2	2	1	1	2	2
My wage is acceptable when compared with other sectors	2	3	1	2	1	1
My salary is in line with my expectation	2	3	2	2	1	2
Opportunity						
I have fair opportunity of getting promotion	3	1	1	2	1	2
I can get support for additional training and education	3	2	2	1	3	2
I will leave my job if a better job opportunity is proposed	2	3	2	3	2	2

Table 17: Mean satisfaction score for the theme teamwork, by cadre

Statement	Doctor	Nurse/ ANM	Diagnostic technician	Pharmacist	Manager	Accountant
Task distribution is fair within the team	4	4	4	4	4	4
When I am in leave of absence, I am replaced by a colleague	4	4	4	4	3	3
I feel comfortable here	4	4	4	4	4	4
I am respected and appreciated by my superiors	4	5	4	4	4	5
I am respected by my colleagues	5	5	5	4	4	5

The mean scores were mostly similar across the cadres for the job, teamwork and miscellaneous theme. In the themes of salary and opportunity, diagnostic technicians, managers and accountants rated the satisfaction levels lower than the doctors and nurses (Table 18). The satisfaction score also varied according to the platform, and were lower for all themes except job for staff working below the primary health centre level.

Table 18: Mean satisfaction score, by platform and cadre

Themes (max possible score)*	Doctor	Nurse/ANM	Diagnostic technician	Pharmacist	Manager	Accountant
All platforms						
Job (45)	34	34	35	34	34	31
Salary (15)	7	7	4	6	4	5
Opportunity (15)	8	6	5	6	6	5
Team work (25)	21	22	21	21	20	19
Miscellaneous (15)	13	12	12	13	13	12
District hospital						
Job (45)	34	34	34	33	32	29
Salary (15)	8	9	6	5	3	5
Opportunity (15)	8	6	6	7	5	5
Team work (25)	21	21	21	21	16	18
Miscellaneous (15)	14	13	13	14	10	12
Sub-divisional hospital						
Job (45)	34	36	36	37	34	30
Salary (15)	7	7	3	9	5	4
Opportunity (15)	9	5	4	8	4	6
Team work (25)	21	22	21	21	21	20
Miscellaneous (15)	12	11	11	11	11	9
Referral hospital						
Job (45)	33	34	33	26	31	38
Salary (15)	7	8	5	7	3	7
Opportunity (15)	6	6	4	7	6	5
Team work (25)	22	22	22	21	21	23
Miscellaneous (15)	13	13	12	14	14	14
Community health centre						
Job (45)	33	36	35	35	35	31
Salary (15)	7	8	3	6	4	4
Opportunity (15)	9	6	5	7	6	6
Team work (25)	21	23	22	21	21	19
Miscellaneous (15)	13	13	13	13	13	13
Primary health centre						
Job (45)	36	32	35	33	33	29
Salary (15)	8	5	2	6	6	5
Opportunity (15)	9	7	6	6	6	5
Team work (25)	21	22	20	19	19	19
Miscellaneous (15)	13	12	12	12	13	11

Themes (max possible score)*	Doctor	Nurse/ANM	Diagnostic technician	Pharmacist	Manager	Accountant
Additional primary health centre						
Job (45)	36	34	36	37	-	37
Salary (15)	4	7	5	7	-	6
Opportunity (15)	7	5	5	5	-	6
Team work (25)	20	22	19	23	-	24
Miscellaneous (15)	11	10	11	13	-	10
Sub centre						
Job (45)	-	35	-	-	-	-
Salary (15)	-	5	-	-	-	-
Opportunity (15)	-	6	-	-	-	-
Team work (25)	-	20	-	-	-	-
Miscellaneous (15)	-	11	-	-	-	-

** Maximum score possible shown in bracket*

Overview by district

There were variations across some of the parameters assessed as part of the HR survey by district (Table 19). A higher proportion of doctors was >40 years of age in Purnea and Samastipur districts whereas the proportion of nurses/ANMs >40 years of age was relatively higher in Aurangabad district. A little over half of all the staff interviewed in East Champaran belonged to the general category (53.9%), which was very different than the distribution in the other districts, mainly driven by the caste distribution of nurses/ANMs in the former. The highest proportion of contractual staff was also documented in East Champaran district (51.5%) accounted for contractual doctors and nurses/ANMs as compared with the distribution in the other three districts. The satisfaction score was similar across the districts.

Table 19: Distribution of demography and satisfaction among the human resources interviewed, by district

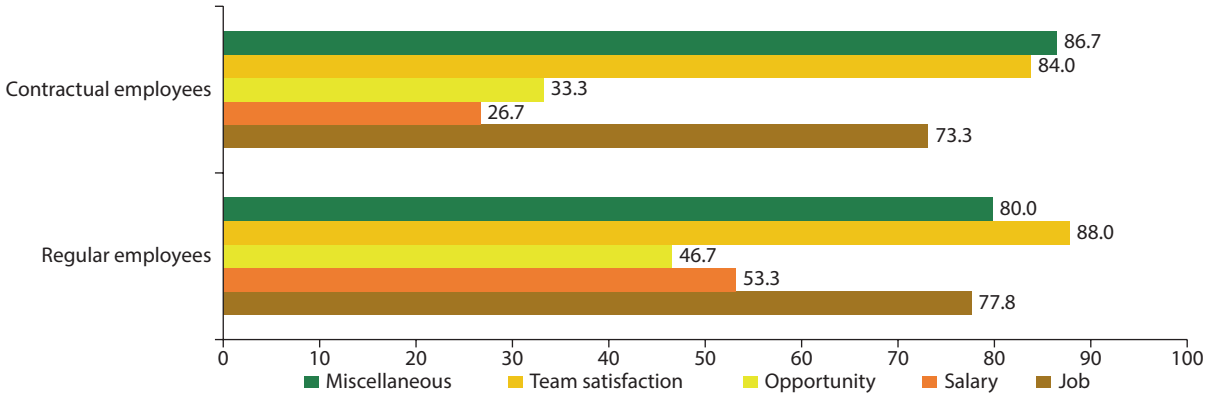
	Aurangabad	Purnea	Samastipur	East Champaran
Total staff interviewed	**185**	**214**	**159**	**165**
Proportion of women interviewed	**95 (51.4%)**	**108 (50.5%)**	**84 (52.8%)**	**70 (42.4%)**
Proportion of staff over 40+ years	119 (64.3%)	132 (61.7%)	106 (66.7%)	112 (67.9%)
Doctor	27 (61.4%)	34 (75.6%)	30 (81.1%)	37 (67.3%)
Nurse/ANM	63 (72.4%)	54 (55.1%)	52 (68.4%)	46 (74.2%)
Diagnostic technician	4 (25.0%)	17 (63.0%)	10 (47.6%)	13 (61.9%)
Pharmacist	9 (100.0%)	15 (83.3%)	6 (100.0%)	3 (75.0%)
Manager	5 (55.6%)	4 (50.0%)	4 (50.0%)	6 (75.0%)
Accountant	11 (55.0%)	8 (44.4%)	4 (36.4%)	7 (46.7%)
Proportion of staff belonging to general category	**47 (25.4%)**	**48 (22.4%)**	**48 (30.2%)**	**89 (53.9%)**

	Aurangabad	Purnea	Samastipur	East Champaran
Doctor	23 (52.3%)	16 (35.6%)	13 (35.1%)	32 (58.2%)
Nurse/ANM	9 (10.3%)	16 (16.3%)	26 (34.2%)	39 (62.9%)
Diagnostic technician	3 (18.8%)	3 (11.1%)	5 (23.8%)	6 (28.6%)
Pharmacist	2 (22.2%)	3 (16.7%)	0 (0%)	1 (25.0%)
Manager	4 (44.4%)	3 (37.5%)	2 (25.0%)	4 (50.0%)
Accountant	6 (30.0%)	7 (38.9%)	2 (18.2%)	7 (46.7%)
Proportion of staff with contractual employment	**72 (38.9%)**	**91 (42.5%)**	**52 (32.7%)**	**85 (51.5%)**
Doctor	20 (45.5%)	20 (44.4%)	17 (46.0%)	33 (60.0%)
Nurse/ANM	19 (21.8%)	17 (17.4%)	3 (4.0%)	21 (33.9%)
Diagnostic technician	15 (93.8%)	21 (77.8%)	16 (76.2%)	15 (71.4%)
Pharmacist	0 (0%)	16 (88.9%)	0 (0%)	1 (25.0%)
Manager	9 (100.0%)	8 (100.0%)	8 (100.0%)	8 (100.0%)
Accountant	9 (45.0%)	9 (50.0%)	8 (72.7%)	7 (46.7%)
Overall satisfaction score	**73**	**71**	**73**	**70**
Job	34	34	35	33
Salary	6	6	7	5
Opportunity	6	6	6	6
Team	22	21	21	21
Miscellaneous	12	12	12	13

Overview by theme

In summary, of the total possible score across each theme, the average scores for satisfaction with salary and opportunity reached only 26.7% and 33.3% for the contractual employees and 53.3% and 46.7% for the regular employees, respectively (Figure 26). The satisfaction with job averaged 75.6% for employees, and the average satisfaction with team work was 86%.

Figure 26: Representation of the mean score as a proportion out of maximum possible for each theme, by type of employment



Health Facility Outputs

Measuring a facility's patient volume and the number of services delivered, which are known as outputs, is critical to understanding how facility resources are utilized for patient care. The data reported by the facilities under the Health Management Information System (HMIS) was used to document the facility outputs. These included number of – outpatient visits, inpatients, deliveries performed, and immunization doses administered. The following considerations are important for meaningful interpretation of these data:

- None of the output indicators allow understanding of "unique patients". Data maintained at the facilities and reported in HMIS is based on number of visits and not number of unique patients.
- Mismatch between the number of inpatients and deliveries was seen at some facilities. Exploration at the ground level led to the understanding that some facilities counted deliveries as inpatients and some did not, suggesting that there was no standard guideline for this reporting. After review of data and deliberations, it was decided to include only inpatients as outputs and not deliveries to avoid double-counting. However, there were some facilities where the number of deliveries was higher than the reported number of inpatients, in which case, we used the number of deliveries as the number of inpatients so as not to underreport the output for the facility.
- The number of inpatients was documented based on the inpatient headcount at midnight reported by each facility.
- Immunisation doses were considered only from community health centre onwards.
- The completeness of data on the output indicators varied across the facilities and platforms. In some instances, the data were smoothened wherever necessary, based on the trends in other facilities or the output indicators seen for that facility.

Annexure 7 provides the outputs by facilities in each platform for the financial years 2016-17 and 2017-18.

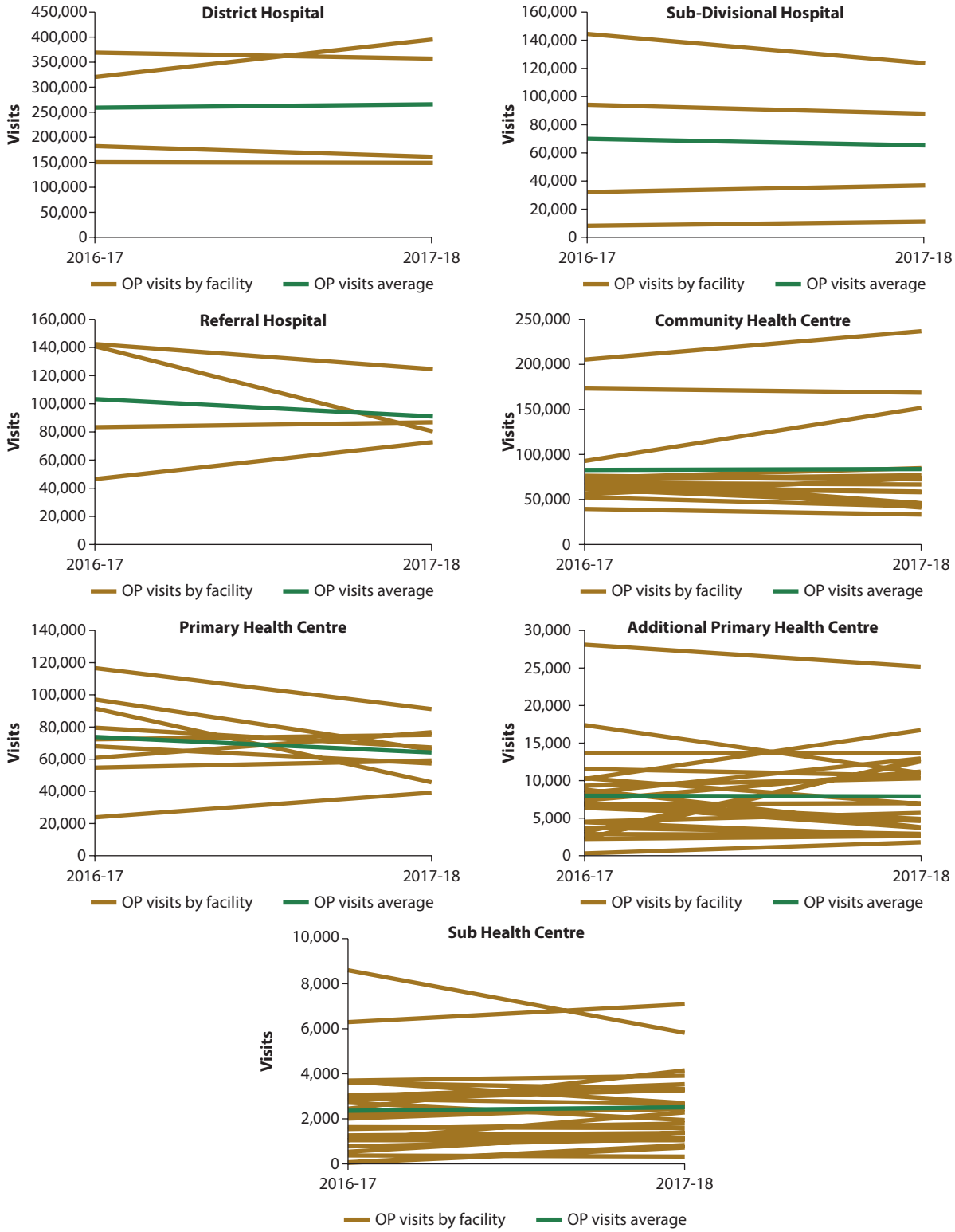
Outpatient visits

The number of outpatient visits by fiscal year, by platform, is presented in Figure 27. Patient volume was the highest in district hospitals average of 256,072 visits in year 2016-17 and 265,736 visits in year 2017-18. Of the 4 district hospitals, two had outpatient visits in the range of 150,000-200,000 whereas the other two were in the range of 300,000 – 400,000 visits per year. The sub-divisional hospitals had a wide variation in the outpatient visits ranging from 10,000 to 140,000 with an average of 69,971 in 2016-17 and 65,240 visits in 2017-18. The referral hospitals reported an average of 103,055 and 91,266 visits in year 2016-17 and 2017-18, respectively.

Three community health centres out-performed in the number of outpatient visits compared to the other community health centres (Figure 27). The community health centres reported an average of 82,746 and 83,729 outpatient visits in year 2016-17 and 2017-18, respectively. Considering the primary health centres, an average of 73,871 in 2016-17 and 64,207 in 2017-18 outpatient visits were reported, with one facility each serving as an outlier on the higher and lower end of these visits. Majority of the additional primary health centres reported outpatient visits less than 15,000 a year but one facility reported nearly double the outpatient visits. Overall, an average of 7,969 and 7,884 outpatient visits were reported by the additional primary health centres. Among the

sub-centres, an average of 2,363 and 2,517 outpatient visits were reported in year 2016-17 and 2017-18, respectively, with two facilities being outliers as shown in Figure 27.

Figure 27: Number of outpatient visits in FY 2016-17 and 2017-18, by platform

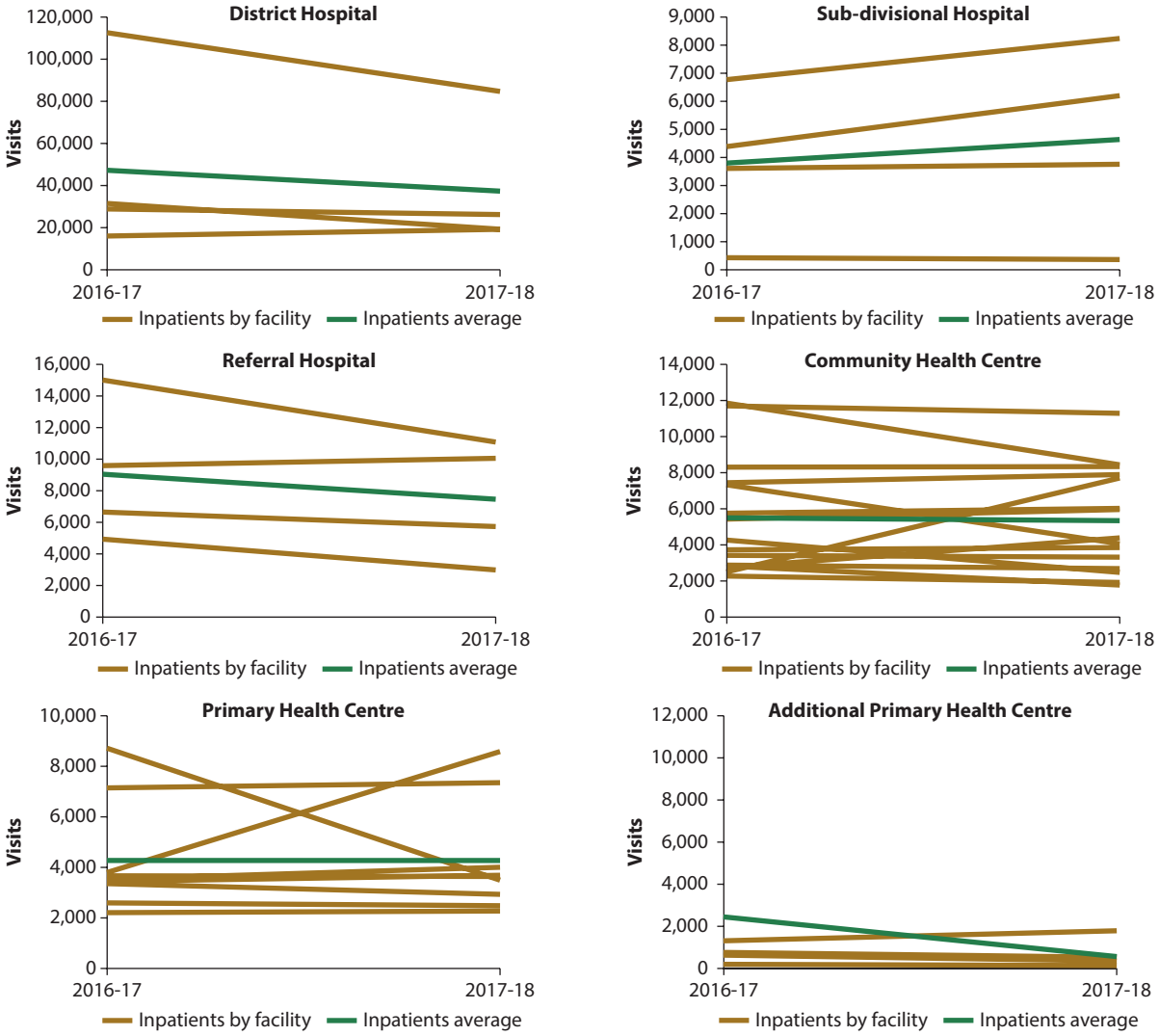


Note: Each line represents outpatient visits for an individual facility, with the bold line depicting the average for the platform. Scales are different for each platform.

Inpatients

The reported numbers of inpatients by year are presented in Figure 28. One of the four district hospitals reported a much higher volume of inpatients than the other three, with an average of 47,232 inpatients in year 2016-17 and 37,333 in year 2017-18 for all district hospitals considered together. One of the four sub-divisional hospitals did not report significant number of inpatients over the two years. Considering the other three sub-divisional hospitals together, an average of 4,929 in 2016-17 and 6,071 inpatients in 2017-18 were reported. One referral hospital reported significantly higher number of inpatients in year 2016-17 and these numbers dropped closer to the other referral hospitals in year 2017-18. The referral hospitals reported an average of 9,048 and 7,466 visits in year 2016-17 and 2017-18, respectively. Most of the primary health centres reported inpatients between 2,000-4,000 in year 2016-17 except three which reported higher numbers of inpatients (one of these dropped significantly in the next year). The number of inpatients reported by primary health centres was an average of 3,913 in 2016-17 and 3,815 in 2017-18. Not much

Figure 28: Number of inpatients in FY 2016-17 and 2017-18, by platform



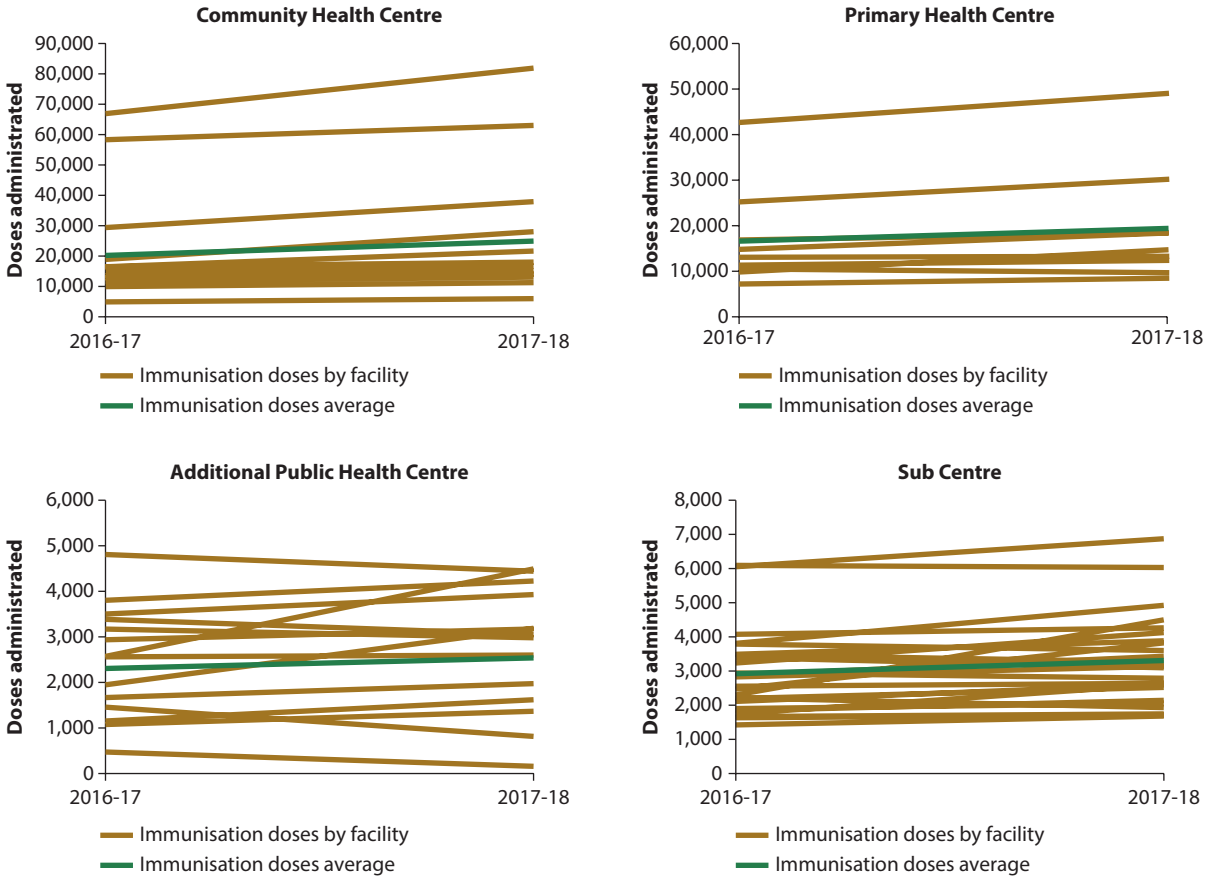
Note: Each line represents inpatient visits for an individual facility, with the bold line depicting the average for the platform. Scales are different for each platform.

change was seen in the number of inpatients in the community health centres in the two years except in two facilities, with one reporting an increase and the other decrease between the two years. The number of inpatients in the community health centres was an average of 5,522 and 5,291 in each of these years, respectively. The additional primary health centres reported an average of 2,457 and 572 in year 2016-17 and 2017-18.

Immunisation doses

The number of immunisation doses administered over time, by platform community health centre onwards, is presented in Figure 29. The number of immunisation doses administered reported by majority of the facilities were stable over the two-year period as shown in Figure 24. Two each of community and primary health centres and sub centres had a higher volume of immunisation doses administered as compared to the other facilities within the same platform. The community health centres had an average of 20,034 and 24,488 doses, the primary health centres had an average of 16,709 and 15,396 doses in 2016-17 and 2017-18, respectively. The additional primary health centres reported an average of 2,306 and 2,538 doses and the sub centres 2,933 and 3,319 doses in year 2016-17 and 2017-18, respectively.

Figure 29: Number of vaccine doses administered in FY 2016-17 and 2017-18, by platform

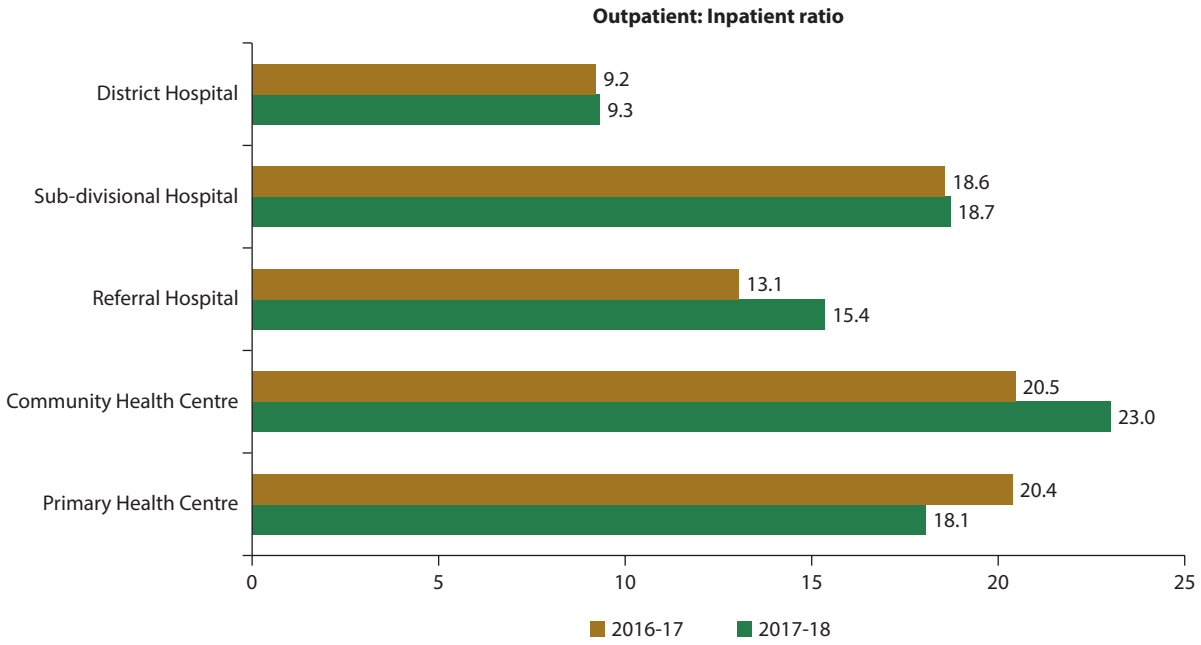


Note: Each line represents immunization doses for an individual facility, with the bold line depicting the average for the platform. Scales are different for each platform.

Ratio of outputs

The ratio of outpatient visits to inpatient ratio was similar for both the years for district and sub-divisional hospitals, was higher in the referral hospitals and community health centres in 2017-18, and was lower in the primary health centres in 2017-18 (Figure 30). This ratio was similar across sub-divisional hospitals and community/primary health centres, and was the least for district hospitals.

Figure 30: Outpatient visits to inpatient ratio based on average, by platform

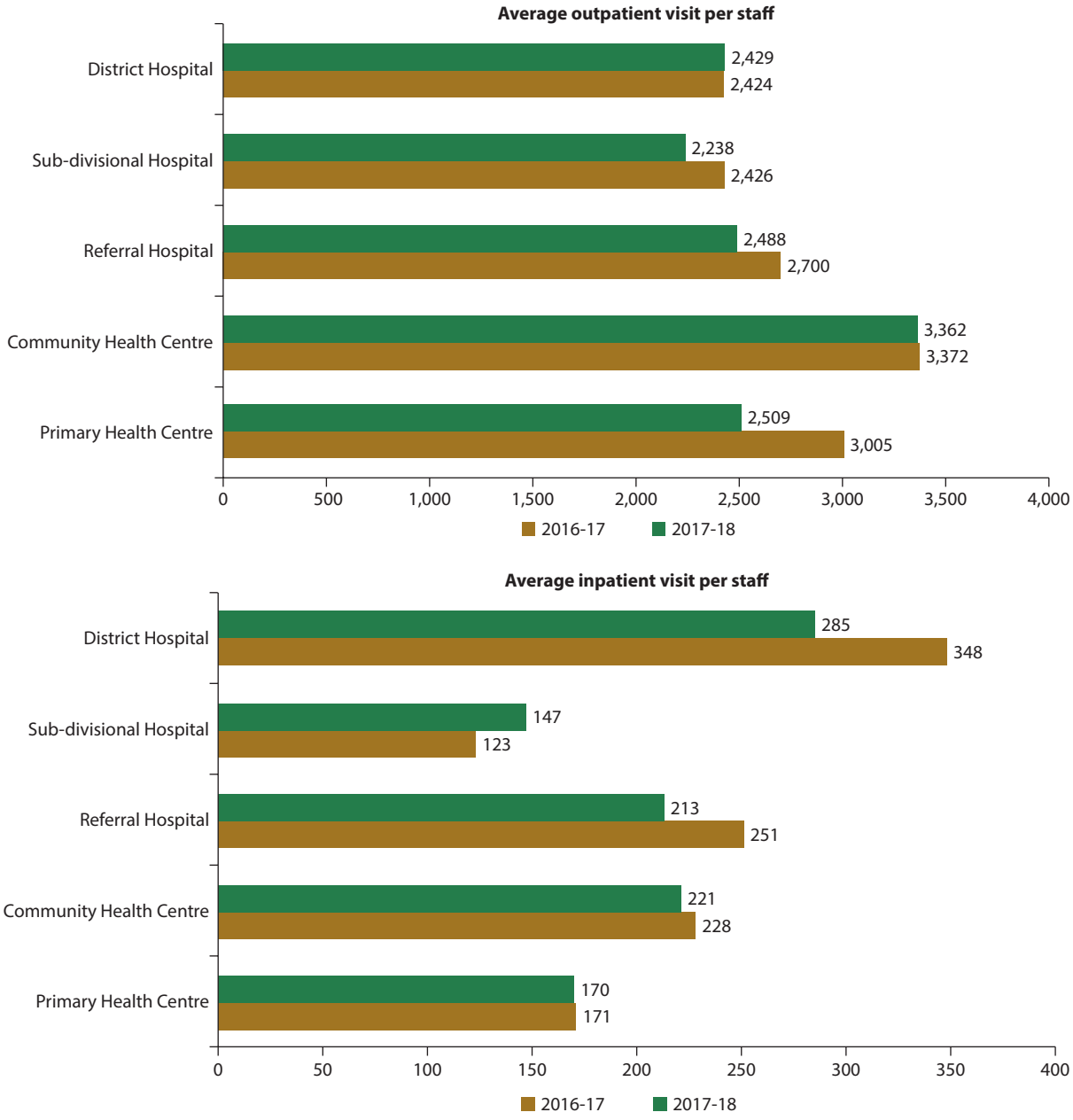


Production of outputs per staff

There is wide variation in outputs between the facilities in each level of care. To further illustrate the production of outputs per inputs—in this case, staff, a simple ratio of outpatient visits and inpatients per staff are presented in Figure 31. District hospitals produced an average of 2,429 outpatient visits per staff in 2017-18, though the number ranged greatly from 1,501 to 4,577. The district hospital with the highest outpatient visits per staff did not have corresponding high the inpatients per staff. The average inpatient per staff in district hospitals reduced from 348 to 285 over the two years considered.

The numbers of outpatient visits and inpatients per staff in the sub-divisional hospitals, community health centres and primary health centres were too wide for any meaningful pattern interpretation. The average ratio for sub-divisional hospitals was 2,238 outpatient visits per staff, for referral hospitals was 2,488 visits, community health centres was 3,362 and for primary health centres was 2,509 visits in year 2017-18. The number of inpatients per staff was 147 in sub-divisional hospitals, 213 in referral hospitals, 221 in the community health centres, and 170 in the primary health centres in the year 2017-18. **Annexure 8** documents these details by each facility.

Figure 31: Average outpatient visits and inpatient per staff, by platform, 2017-18



Health Facility Expenditure

The data on health facility expenditure was documented from more than one source as not all expenditure data was readily available in a consolidated manner from the facilities. These data at the facility were captured from two sources – the annual NHM budget and *Rogi Kalyan Samiti* (RKS) expenditure reports available with the NHM accountant and the state expenditure report available with the state accountant working at the facility. The expenditure on pharmaceuticals, consumables and other expenditure was not readily available at the facilities, and these were documented from the respective districts. The following considerations are important for meaningful interpretation of these data:

- Given the level of detail available for the expenditure, we considered the expenditure in three broad categories – personnel, pharmaceuticals and consumables, and all the other.
- The pharmaceuticals and consumables expenditure collected from the district level was apportioned for each facility based on the number and type of facilities and average outputs by the level of platform in a given district.
- For the facilities with which another facility was functioning in the same campus (two different levels of platform), we took this arrangement into account while apportioning the costs.
- In addition, for some facilities if a specific expenditure component was missing for a year, we imputed it based on the amount for the other year in relation to the outputs for both the years.

Overall expenditure

In terms of annual total expenditure, trends in average spending varied by platform between 2016-17 and 2017-18 (Figure 32). As expected, the district hospitals had the highest overall expenditure which was nearly 3-4 times as compared with the other platforms in both these years. The expenditure of all other platforms was nearly in a similar range.

Figure 32: Overall expenditure, by platform 2016-17 and 2017-18

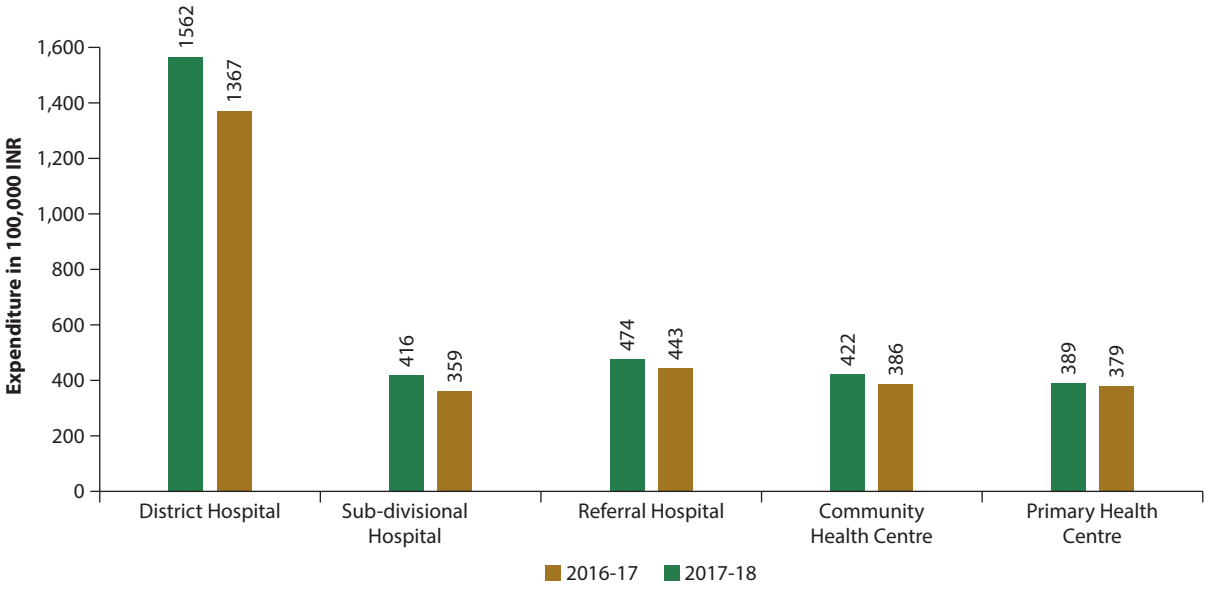


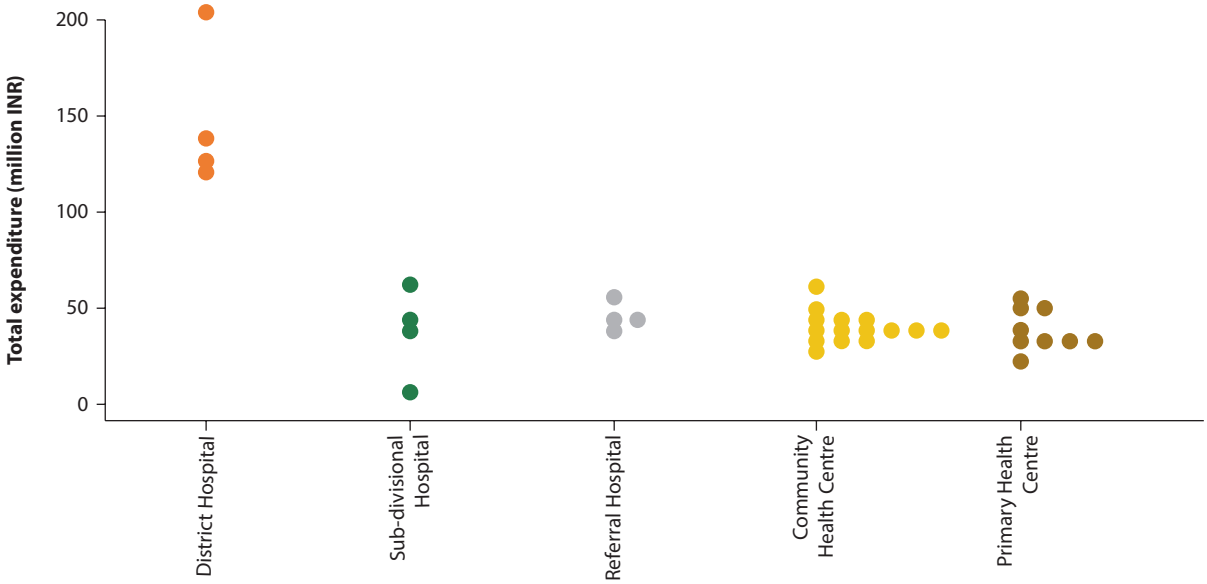
Table 20 shows the overall expenditure for each platform by the district for the most recent financial year. The amount for each facility is shown in Figure 33. Considering all platforms together, the overall expenditure in the district hospitals was 3.2 times higher than that in the sub-divisional and referral hospitals, and 3.7 times higher than the community and primary health centres. The sub-divisional hospital in Aurangabad was established recently (3 years) and, hence, is an outlier in the Table 20.

Table 20: Overall expenditure for each platform, by district, 2017-18

	Aurangabad	Purnea	Samastipur	East Champaran	Range of overall expenditure
District Hospital	120,388,742	202,098,196	135,840,833	127,537,690	(120,388,742- 202,098,196)
Sub-divisional Hospital	8,203,908	60,894,104	44,424,626	41,401,595	(8,203,908-60,894,104)
Referral Hospital	55,788,844	45,007,354	44,965,137	37,646,404	(37,646,404-55,788,844)
Community Health Centre*	44,710,541	36,373,907	46,684,207	33,865,152	(28,832,474-58,243,079)
Primary Health Centre*	48,509,786	37,984,432	29,436,806	54,636,406	(2,359,532-54,636,406)

** Average expenditure presented for all sampled facilities in a given platform*

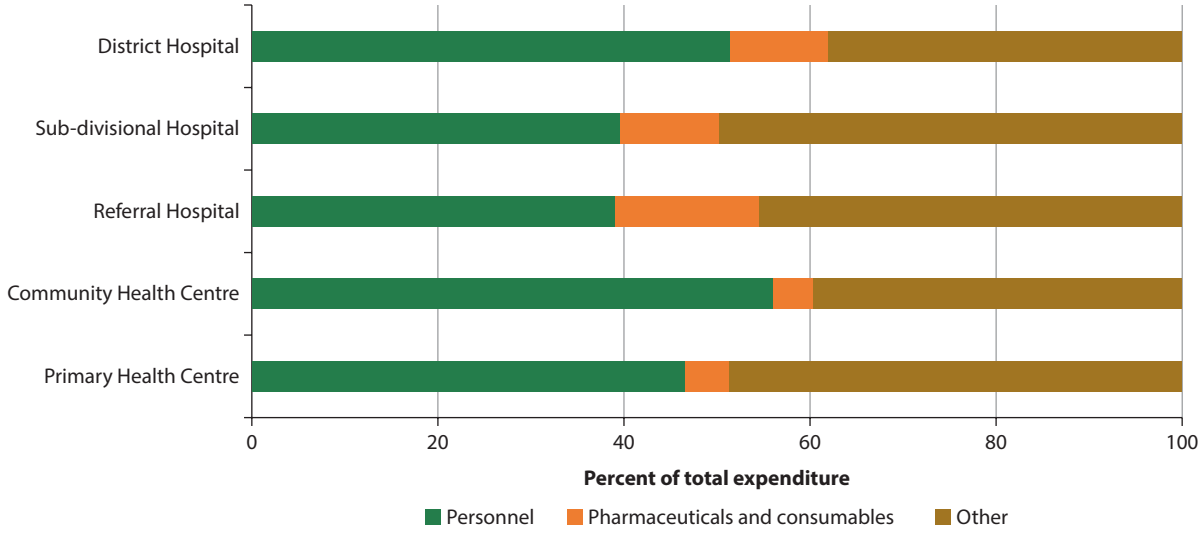
Figure 33: Average overall expenditure, by facility in 2016-17 and 2017-2018 combined. Each dot represents a facility



Expenditure by component

Figure 34 shows the average composition of expenditure type across platforms for 2017-18 and 2016-17 combined. The personnel expenditure in district hospitals and community health centres accounted for a little over 50% of the total expenditure, whereas the sub-divisional and referral hospitals spent a slightly lower proportion of their total expenditure on personnel than the other platforms (40%). On the other hand, the proportion of expenditure on pharmaceutical and consumables was highest at the referral hospitals (15.5%) followed by district hospitals (10.6%) and sub-divisional hospitals (10.7%), and was less than 5% for the community and primary health centres. All the other expenditure (other than personnel, pharmaceutical and consumables) was categorised under the "other expenditure category" as detailed analysis of this expenditure was not possible given the format in which these data were available. **Annexure 9** shows the range for each type of expenditure by platform between 2016-17 and 2017-18.

Figure 34: Average percentage of by type of expenditure, by platform in 2016-17 and 2017-18 combined



The personnel, pharmaceutical and consumables and other expenditure for each facility is shown in Figures 35-37. Not much variation was seen in personnel expenditure in community and primary health centres, however, one facility each in the district, sub-divisional and referral hospitals had relatively higher or lower expenditure than the other facilities in the respective platforms (Figure 34). For the pharmaceutical and consumables expenditure, not much variation was seen for the community and primary health centres, but was seen for the higher platforms (Figure 35). The sub-divisional hospitals and primary health centres showed variation for the other expenditure component (Figure 36).

Figure 35: Average personnel expenditure, by facility in 2016-17 and 2017-18 combined. Each dot represents a facility

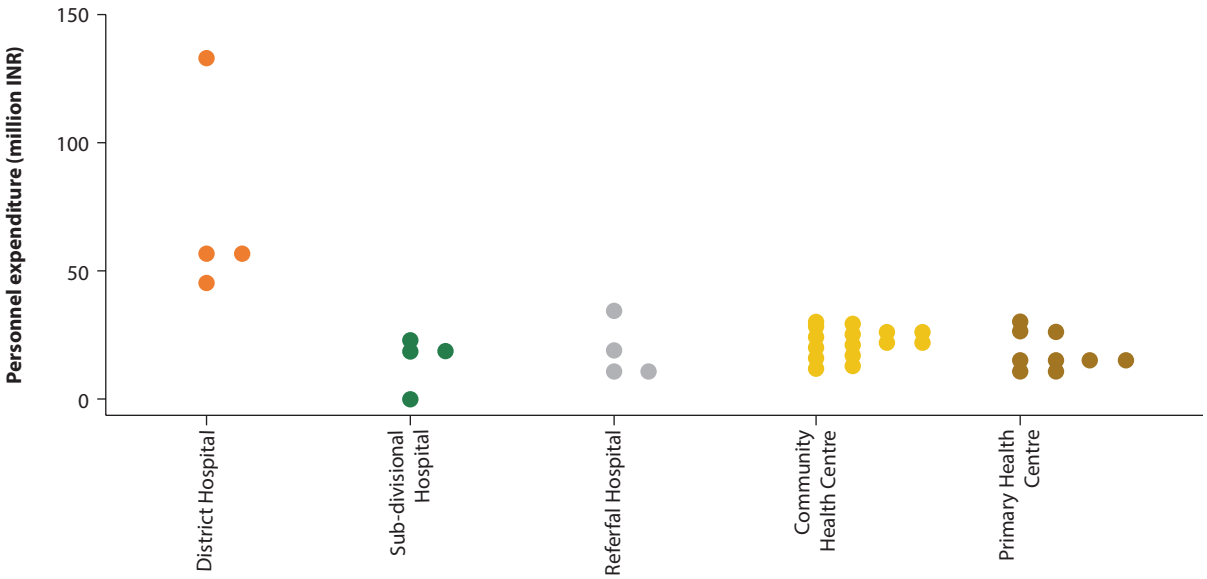


Figure 36: Average pharmaceuticals and consumables expenditure, by facility in 2016-17 and 2017-18 combined. Each dot represents a facility

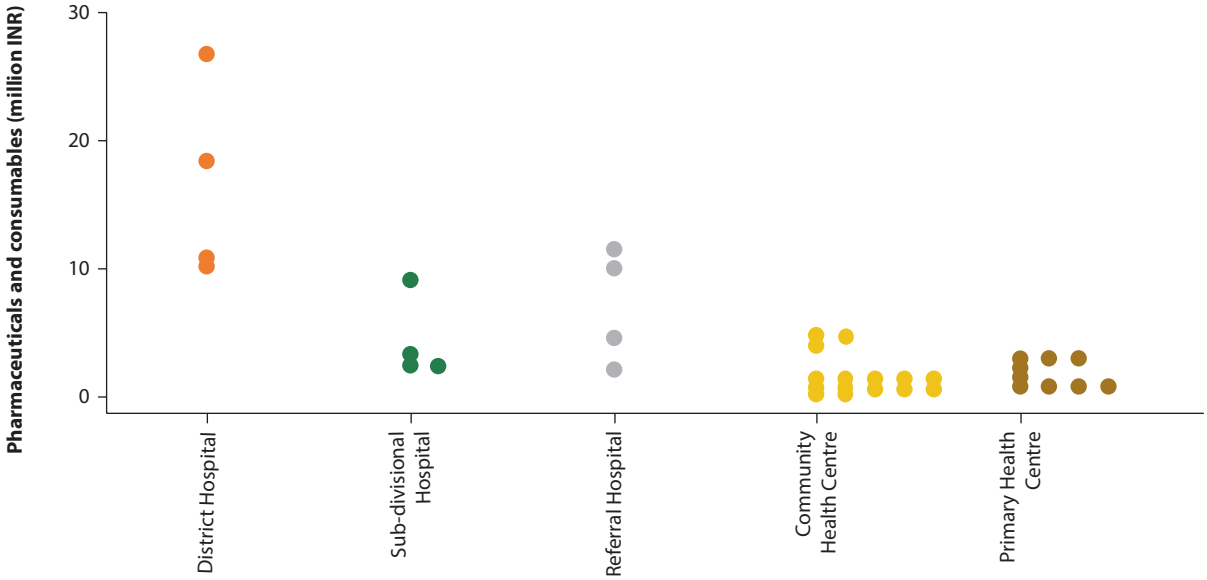
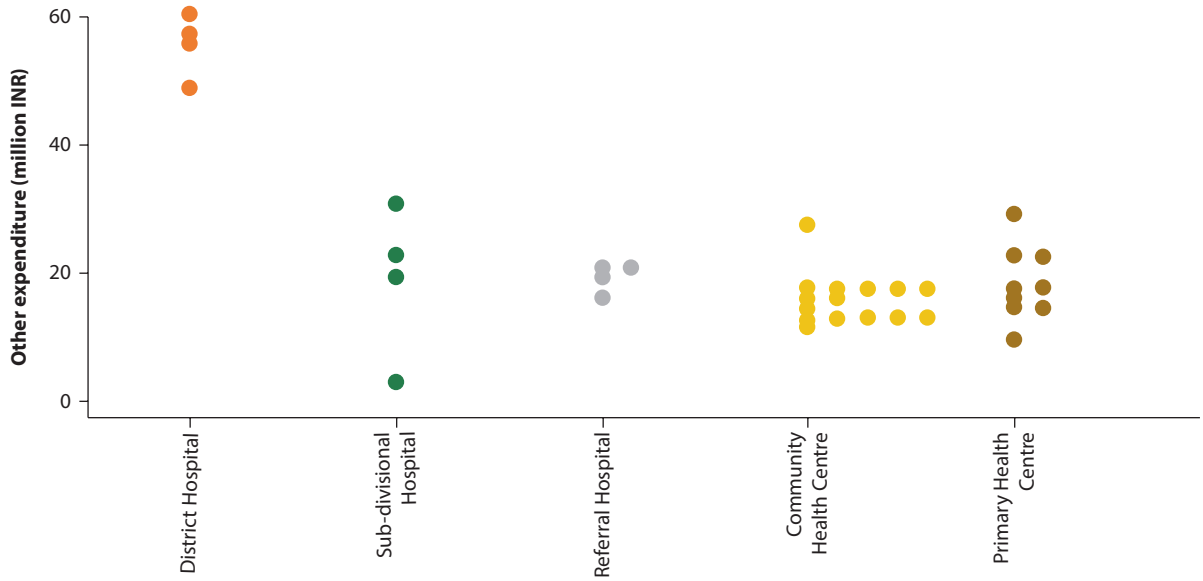
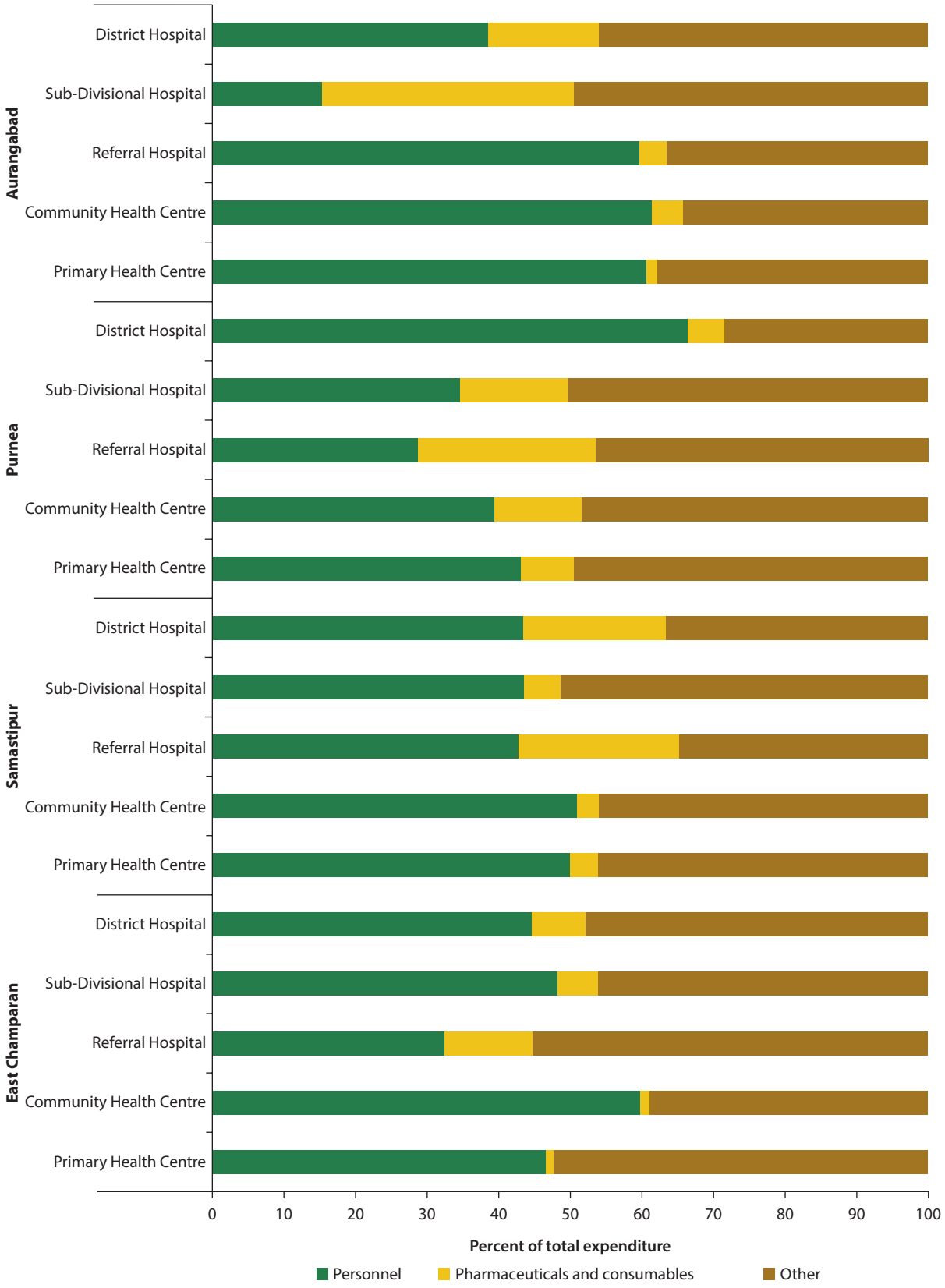


Figure 37: Average other expenditure, by facility in 2016-17 and 2017-18 combined. Each dot represents a facility



Interesting variations between and within the districts were seen for expenditure by component (Figure 38). The proportion of personnel expenditure was relatively higher in referral hospitals and community and primary health centres in Aurangabad, district hospital in Purnea, and community health centres in East Champaran. The proportion of pharmaceuticals and consumables expenditure was the highest at the sub-divisional hospital in Aurangabad, and was the least in community and primary health centres across the four districts compared with the other platforms.

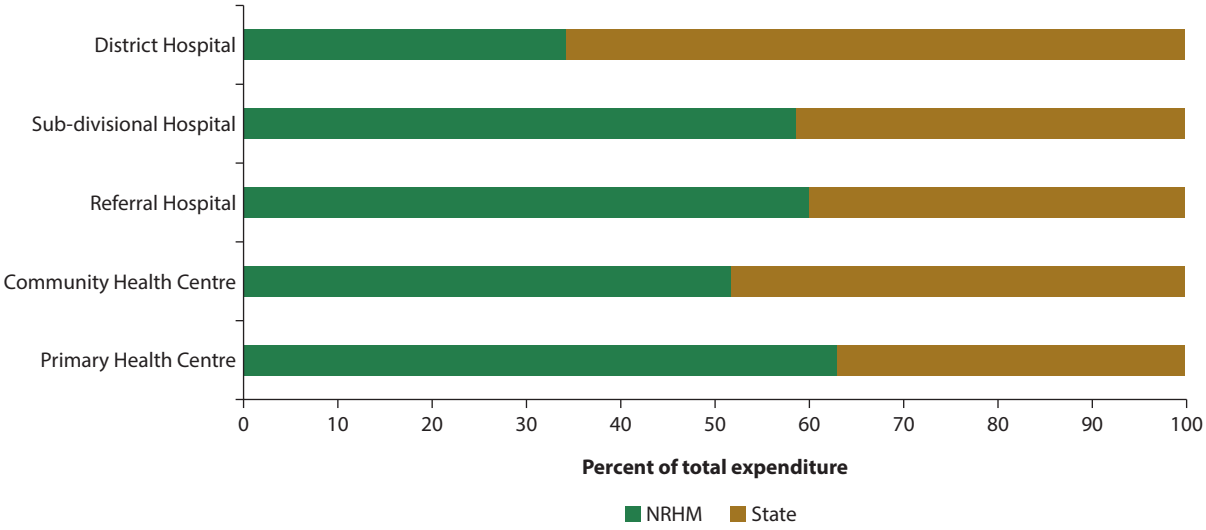
Figure 38: Average percentage of by type of expenditure by platform in 2016-17 and 2017-18 combined, by district



Expenditure by source

The facility level expenditure occurs under two major sources of expenditure – the NRHM and the state. The former also includes the component of *RKS*. NRHM accounted for the least overall expenditure at the district hospitals (34.3%), while accounting for nearly 60% expenditure in the other platforms (Figure 39).

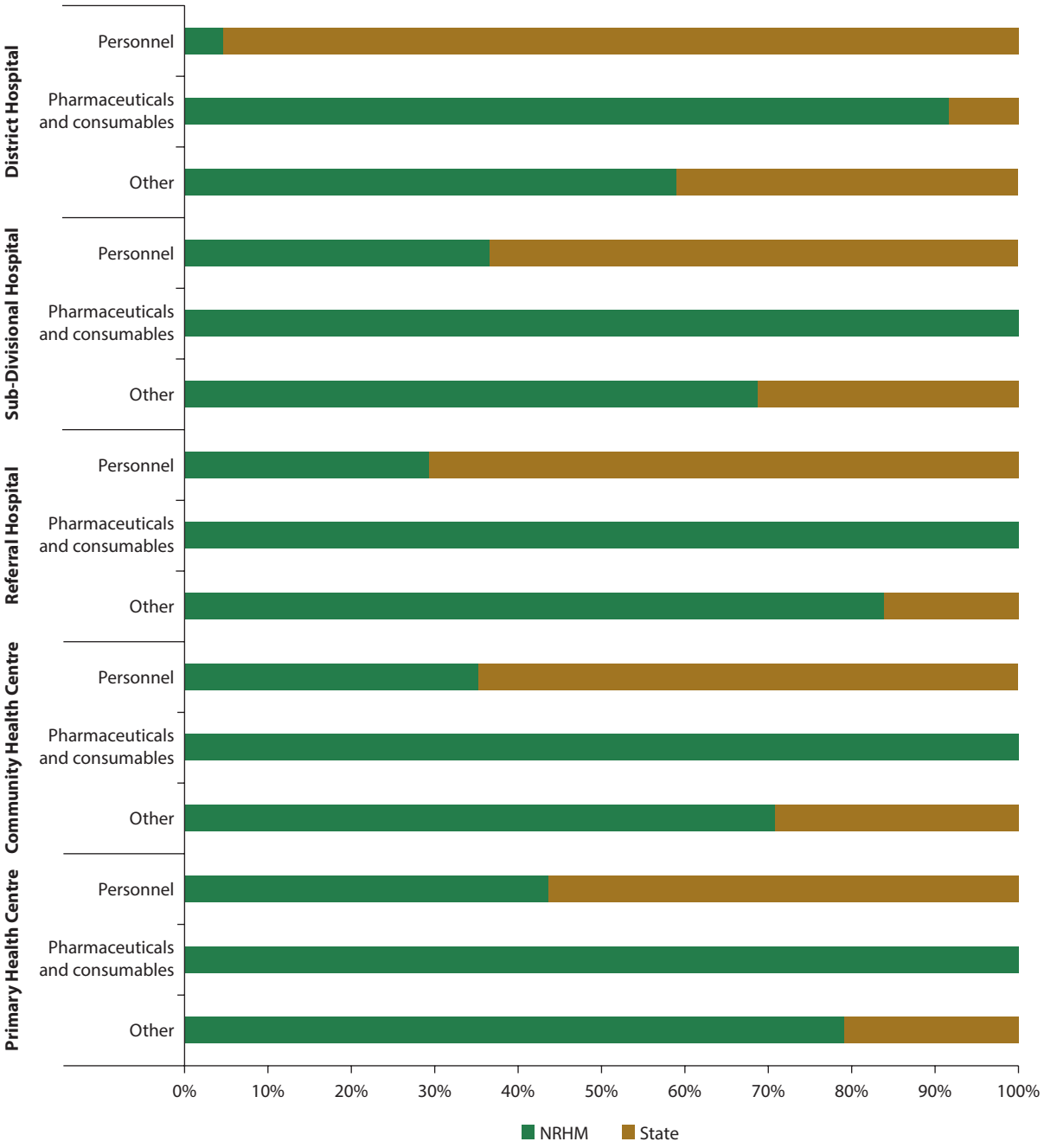
Figure 39: Average percentage of total expenditure, by facility type and source in 2016-17 and 2017-18 combined



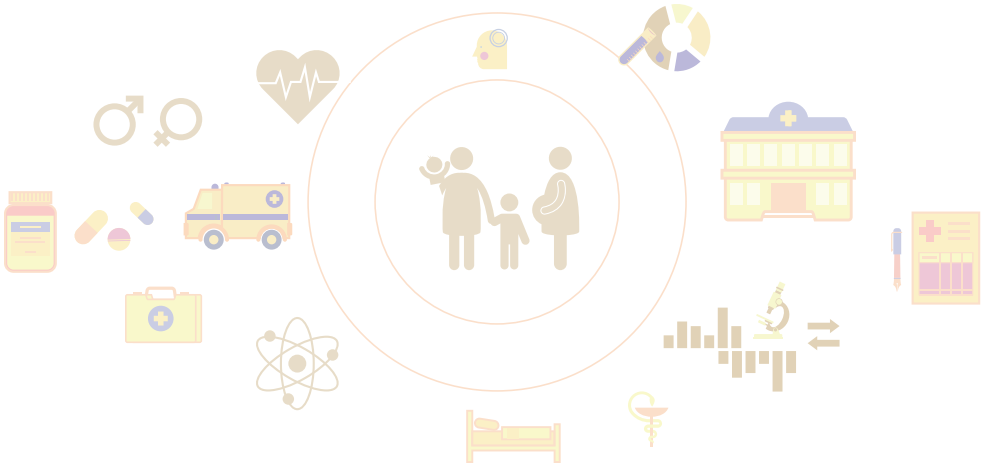
NRHM denotes National Rural Health Mission and includes RKS expenditure.

Distinct patterns emerged by the source of expenditure for the personnel expenditure component. NRHM accounted for at least one-third of the expenditure on personnel in all the platforms other than the district hospitals where almost all of the personnel expenditure was through the state (Figure 40). As expected, the state had less role in the expenditure beyond the personnel as majority of the pharmaceuticals and consumables and other expenditure was taken care by the NRHM.

Figure 40: Average percentage for type of expenditure for each platform, by source in 2016-17 and 2017-2018 combined



NRHM denotes National Rural Health Mission and includes RKS expenditure.



CHAPTER 4

Technical Efficiency

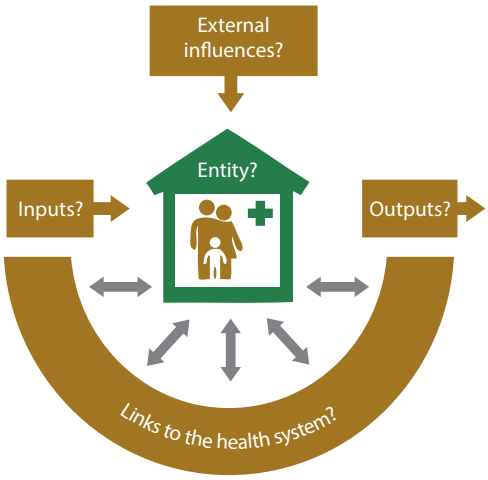
With increased focus on provision of universal health coverage, efficiency in health care sector has attracted significant interest in recent decades due to escalating health care costs. The efficiency scores estimated in this study measured the volume of output that a facility is currently producing, relative to the maximum volume it could potentially produce from its current inputs. Identifying variability in efficiency is therefore of great importance, and becomes increasingly relevant to health systems grappling with significant resource constraints.

Analytical Framework

Whether inefficiency takes the form of inputs misdirected towards relatively low-value health outputs, or inputs lost in the production of valued health outputs, a first step towards remedial actions is to properly recognize the nature of any such inefficiency. It is important to be aware of what a specific efficiency indicator informs and to be able to identify ways in which an indicator may be informative, misleading or reflect only some aspect of a production process. To this end, it is necessary to understand what is actually being measured and, importantly, how to interpret the findings from an efficiency analysis. The following analytical framework shows the five aspects of any efficiency indicator that should be explicitly considered (Figure 41).[51]

- the entity to be assessed
- the outputs (or outcomes) under consideration
- the inputs under consideration
- the external influences on attainment
- the links with the rest of the health system

Figure 41: Visualisation of analytical framework for efficiency[51]



The data available for efficiency assessment in this study utilized three of the five indicators, and did not include the external influences on attainment, or the links with the rest of the health system as these were beyond the scope of the present study. The external influences are the influences on the entity, beyond its control, that reflect the external environment within which it must operate. For example, population mortality rates are heavily dependent on the demographic structure of the population under consideration and the broader social determinants of health; intensity of resource use is usually highly contingent on the severity of disease; and health outcomes achieved by clinical teams may be highly dependent on the health and social characteristics of the patient group they serve. Likewise, no outputs from a health service practitioner or organization can be considered in isolation from their impact on the rest of the health system in which they operate. For example, the effectiveness of preventive services will affect the nature of demand for curative services; the performance of health facility support services, such as diagnostic departments, will affect the efficiency of functional areas such as surgical services; the actions of hospitals, for example in creating care plans for discharged patients, may have profound implications for primary care services; and the performance of rehabilitative services may have important implications for future hospital readmissions. Taking such varied factors was beyond the scope of this assessment.

The indicators chosen efficiency analysis for the other three aspects were as follows:

- the entity to be assessed – health facility
- the outputs (or outcomes) under consideration – the HMIS allowed for use of outputs and not outcomes for a given facility. We used the number of outpatient visits, number of inpatient visits and immunization doses as the outputs of interest
- the inputs under consideration – We used the expenditure for a given facility (personnel, pharmaceuticals and consumables, and others), number of staff (doctors, nurses/ANMs, para-medical and non-medical), and number of beds as the inputs of interest.

Analytical Approach

Technical efficiency indicates how far the system is minimizing the use of inputs in producing its chosen outputs, regardless of the value placed on those outputs. An alternative but equivalent formulation is to say that it is maximizing its outputs given its chosen level of inputs. Any variation in performance from the highest feasible level of production is an indication of technical inefficiency, or waste. The main interest in technical efficiency is therefore in the operational performance of the entity, rather than its strategic choices about the outputs it produces or the inputs it consumes. With this background, we only estimated the technical efficiency for the facilities in the study sample.

No consensus exists on the most appropriate models and methods for estimating efficiency across settings, and there are robust and ongoing debates around two major methodological approaches: Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA).[69] These approaches can yield very different estimates of health facility efficiency.[70] To address these variations in the efficiency estimates, an ensemble approach (ENS) combining efficiency estimates from a restricted version of DEA (rDEA) and restricted SDF (rSDF) has been proposed as the preferable method across a range of scenarios.[71-74]

Hence, we utilized the ensemble model approach to quantify technical efficiency in health facilities, combining results from two approaches – the restricted versions of rDEA and rSDF.[71] DEA defines

a composite performance indicator by computing the ratio of weighted outputs to weighted inputs. The facility with the highest ratio of outputs to inputs is considered as best performing and is assigned an efficiency score of one. All the other facilities receive an efficiency score reflecting their relative performance to the frontier set by the best-performing facility.[75, 76] The SDF approach requires an assumption regarding the functional form of the multiple-output production function and distribution of efficiency, and is based on the Cobb-Douglas multiple-output production function (rSDF-CD).[77, 78]

The ensemble model (ENS) used in this report consisted of combining efficiency estimates from rSDF-CD and rDEA. Efficiency estimates resulted from the mean score for each facility, as shown in equation below. The ENS approach wherein efficiency estimates from rDEA and rSDF-CD are combined, provides the preferred solution for estimating efficiency in cases where the underlying production function is uncertain.

$$\theta_i^{ENS} = \frac{\theta_i^{rSDF-CD} + \theta_i^{rDEA}}{2}$$

Furthermore, the approach we took was "constant returns to scale (CRS)" and an output orientation. CRS stipulates that the changes in output production are proportional to changes in all inputs. An output-oriented model seeks to increase outputs given its current inputs and an input-oriented model aims to minimize the use of inputs given its current outputs. We prefer the output orientation, as expanding outputs (e.g., the number of outpatient visits) is a goal in less resource settings, and health facility often have limited control over inputs (e.g., the number of doctors at the facility).

A technical efficiency score was estimated for each facility, capturing a facility's use of its resources. Relating the outputs to inputs, the rDEA and rSDF approaches computed efficiency scores ranging from 0% to 100%, with a score of 100% indicating that a facility has achieved the highest level of outputs with the available inputs relative to all facilities in that platform. Recognizing that each type of input requires a different amount of facility resources (e.g., on average, an inpatient visit uses more resources and more complex types of equipment and services than an outpatient visit), we applied weight restrictions to rescale each facility's mixture of inputs and outputs. The incorporation of additional weight restrictions is widely used in order to improve the discrimination of the models. Relative weight restrictions were used in this analysis. Weight restrictions are most commonly based upon the judgment about the importance of individual inputs and outputs, or reflect cost or price considerations. A weight of lower and upper bounds of weights as the ratio of each output j to output 1 and each input r to input 1. We used non-zero weights calculated in DEA to form a distribution of relative weights for each of the $R - 1$ inputs and $J - 1$ outputs, relative to the first input and output. From these distributions, we then drew lower and upper p-percentiles from the relative weight distributions to set *lower* and *upper* bounds.

Furthermore, we ran two models that differed in the inputs (Table 21). The outputs for both the models were the same – number of outpatient visits, number of inpatients, and immunisation doses (only for CHC and PHC). Model 1 had only expenditure-based input, whereas model 2 input was based on number of staff and beds in a given facility. Owing to small sample size for district, sub-divisional and referral hospitals, we ran a combined model for these platforms. Combined model was run for the community health centres and primary health centres as these offered similar level of patient care services. The results presented are ensemble technical efficiency scores that were averaged over two years and between the two input models.

Table 21: Input-output model specifications for technical efficiency models

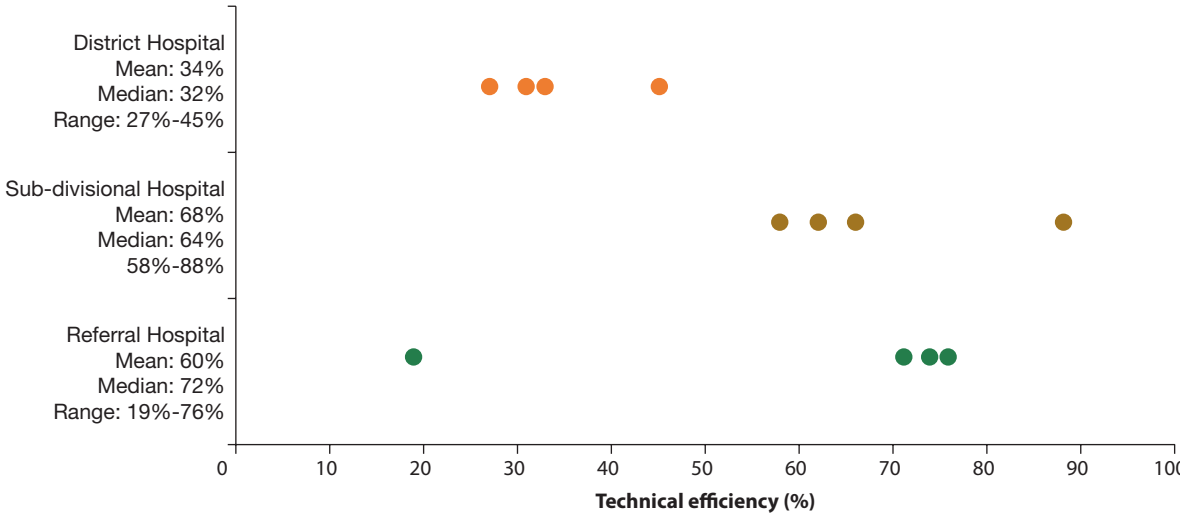
	Category	Variables
Model 1	Inputs	Expenditure on personnel Expenditure on pharmaceuticals and consumables All other expenditure
	Outputs	Outpatient visits Number of inpatients Immunisation doses*
Model 2	Inputs	Number of beds Number of doctors Number of nurses/ANMs Number of para-medical staff Number of non-medical staff
	Outputs	Outpatient visits Number of inpatients Immunisation doses*

** Considered only for community and primary health centres*

Efficiency of the District, Sub-divisional and Referral Hospitals

The technical efficiency score for each facility under these platforms are shown in Figure 42 and Table 22. A pattern was seen in technical efficiency considering all these three platforms together. In general, the districts where in the technical efficiency of the district hospital was lower, the technical efficiency of the sub-divisional and referral hospitals was higher. No district hospital had technical efficiency >50%.

Figure 42: Range of technical efficiency scores across District, Sub-divisional and Referral Hospitals



Note: Each circle represents the two-year facility average efficiency score; Range refers to intra-quartile range.

Table 22: District-wise technical efficiency scores (%) for each district, sub-divisional and referral hospital

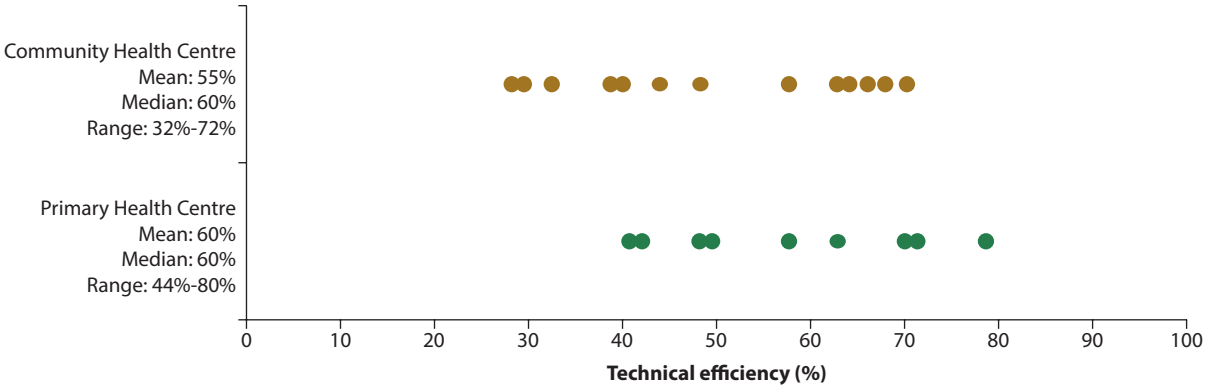
Platform/District	Aurangabad	Purnea	Samastipur	East Champaran
District Hospital	27%	45%	31%	33%
Sub-divisional Hospital	62%	58%	66%	88%
Referral Hospital	74%	19%	71%	76%

The highest technical efficiency among the four district hospitals was 45% in district Purnea, with a platform average of 34%. There was 1.7 times difference in technical efficiency between the highest and the lowest technical efficiency for this platform between districts. Of the four sub-divisional hospitals, the one in district East Champaran had the highest technical efficiency at 88%, with average technical efficiency for this platform at 68.5%. The difference between the highest and the lowest technical efficiency for this platform was 1.5 times. All the sub-divisional hospitals had technical efficiency higher than their respective district hospitals. Three of the 4 (75%) referral hospitals had technical efficiency >50%, with the highest being 76% in East Champaran. The difference between the highest and the lowest technical efficiency for this platform was 57%. **Annexure 10** shows the average outputs and inputs for the facilities with the lowest and highest efficiency scores across these platforms.

Efficiency of the Community and Primary Health Centres

The technical efficiency score for each community and primary health centre is shown in Figure 43 and Table 23. Among the 15 community health centres sampled in this study, the technical efficiency ranged between 32% and 70%. Only 8 of the 15 community health centres (53.3%) had a technical efficiency score of >50%. The highest technical efficiency was seen for CHC Hasanpur and CHC Madanpur at 72% in Samstipur. The difference between the highest and the lowest technical efficiency for this platform was 125%. Among the 9 sampled primary health centres, the technical efficiency ranged between 44% and 80%. Only 2 primary health centres (22%) had a technical efficiency score of <50%. The difference between the highest and the lowest technical efficiency for this platform was 82%. **Annexure 10** shows the average outputs and inputs for the facilities with the lowest and highest efficiency scores across these platforms.

Figure 43: Range of technical efficiency scores across community and Primary Health Centres



Note: Each circle represents the two-year facility average efficiency score; Range refers to intra-quartile range.

Table 23: District-wise technical efficiency scores (%) for Community and Primary Health Centres

District	Facility	Technical efficiency score
Aurangabad	CHC Barun	47%
	CHC Deo	36%
	CHC Madanpur	70%
	CHC Obra	51%
	CHC Rafiganj	66%
	PHC Goh	52%
Purnea	CHC Baisa	65%
	CHC Bhawanipur	43%
	PHC Barhara Kothi	65%
	PHC Jalalgarh	51%
	PHC Krityanandnagar	60%
	PHC Shrinagar	80%
Samastipur	CHC Hasanpur	72%
	CHC Mohiuddinpur	72%
	CHC Sarairanjan	68%
	PHC Mohanpur	73%
	PHC Shivajinagar	44%
	PHC Warisnagar	72%
East Champaran	CHC Chiraiya	42%
	CHC Kalyanpur	33%
	CHC Mehashi	32%
	CHC Pahadpur	70%
	CHC Patahi	60%
	PHC Raxaul	45%

Possible Additional Outputs

Despite the small sample size in this study, the findings indicate poor technical efficiency with only 9 (25%) of the 36 facilities having technical efficiency of >70%, and only one with technical efficiency of 88%. Given these observed levels of facility-based resources (inputs), it then appears that most of these facilities have the capacity to handle much larger patient volumes with the available resources than they currently handle as compared with the more efficient facilities in that particular platform.

The current outputs of the sampled facilities are shown in Table 24. We present three different scenarios for additional outputs to increase outputs based on the technical efficiency results – if all the facilities were to be 100% efficient, if all facilities were to perform at the highest level of efficiency for a given platform, and if all the facilities were to perform at the average level of efficiency for a given platform. It should be noted that this is a simplistic way of understanding the additional outputs that the system can produce with the current level of inputs, without taking into account any external factors.

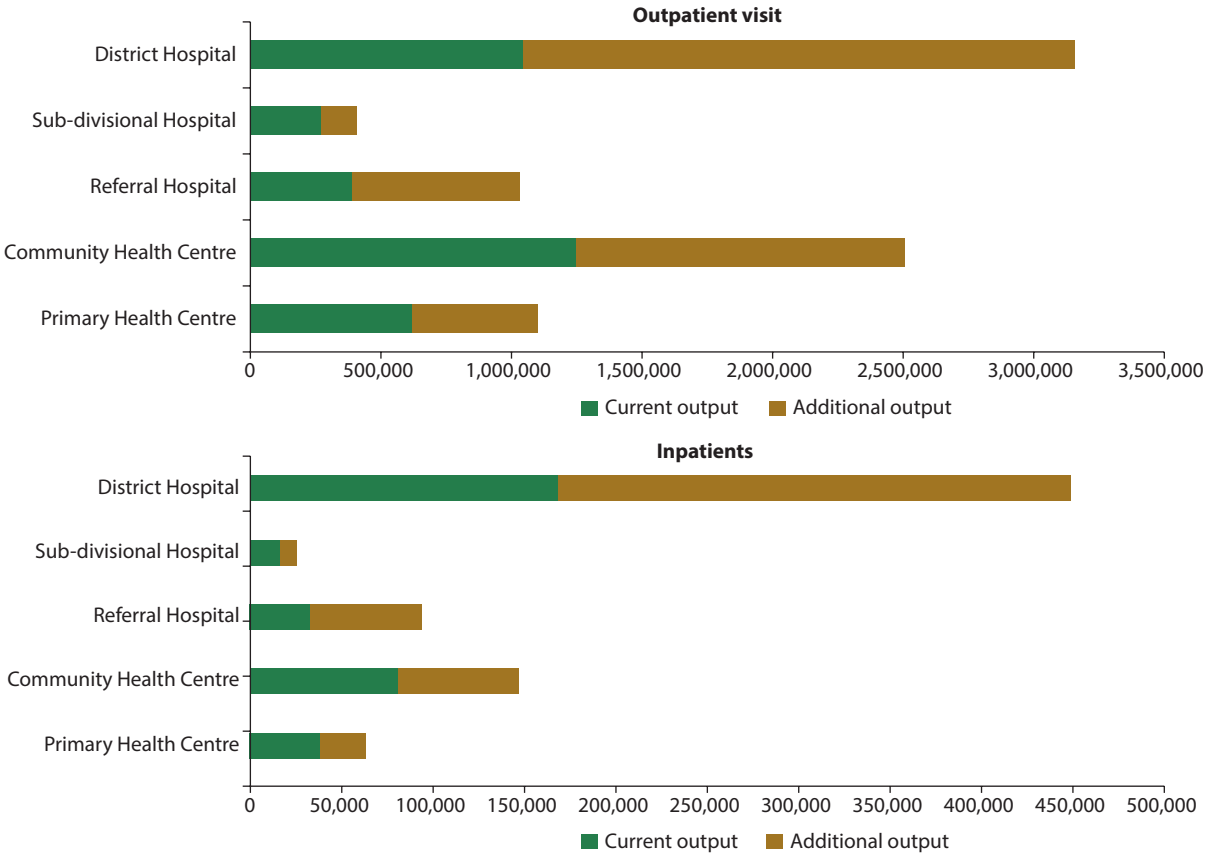
Table 24: Current outputs of the sampled facilities, by platform

Platform	Current output	
	Outpatient visits	Inpatients
District Hospital	1,043,616	169,128
Sub-divisional Hospital	270,421	16,906
Referral Hospital	388,562	33,028
Community Health Centre	1,248,560	81,453
Primary Health Centre	621,352	38,494
All the above facilities	**3,572,510**	**339,008**

Scenario 1: 100% Technical Efficiency

If all the sampled facilities in this study were to function at 100% technical efficiency, then the additional possible outputs in these facilities are shown in Figure 44. The outputs of district hospitals could see the highest percent of increase across the outpatient visits (302.5%) and referral hospitals saw the highest percent of inpatients (186%), with the current level of inputs. **Annexure 11** documents the potential additional numbers of outpatient visits and inpatients by platform.

Figure 44: Additional outputs based on 100% technical efficiency, by platform

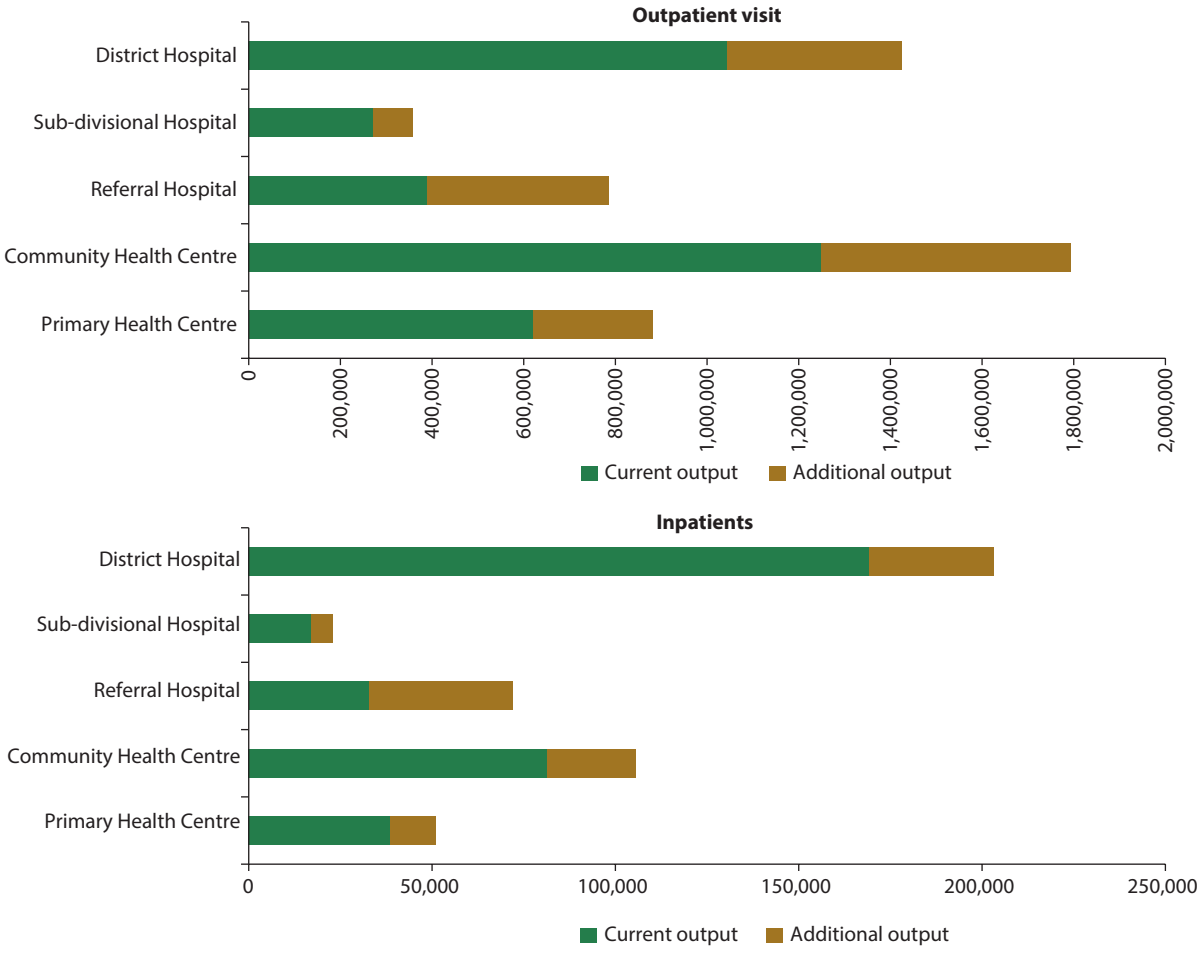


** Highest technical efficiency for DH is 45%, SDH is 88%, RH is 76%, CHC is 72%, and PHC is 80%*

Scenario 2: Highest Technical Efficiency

If all the sampled facilities in this study were to function at the highest technical efficiency level for a given platform, then the additional possible outputs are shown in Figure 45. The district and referral hospitals could manage a higher proportion of additional outputs as compared with the other health platforms. **Annexure 11** documents the potential additional numbers of outpatient visits and inpatients by platform.

Figure 45: Additional outputs based on the highest technical efficiency, by platform

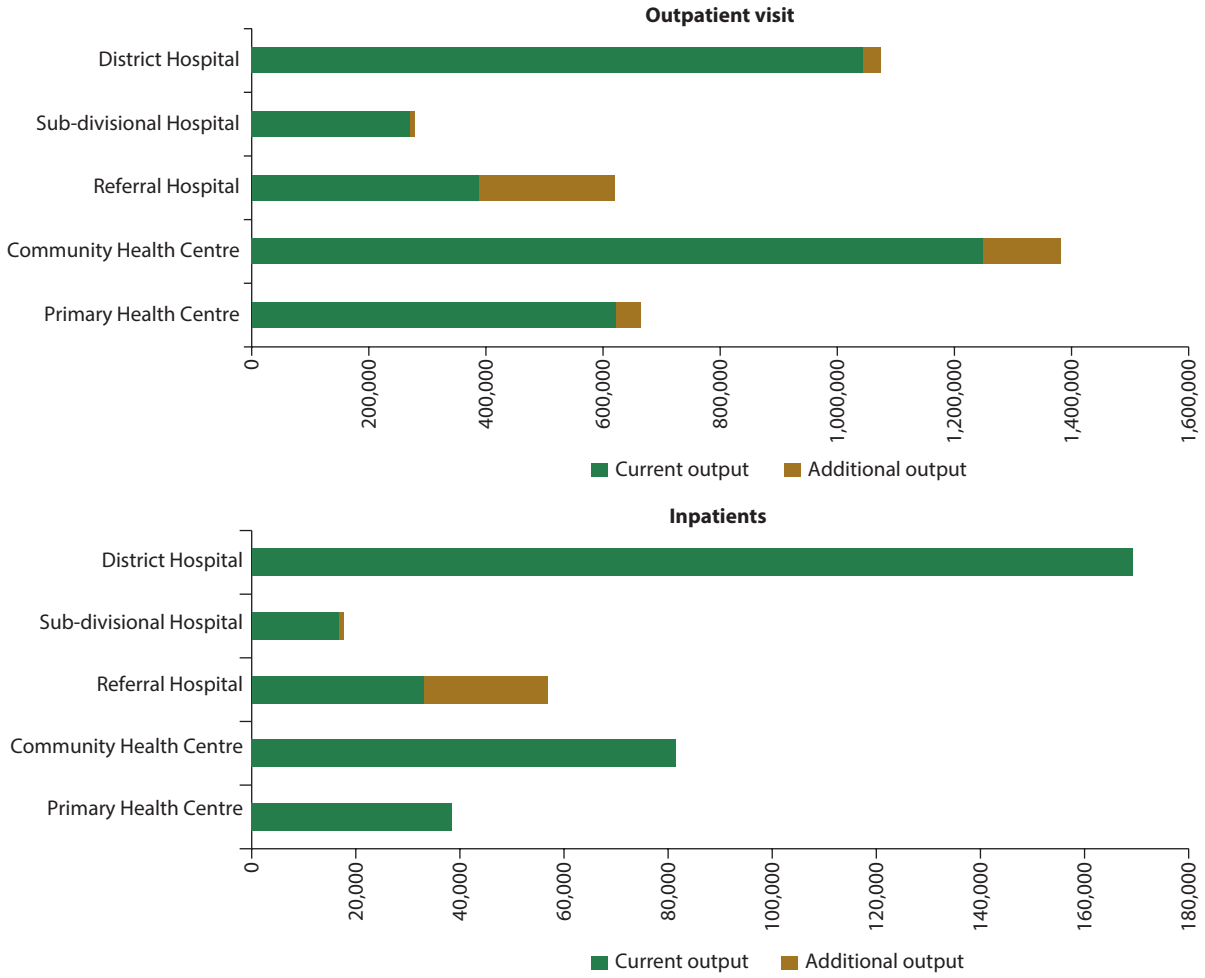


** Highest technical efficiency for DH is 45%, SDH is 88%, RH is 76%, CHC is 72%, and PHC is 80%*

Scenario 3: Average Technical Efficiency

If all the sampled facilities in this study were to function at the average technical efficiency level for a given platform, then the additional possible outputs are shown in Figure 46. As expected, the additional outputs expected would be lower than those shown for the above two scenarios. The referral hospitals will see a substantial increase in this scenario for both types of outputs. **Annexure 11** documents the potential additional numbers of outpatient visits and inpatients by platform.

Figure 46: Additional outputs based on average technical efficiency, by platform



** Average efficiency for DH is 34%, SDH is 68%, RH is 60%, CHC is 55%, and PHC is 60%*

District Level Efficiency and Child Mortality

In addition to understanding outputs in relation to the efficiency of health facilities, we attempted to explore if the districts with higher efficiency score had better outcomes. As most of these facilities cater largely to maternal and child health, we assessed the relation neonatal and under-5 mortality rate with technical efficiency. The district-level neonatal and under-5 mortality estimates for 2017 available from the Global Burden of Disease Study were used for this exploration.

An interesting pattern emerged. Samastipur district with most facilities below the district hospital having an efficiency score >60% had the least neonatal and under-5 mortality rates (Figures 47-48). In general, the higher the average efficiency score of the facilities in a district, lower the neonatal and under-5 mortality rates. In other words, wider the spread of efficiency score of facilities across the platform in a given district, higher the neonatal and under-5 mortality rates. It is important to note that though this analysis suggests a possible association between child mortality indicators and efficiency of facilities for these four districts, this needs to be explored further with a larger number of districts and facilities.

Figure 47: Relationship between district level neonatal mortality rate (2017) and efficiency scores of all sampled facilities in a given district

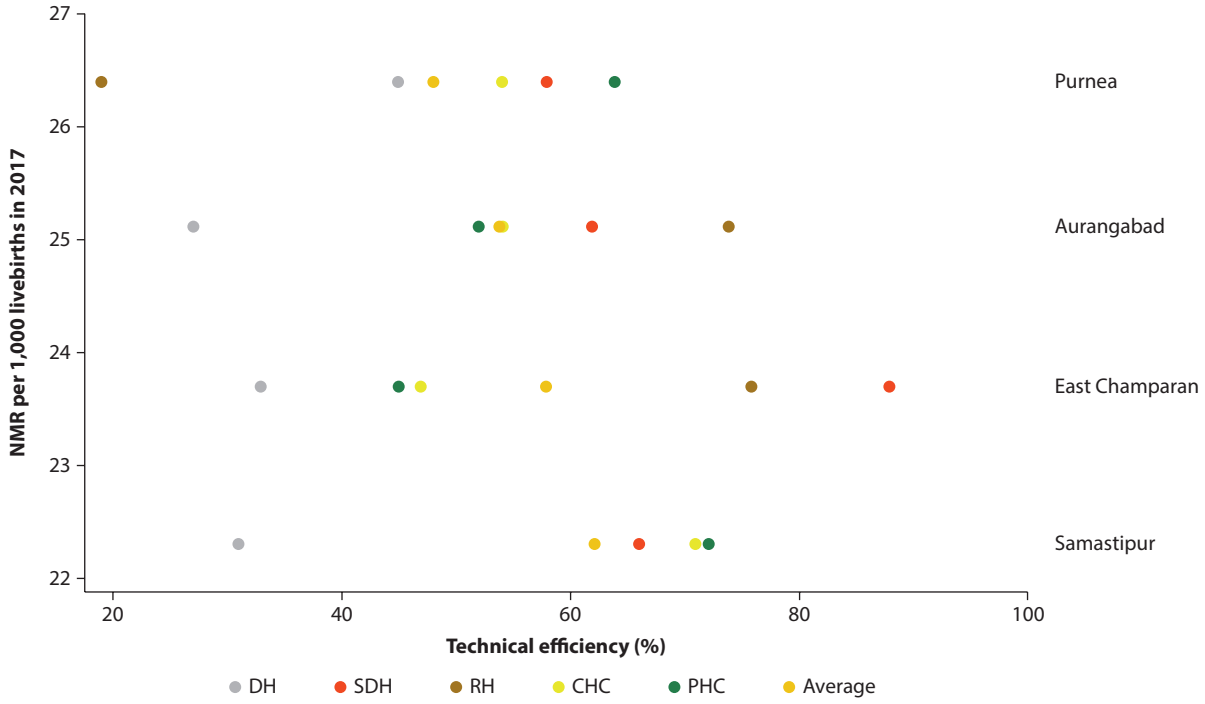
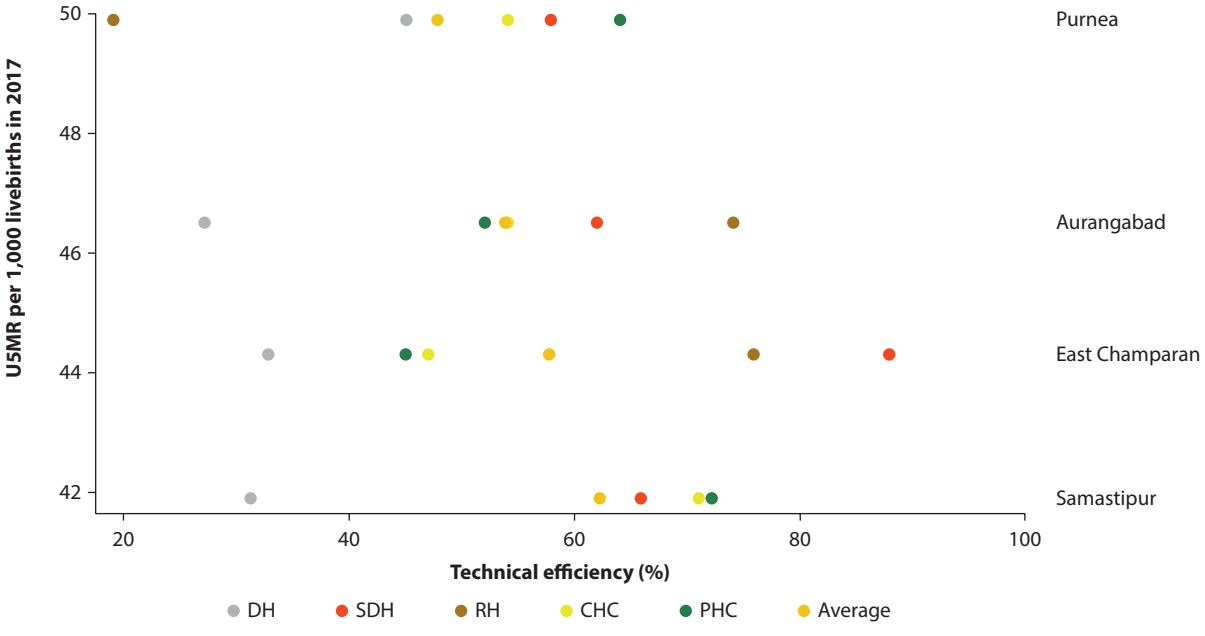
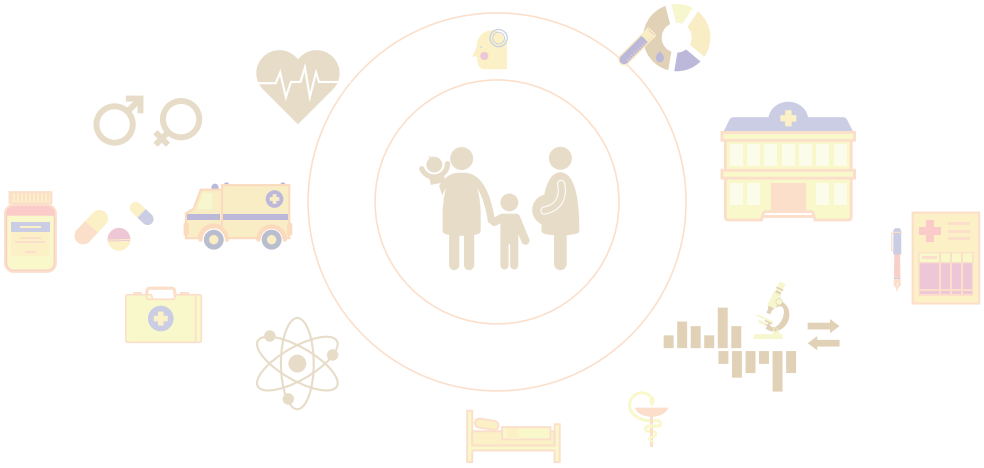


Figure 48: Relationship between district level under-5 mortality rate (2017) and efficiency scores of all sampled facilities in a given district



Summary

The efficiency scores estimated in this study measured the volume of outputs that a facility is currently producing relative to the maximum volume it could potentially produce from its current inputs. Using the two fiscal years of data to estimate the technical efficiency scores for all facilities, four main findings emerged. First, the technical efficiency scores were relatively low across all levels of health facilities. Second, the range between the facilities with the highest and lowest technical efficiency scores was quite broad within platforms, suggesting that a substantial performance gap exists between facilities. Third, all the sampled health facilities were capable of handling a larger volume of patients. More detailed work to understand the determinants of efficiency could help identification of factors that could facilitate this projected increase in outputs. Lastly, there is potentially an association between neonatal and under-5 mortality and efficiency of facilities in these four districts, however, this needs to be tested further in a larger number of districts.



CHAPTER 5

Patient Perspectives

A facility's availability and capacity to deliver services is only half of the health care provision equation; the other half depends upon patients seeking those health services. Many factors can affect patients' decisions to seek care, ranging from associated visit costs to how patients view the care they receive. These "demand-side" constraints can be more quantifiable (e.g., distance from facility) or intangible (e.g., perceived respectfulness of the health care provider), but each can have the same impact on whether patients seek care at particular facilities or have contact with the health system at all.

Patient Participation

Table 25 shows the sample of patients contacted against the required number of sample, and the participation rate in the exit survey across the platforms. Overall, the participation rate was 91.8% in the district hospitals, 95.7% in the sub-district hospitals, 95.3% in referral hospitals, 93.6% in community health centres and 91.7% in primary health centres.

Table 25: Participation rate by platform

Platform	Number of patients required	Number of patients contacted	Number of interviews done	Percent of participation
District Hospital	360	453	416	91.8
Sub-District Hospital	160	163	156	95.7
Referral Hospital	160	192	183	95.3
Community Health Centre	525	629	589	93.6
Primary Health Centre	315	411	377	91.7

Patient Characteristics

Using data collected from the Patient Exit Interview Surveys component of ACCO study, we examined the characteristics of patients who visited the health facilities and their perspectives on the care they received that day. Table 26 provides an overview of the interviewed patients or their attendants (N=1,766) across the health facilities. Nearly half of the patients were female (49.2%), and about a quarter (23.6%) identified themselves as scheduled caste/scheduled tribe. Nearly half (49.5%) of the patients were under the age of 30 years, 32.1% had no education, and 28.1% reported possessing a health insurance card. Nearly 60% of the patients rated their health status to be poor on the day of visit.

Table 26: Characteristics of patients interviewed after receiving care at facilities

	District Hospital	Sub-divisional Hospital	Referral Hospital	Community Health Centre	Primary Health Centre	Total
Total patient sample	437	158	193	594	384	1,766
Percent female	41.6%	47.4%	58.5%	49.6%	53.1%	49.2%
Patient's age group (years)						
<5	6.0%	11.4%	8.3%	11.3%	9.1%	9.2%
5-15	8.2%	8.9%	13.5%	10.8%	10.2%	10.1%
16-29	33.0%	33.5%	32.6%	27.6%	28.4%	30.2%
30-49	30.9%	24.1%	28.5%	28.3%	29.4%	28.8%
≥ 50	22.0%	22.2%	17.1%	22.1%	22.9%	21.7%
Hindu	83.5%	85.4%	76.1%	84.5%	79.4%	82.3%
Caste						
Scheduled caste/tribe	23.7%	18.3%	28.4%	25.5%	20.3%	23.6%
Extremely backward	15.4%	11.3%	10.0%	10.6%	17.4%	13.3%
Other backward	39.0%	56.3%	39.4%	47.4%	48.8%	45.6%
General	21.7%	13.9%	22.1%	16.3%	13.3%	17.4%
Education attainment						
None	27.4%	26.5%	30.8%	30.4%	43.0%	32.1%
Classes 1 to 5	16.2%	15.8%	22.5%	19.2%	19.3%	18.5%
Classes 6 to 9	16.2%	27.2%	21.9%	22.1%	14.3%	19.4%
Class 10 to 12	24.9%	21.5%	16.7%	20.2%	16.4%	20.3%
Higher than class 12	15.1%	8.8%	7.8%	7.9%	6.7%	9.5%
Household has BPL card	56.2%	63.2%	52.8%	60.7%	64.0%	59.7%
Access to any health insurance scheme	23.5%	29.1%	31.0%	26.4%	34.1%	28.1%
Overall perceived health status of the patient today						
Poor	55.3%	60.7%	58.0%	57.0%	61.3%	57.9%
Fair	39.1%	35.4%	32.1%	38.4%	34.7%	36.8%
Good - Very good	5.5%	3.8%	8.8%	4.2%	3.4%	4.8%

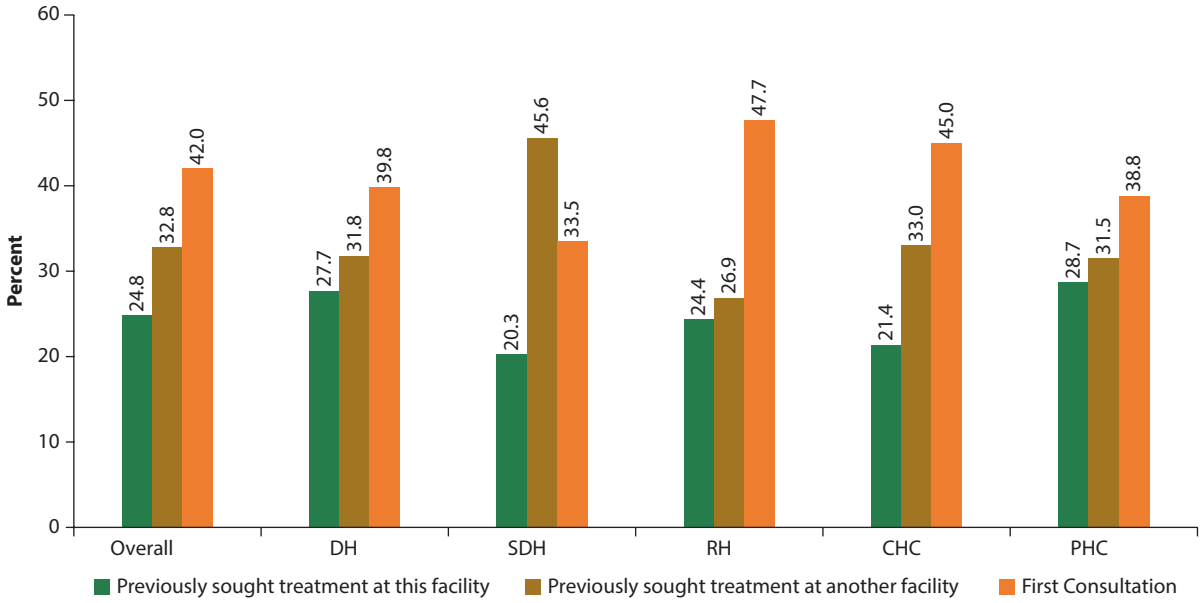
Note: Educational attainment refers to the patient's level of education or the attendant's educational attainment if the interviewed patient was younger than 16 years old.

Disease Conditions for Which Treatment was Sought

Overall, 78% of the patients had previously sought treatment for any health condition at the facility where they were interviewed, which was nearly similar across the platforms. Forty-two percent of the patients reported being first-time patient to this health facility, while 24.8% reported having a previous visit to the same health facility. These proportions varied by the platform (Figure 49).

The average duration of symptoms for the patients who had sought treatment/consultation for the first time for the specific disease condition at the facility on the day of interview was 45 days (95% CI 24.2-67.8) i.e., 1.5 months. On the other hand, the average duration of symptoms for the patients who had sought treatment previously for the specific disease condition was 232 days (95% CI 194.4-269.7) i.e., 7.6 months.

Figure 49: Treatment seeking for the current disease/condition, by platform



DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre

The reported disease/conditions by the patients were categorized based on the Global Burden of Disease (GBD) Study classification for ease of interpretation as shown in Table 27.

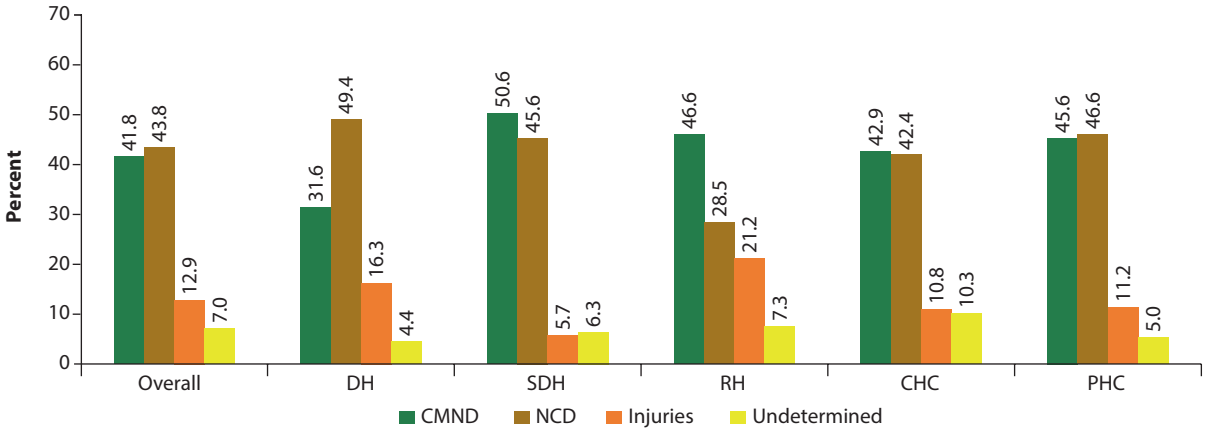
Table 27: Categorization of reported disease conditions as per the Global Burden of Disease Study

Non-Communicable, maternal, neonatal and nutritional diseases		
1	Respiratory infections and tuberculosis	Breathing/tuberculosis
2	Enteric infections	Fever/cold cough/diarrhea/pneumonia
3	Neglected tropical diseases and malaria	Malaria/filaria/dengue
4	Other infectious diseases	Infection/jaundice
5	Nutritional deficiencies	Anemia
6	Maternal related conditions	Antenatal and postnatal check up

Non-communicable diseases		
7	Neoplasm	Cancer/leukaemia
8	Cardiovascular diseases	Chest pain/heart problem/stroke
9	Digestive diseases	Pain in abdomen/constipation/liver/acidity
10	Neurological disorder	Headache
11	Mental disorder	Psychiatric
12	Diabetes and kidney diseases	Kidney stone/diabetes
13	Skin and subcutaneous diseases	Skin disease and allergy
14	Sense organ disorder	ENT/eye pain/eye infection
15	Musculoskeletal disorders	Neck pain/back pain and pain in legs, pain in hands, shoulder pain, body pain
16	Other	Dental/teeth pain/mouth ulcer/gynaecological related/ family planning
Injuries		
17	Unintentional injuries	Animal bites
18	Injuries unspecified	Other injuries/burn/cuts
Undetermined		
19	Undetermined	Vaccination/giddiness/hydrocele/piles/swelling/ weakness/follow up visit

The proportion of patients seeking care at the health facility was nearly similar for communicable, maternal, neonatal and nutritional diseases (CMND) 41.8% and non-communicable diseases (NCD) 43.8% as shown in Figure 50 (disease/conditions are not mutually exclusive as some patients reported more than one disease condition). A total of 13% of patients reported seeking care for injury. The patients interviewed at the district hospitals had a lower proportion of communicable diseases, and those interviewed at referral hospitals had a relatively lower proportion of non-communicable diseases and a higher proportion of injuries.

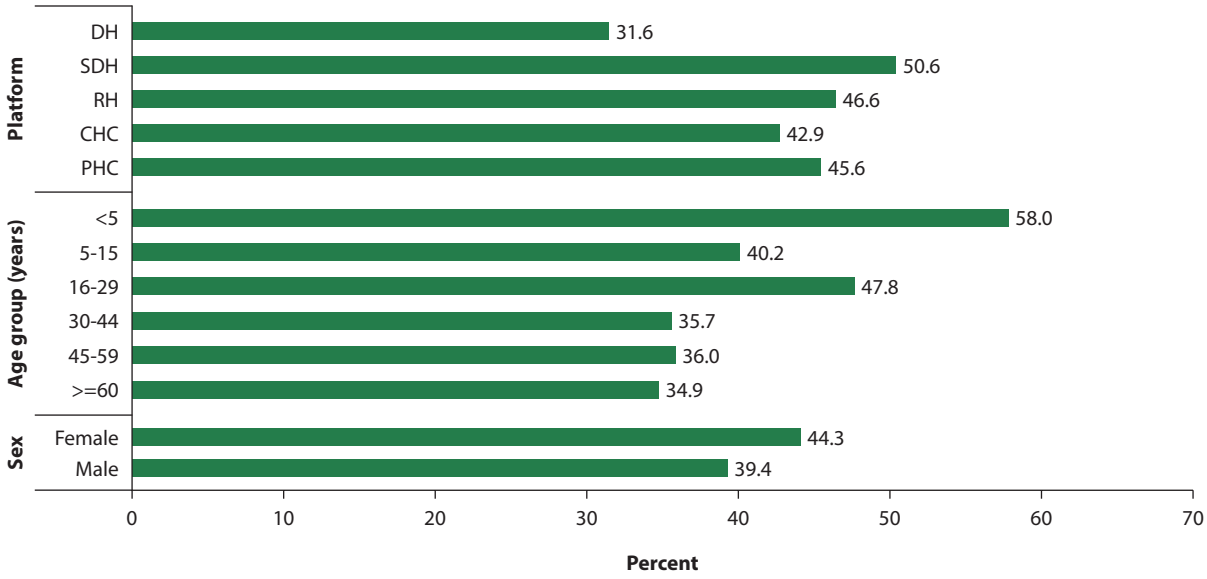
Figure 50: Type of health condition for treatment seeking today, by platform (not mutually exclusive)



DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre
CMND: Communicable, maternal, neonatal and nutritional diseases; NCD: Non-communicable diseases

Among the patients who reported seeking care for CMND, the highest proportion of patients were at the sub-divisional hospital and were less than 5 years of age (Figure 51).

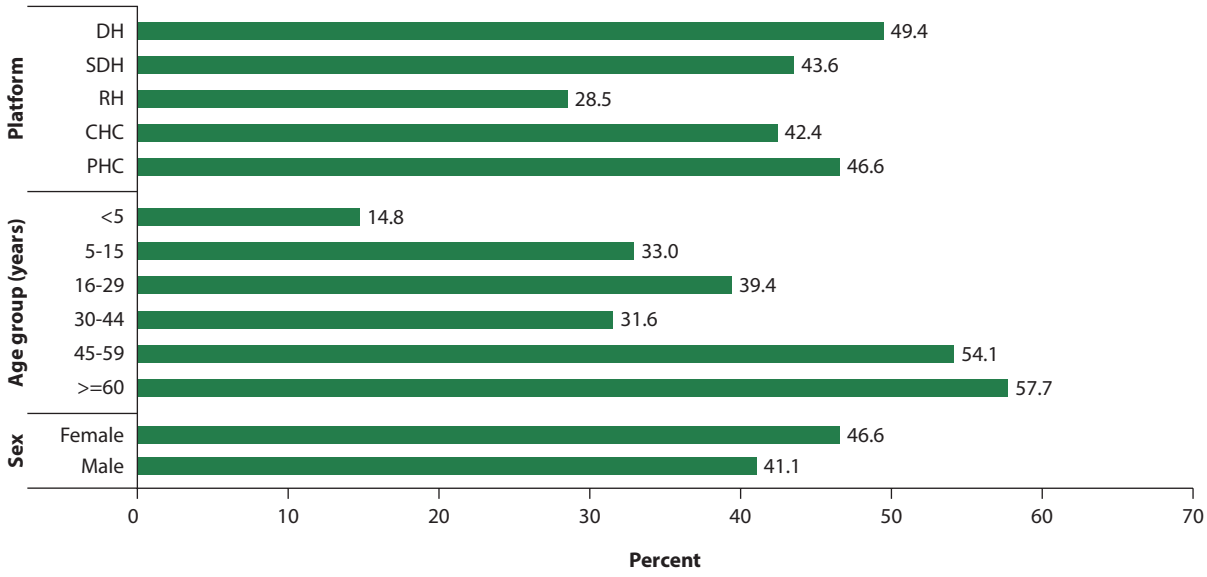
Figure 51: Communicable, maternal, neonatal and nutritional diseases distribution, by platform, age and sex



DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre

Among the patients who reported seeking care for NCD, the lowest proportion was reported at the referral hospital and belonging to 30-49 years of age group (Figure 52).

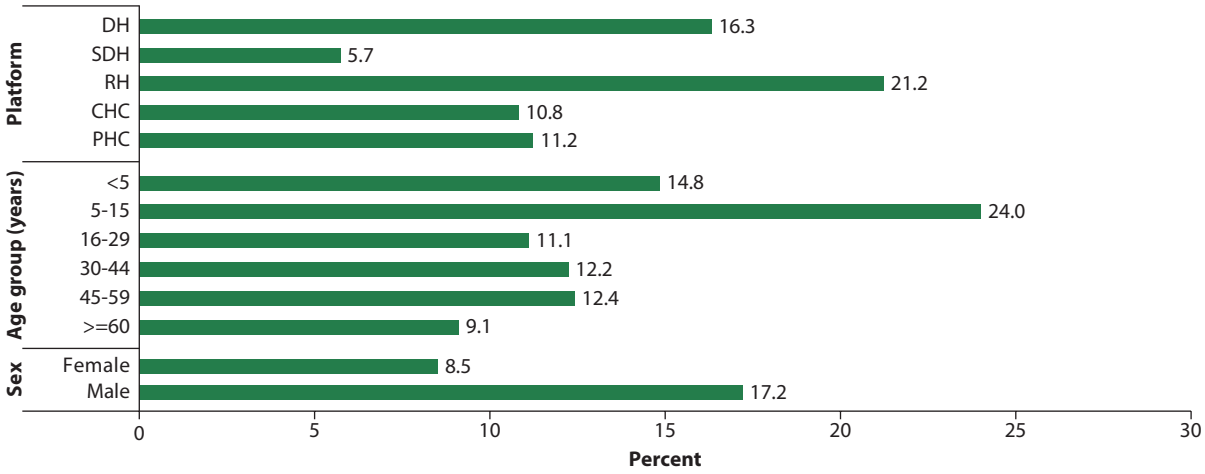
Figure 52: Non-communicable disease distribution, by platform, age and sex



DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre

Among the patients who reported seeking care for injury, a higher proportion was found at the referral hospital, and majority were in 5-15 years age group (Figure 53).

Figure 53: Injuries distribution, by platform, age and sex



DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre

Reasons for Choosing this Facility Today

Table 28 shows the reasons cited by the patients for choosing this facility for treatment. The most common reason cited by the patients for choosing this facility was that free treatment, followed by availability of good medicines. Convenient location was another reason which most of the patients cited. Across the platforms, 86.5% of patients visited the SDH because it was free and 77.6% and 77.0% visited the CHC and PHC respectively for similar reason. 63.2% of the patients visited SDH because availability of medicines is good, while only 39.8% and 48.1% of patients visited the RH and DH respectively. Convenient location was cited by only 46.0% of the patients who visited PHC, while only 32.7% and 33.1% cited this reason at DH and SDH.

Table 28: Reasons for visiting the facility for treatment, by platform

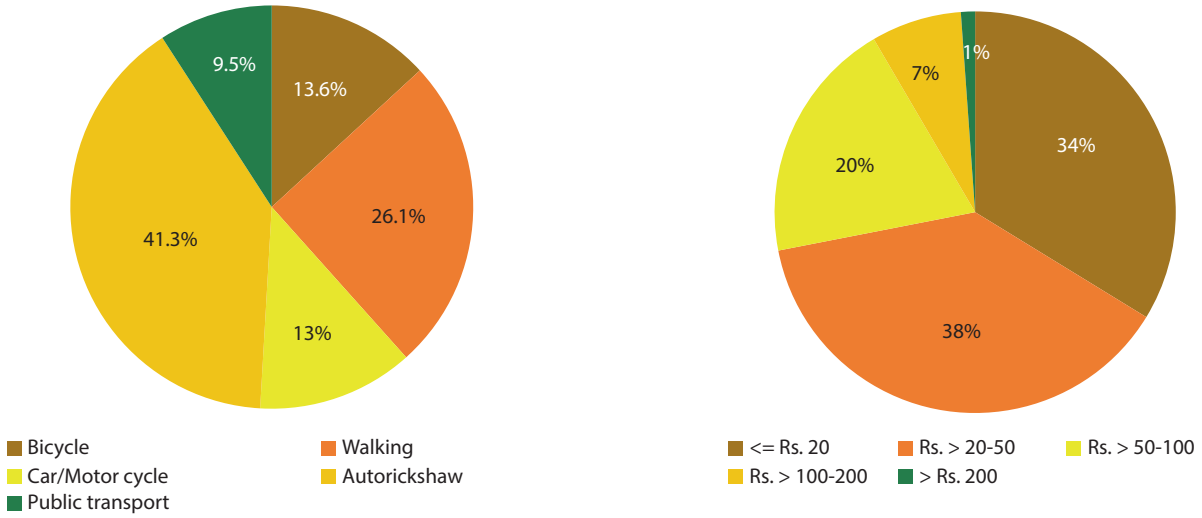
Reasons	DH	SDH	RH	CHC	PHC
Convenient Location	32.7%	33.1%	43.4%	41.4%	46.0%
Convenient Working Hours	21.0%	26.4%	36.7%	35.1%	42.1%
Facility is Free	69.8%	86.5%	67.4%	77.6%	77.0%
Seeing Doctor is inexpensive	33.8%	26.4%	40.8%	37.3%	29.1%
Medicines are inexpensive	43.1%	19.6%	46.9%	32.4%	25.9%
Good medicines is available	48.1%	63.2%	39.8%	51.8%	49.9%
Good reputation of medical staff	17.7%	23.3%	7.7%	12.0%	15.9%
Referred from another facility	1.1%	-	2.0%	0.5%	0.7%
Advised by a HW in the community	5.3%	6.8%	7.1%	2.2%	8.8%
Advised by family of friends	34.9%	14.1%	48.5%	35.4%	21.5%
Only facility available	1.1%	-	0.5%	0.3%	0.5%
Other reasons	5.3%	4.9%	2.6%	1.6%	1.7%

DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre

Mode and Cost of Transport

Mode and cost of transport plays a crucial role during the care seeking behavior of the patients. The decision to choose certain health facility over the other depends on the availability of mode of transport and their related cost. Among the patients who were interviewed, 41.3% took auto rickshaw, while 26.1% walked to the facility. However, 38.2% of patients paid 21 to 50 rupees for the mode of transport taken by them to the facility, while 33.7% have spent over 201 rupees which explains the distance travelled by the patients for specialized care at the higher health facility (Figure 54).

Figure 54: Patient's mode and cost of transport

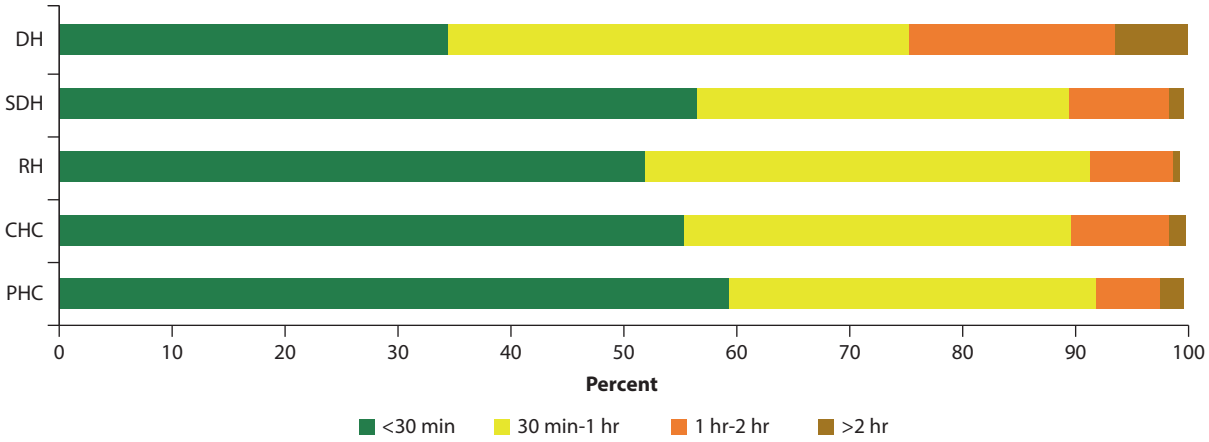


Travel and Wait Times

The amount of time patient spends traveling to facilities and then waiting for services can substantially affect their care-seeking behaviors. Among the patients who were interviewed, we found that travel time to a facility for care differed by the platform, with generally shorter travel time for patients seeking care at lower-level facilities than higher-level (Figure 55). It is important to note that patients only reported on the time spent traveling to facilities, not the time needed for round-trip visits. Most patients had travel times of less than 30 minutes to a facility for care (Figure 53). 34.3% of patients who went to district hospitals travelled fewer than 30 minutes, 40.7% travelled between 30 minutes and one hour. At community and primary health centres, these proportions were 59.1% and 32.5%; 55.2% and 34.1%, respectively. This finding is not unexpected, as these are the closest health facilities for many patients, particularly those in rural areas. It also reflects longer distances that patients travel to receive the specialized care offered at district hospitals, which is located in the district headquarter town.

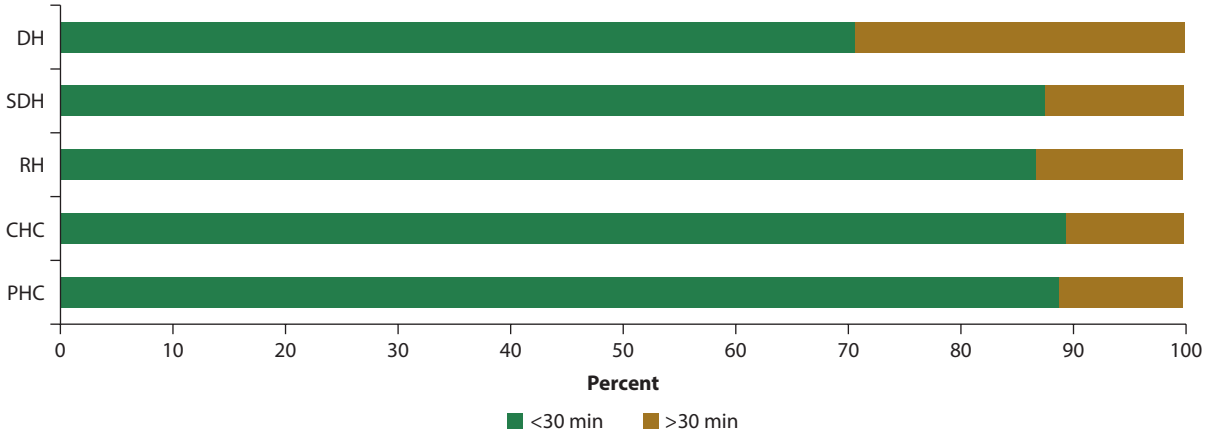
In terms of wait time, the large majority of patients waited less than 30 minutes to receive care at all platforms (Figure 56), and nearly all patients seeking care at community and primary health centres (>85%) received care within 30 minutes. Wait times were longer at district hospitals (29.2% of

Figure 55: Patient travel times to facilities, by platform



DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre

Figure 56: Patient wait times at facilities, by platform



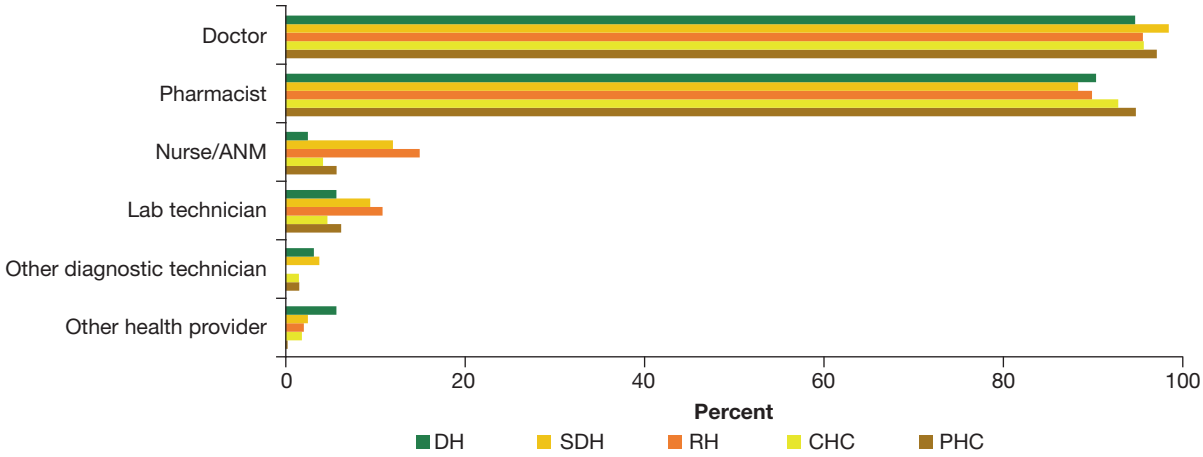
DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre

patients waited more than 30 minutes to receive care). Fewer than 3.7% of all patients waited more than 1 hour to receive care.

Interaction with Health Providers

The patients were asked to report all the health providers (medical and para-medical) with whom they had interacted on that day for health care. Majority of the patients interacted with 2 health providers (87.1%), and the range was 1 to 4. Of all the patients, 96.3% of all patients reported interaction with a doctor, 6.0% nurse/ANM, and 92.2% pharmacist, and some proportion with the other providers. Interestingly, interaction only with the doctor and pharmacist combination was reported by majority of the patients (82.6%).

Figure 57: Distribution of health provider met, by platform

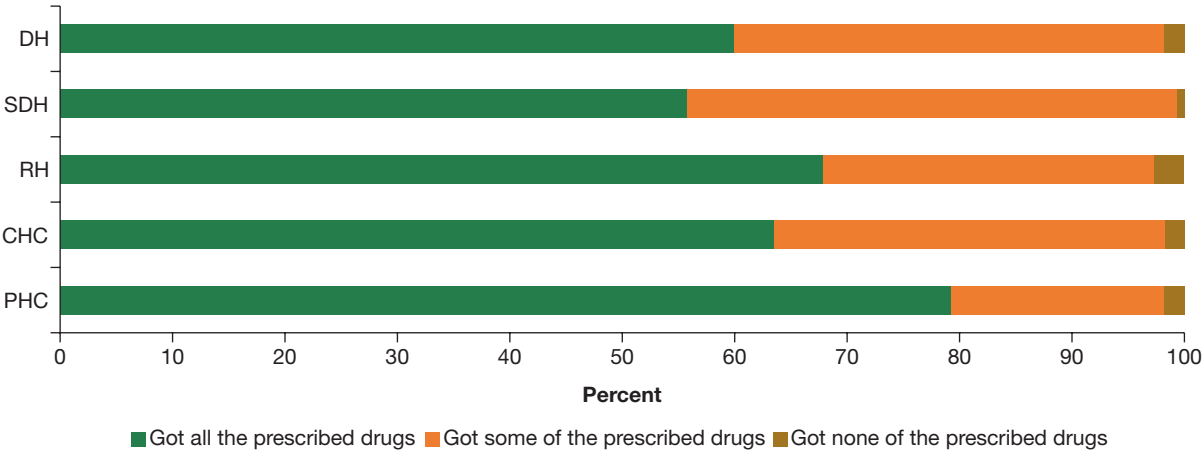


DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre

Availability of Prescribed Drugs

Among 1,709 patients, who were prescribed drugs and attempted to obtain those drugs during the visit, 1,132 received all prescribed drugs (Figure 58). This ranged from 60% of patients at district hospitals to 79% of patients at the primary health centres.

Figure 58: Availability of prescribed drugs at facility, by platform

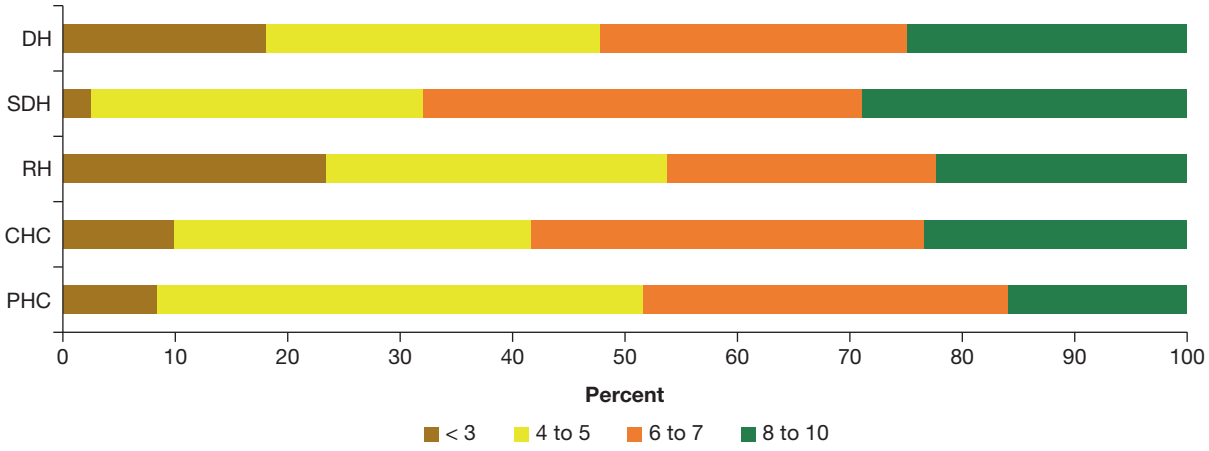


DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre

Patient Satisfaction

We report primarily on factors associated with patient satisfaction with provider care and perceived quality of services by patients on medicine availability, and hospital infrastructure. Ratings of patient satisfaction were based on a rating from 1-10, with 10 being the highest score. The distribution of satisfaction scores by platforms is shown in Figure 59. Very few patients (2.2%) gave a rating of 10, 22.1% rated between 8 and 10, 31.6% between 6 and 7, 33.8% between 4 and 5, and 12.3% rated <3. The highest proportion of <3 rating was for referral hospitals (23.1%) and the least for sub-divisional hospitals (2.5%).

Figure 59: Patient scores of facilities, by platform



Patients were asked to score the facility on a scale from 1-10, with 10 being the highest score.
DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre
Note: Facility ratings were reported along a scale of 0 to 10, with 0 as the worst facility possible and 10 as the best facility possible.

Overall, the mean satisfaction score was 5.8 and some variations were seen across the platforms (Table 29). The mean satisfaction score in district hospitals was 5.7, sub-divisional hospitals was 6.4, referral hospitals was 5.4, community health centres was 6.0 and that in primary health centres was 5.5.

Table 29: Mean satisfaction score with the facility, by platform

	District Hospital	Sub-divisional Hospital	Referral Hospital	Community Health Centre	Primary Health Centre	Total
Total patient sample who reported satisfaction	420	155	177	574	362	1,688
Male	5.7	6.4	5.3	6.2	5.4	5.8
Female	5.6	6.4	5.5	5.8	5.5	5.7
Patient's age group (years)						
<5	5.1	6.5	4.8	6.1	5.1	5.6
5-15	5.7	6.1	5.1	6.2	5.5	5.8
16-29	5.6	6.3	5.6	5.9	5.5	5.8
30-49	5.7	6.8	5.5	6.0	5.4	5.8
≥ 60	5.8	6.4	5.4	5.9	5.5	5.8
Hindu	5.6	6.4	5.5	6.1	5.4	5.8
Caste						
Scheduled caste/tribe	5.6	6.3	5.2	6.1	5.3	5.7
Extremely backward	5.6	6.7	5.2	5.9	5.5	5.8
Other backward	5.7	6.5	5.6	6.0	5.4	5.7
General	5.7	6.1	5.4	6.0	5.6	5.7

	District Hospital	Sub-divisional Hospital	Referral Hospital	Community Health Centre	Primary Health Centre	Total
Education attainment						
None	5.7	6.3	5.4	5.7	5.5	5.7
Classes 1 to 5	5.4	6.4	5.1	5.9	5.3	5.6
Classes 6 to 9	6.2	6.3	5.6	6.0	5.5	6.0
Class 10 to 12	5.4	6.8	5.9	6.6	5.8	6.1
Higher than class 12	5.8	6.5	4.5	5.9	4.3	5.5
Household has BPL card	5.8	6.5	5.2	6.0	5.6	5.8
Overall health status of the patient today						
Poor	5.8	6.2	5.9	6.2	5.5	5.9
Fair	5.3	6.8	4.2	5.7	5.2	5.4
Good - Very good	6.5	6.7	7.1	6.5	6.8	6.7
Type of disease/condition for which the patient sought treatment today						
Communicable diseases and maternal and child health	5.4	6.5	5.6	6.1	5.3	5.8
Non-communicable diseases and injuries	5.8	6.3	5.1	5.9	5.4	5.7

Table 30 provides an in-depth examination of patient ratings of facility characteristics and visit experiences. The lowest satisfaction ratings were given by the patients to the toilet cleanliness followed by privacy during consultation at the facility. Three parameters were assessed to document satisfaction with health providers - respectfully treated by the provider, clarity of explanation by the provider, and provider allowing enough time to ask questions about health problem or treatment. We used a 5-point Likert scale and segregated the highest ratings of good and very good responses combined as satisfied, while lower rating as not satisfied. This was assessed for each of the staff with whom the patient interacted on the given day. Here, we present the findings for doctor and pharmacist only, as these two providers were visited by the majority of patients interviewed.

A wide variation was seen for interactions with doctors and pharmacists. More proportion of patients reported satisfaction with the doctor for respectfulness and time whereas clarity of explanations was reported higher for the latter than the former. For the doctors, time to ask questions had the least proportion of patients satisfied, and the proportion of satisfaction for respectfulness and clarity of explanations increased with decreasing level of platform. Irrespective of the platform, the satisfaction with pharmacist was low, particularly for respectfulness and time to ask questions.

Privacy during consultation and examination by doctor showed poor levels of satisfaction across the platforms, and deceased with decreasing level of platform. Despite these issues, most patients were likely to return to the facility or recommend the facility to someone else.

Table 30: Proportion of patients satisfied with facility visit indicators, by platform

		District Hospital	Sub-divisional Hospital	Referral Hospital	Community Health Centre	Primary Health Centre
Staff interactions						
Doctor	Provider respectfulness	75.1%	85.2%	87.5%	88.7%	84.7%
	Clarity of provider explanations	71.5%	83.3%	82.1%	79.9%	74.8%
	Time to ask questions	65.0%	71.1%	77.8%	70.6%	63.9%
Pharmacist	Provider respectfulness	60.8%	38.5%	70.1%	52.7%	32.6%
	Clarity of provider explanations	83.3%	92.1%	87.3%	92.5%	86.8%
	Time to ask questions	51.7%	42.1%	37.3%	37.3%	25.2%
Facility cleanliness		**75.6%**	**81.5%**	**70.6%**	**86.5%**	**68.1%**
Privacy						
Audio-visual privacy during consultation with doctor		51.8%	51.2%	49.1%	47.9%	33.4%
Privacy during examination by doctor		45.0%	37.8%	36.7%	32.8%	23.5%
Patient likely to return to this facility for another consult		89.4%	95.5%	88.6%	94.2%	94.0%
Patient likely to recommend this facility to someone else		**88.3%**	**95.5%**	**88.0%**	**94.7%**	**95.3%**

Lowest proportion *Highest proportion*

Determinants of Patient Satisfaction with Facility

There are many complex factors which affect patient satisfaction with the care they receive. Given this, a multivariate logistic regression was conducted in order to determine which patient and facility characteristics were associated with patient satisfaction (Table 31). For this analysis, satisfaction with the facility was defined as patient's giving a score more than the mean facility score (>5.8).

For each characteristic—for example, the age or sex of the patient—the odds ratio (OR) is presented. The OR represents the odds that a patient is satisfied given a particular characteristic, compared to the odds of the patient being satisfied in the absence of that characteristic. An OR and 95% confidence interval (CI) greater than 1.0 indicates that there are greater odds of being satisfied with care as compared to the reference group. An OR and 95% CI below 1.0 indicates that there are lower odds of being satisfied with care than the reference group. For example, while the OR for female patients being satisfied with facility is 1.05 (95% CI 0.85-1.28) as compared to male patients, it is not statistically different from an OR of 1.0. This means that, considering all other characteristics, female patients are not more or less satisfied with facility than male patients.

We ran three separate multiple logistic regression models. First model included patient demography and health-related characteristics; the second model included type of platform in addition to the themes in model 1; and the third model also included patient experience characteristics in addition to the themes in model 2.

Patient demography and health characteristics model: None of the demography characteristics of the patient was significantly associated with patient's satisfaction with the facility. The patients who rated their health status as good/very good were more likely to be satisfied with the facility (OR 3.42, 95% CI 1.90-6.13).

Patient demography, health characteristics and type of platform model: None of the demography characteristics of the patient was significantly associated with patient's satisfaction with the facility. The patients who rated their health status as good/very good were more likely to be satisfied with the facility (OR 3.64, 95% CI 2.02-6.56). The patients interviewed at the district hospital (OR 1.39; 95% CI 1.03-1.86), sub-divisional hospitals (OR 2.63; 95% CI 1.76-3.92) and community health centres (OR 1.91 95% CI 1.44-2.51) were significantly more satisfied with the facility as compared with those interviewed at the primary health centres.

Patient demography and health characteristics, type of platform and patient experience model: None of the demography characteristics of the patient was significantly associated with patient's satisfaction with the facility. The highest association with patient's satisfaction with the facility was seen for level of cleanliness of the rooms (OR 3.10; 95% CI 2.37-4.06) in a facility. Patients whose health status on the day of interview was good or very good were significantly more satisfied with the facility as compared with those reported poor health status 3.02 (95% CI 1.63-5.59). Patients interviewed at the sub-divisional hospitals (OR 2.52; 95%CI 1.64-3.86), community health centres (OR 1.63; 95% CI 1.22-2.19) and district hospitals (OR 1.49; 95%CI 1.08-2.06) were significantly more satisfied with the facility as compared with those interviewed at the primary health centres. Patients who reported satisfaction with respectfulness by doctor (OR 1.89; 95% CI 1.34-2.65) and time to ask questions to the doctor (OR 1.31; 95% CI 1.01-1.71), and those who were able to obtain all the prescribed medicines at the facility (OR 1.37; 95% CI 1.09-1.72) were more likely to be satisfied with the facility.

Table 31: Multiple logistic regression results for patient's satisfaction with facility. Values in bold denote significant association with the outcome variable of interest

Characteristics	Category	Proportion of patients satisfied with the facility*	Odds of being satisfied with the facility* (95% Confidence Interval)		
			Patient demography and health characteristics model	Patient demography and health, and facility characteristics model	Patient demography and health facility characteristics and patient experience model
Patient demography and health					
Age in years	<15	52.9	1.00	1.00	1.00
	16-49	54.6	1.10 (0.85-1.43)	1.12 (0.86-1.46)	1.20 (0.90-1.59)
	>=50	52.4	1.04 (0.76-1.42))	1.02 (0.74-1.40)	1.06 (0.76-1.50)
Sex	Male	53.3	1.00	1.00	1.00
	Female	54.3	0.99 (0.80-1.21)	1.00 (0.81-1.23)	0.95 (0.76-1.19)
Caste†	General	50.0	1.00	1.00	1.00
	SC/ST	53.0	1.15 (0.85-1.57)	1.12 (0.82-1.53)	1.01 (0.73-1.41)
	OBC	56.4	1.32 (1.01-1.74)	1.27 (0.96-1.68)	1.31 (0.97-1.76)
	EBC	51.3	1.09 (0.77-1.55)	1.11 (0.78-1.58)	1.11 (0.76-1.62)

Characteristics	Category	Proportion of patients satisfied with the facility*	Odds of being satisfied with the facility* (95% Confidence Interval)		
			Patient demography and health characteristics model	Patient demography and health, and facility characteristics model	Patient demography and health facility characteristics and patient experience model
Schooling	None	52.4	1.00	1.00	1.00
	Class 1-9	55.8	1.14 (0.89-1.45)	1.09 (0.85-1.39)	1.01 (0.78-1.32)
	>Class 10	52.6	0.98 (0.75-1.28)	0.93 (0.71-1.22)	0.90 (0.67-1.21)
Self-reported health status on the day of interview	Poor	56.0	1.00	1.00	1.00
	Fair	47.1	0.70 (0.57-0.86)	0.69 (0.56-0.84)	0.71 (0.57-0.88)
	Good - very good	81.3	3.42 (1.90-6.13)	3.64 (2.02-6.56)	3.02 (1.63-5.59)
Patient sought treatment for communicable diseases and/or maternal and child health issues today	Yes	54.5	0.89 (0.66-1.18)	0.90 (0.67-1.20)	1.00 (0.73-1.38)
	No	53.3	1.00	1.00	1.00
Patient sought treatment for non-communicable diseases and/or injuries today	Yes	52.1	0.80 (0.60-1.07)	0.82 (0.61-1.10)	0.80 (0.58-1.10)
	No	56.1	1.00	1.00	1.00
Facility					
Type of platform‡	DH	51.9		1.39 (1.03-1.86)	1.49 (1.08-2.06)
	SDH	67.7		2.63 (1.76-3.92)	2.52 (1.64-3.86)
	RH	46.3		1.01 (0.70-1.47)	1.02 (0.68-1.52)
	CHC	59.8		1.91 (1.45-2.51)	1.63 (1.22-2.19)
	PHC	44.2		1.00	1.00
Patient experience					
Patient satisfied with cleanliness of rooms in facility§	Yes	60.6			3.10 (2.37-4.06)
	No	29.4			1.00
Waiting time to see the health provider	≤30 mins	53.5			1.01 (0.75-1.36)
	>30 mins	56.0			1.00
Patient satisfied by respectful treatment by doctor§	Yes	58.0			1.89 (1.34-2.65)
	No	32.0			1.00
Patient satisfied with clarity in explanation by doctor§	Yes	58.1			1.28 (0.93-1.74)
	No	38.8			1.00

Characteristics	Category	Proportion of patients satisfied with the facility*	Odds of being satisfied with the facility* (95% Confidence Interval)		
			Patient demography and health characteristics model	Patient demography and health, and facility characteristics model	Patient demography and health facility characteristics and patient experience model
Patient satisfied with the time to ask questions to doctor§	Yes	58.9			1.31 (1.01-1.71)
	No	42.3			1.00
Patient received all prescribed medicines at the facility	Yes	56.2			1.37 (1.09-1.72)
	No	49.4			1.00

** Defined as score >5.8*

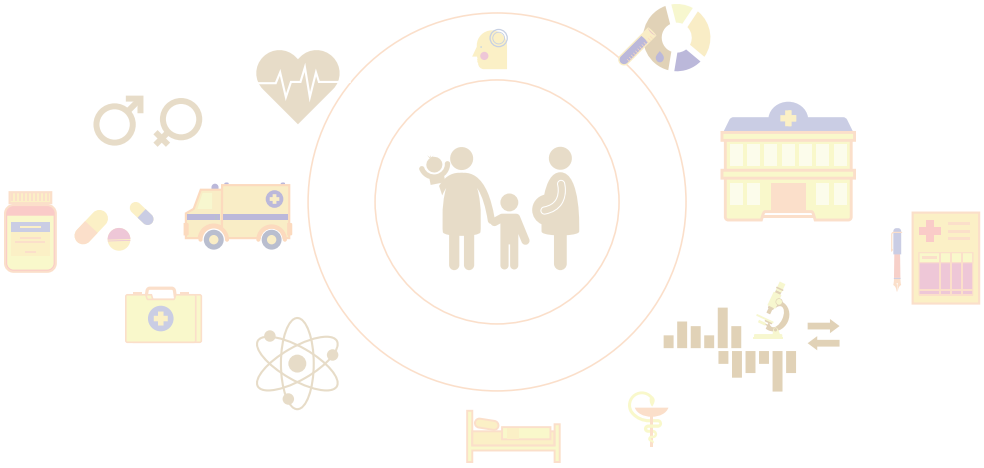
† SC: Schedule caste; ST: Schedule tribe; OBC: Other backward caste; EBC: Extremely backward caste

‡ DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre

§ Good and very good responses considered as satisfied

Summary

The overall patient satisfaction score with the facility was lower than that with the medical doctor. Facility cleanliness and privacy during examination/consultation were highlighted as areas of concern by the patients. The health status of patient, type of facility where treatment was sought, interaction with doctor on that day, cleanliness of facility, and availability of prescribed medicines were the factors determining the patients giving a score more than the mean satisfaction score. No demographic factors (age, sex, education and caste of the patient) were determinant in deciding a higher patient satisfaction.



CHAPTER 6

Conclusions and Policy Recommendations

In this report, we have examined the facility capacity across platforms as well as the efficiencies associated with service provision for each type of facility. We present the conclusions from these findings and make recommendations within the context of increased focus on the provision of universal health coverage in the background of the gaps and challenges already known for the state.

Capacity for Service Provision

The availability of a subset of services including routine delivery, antenatal care, general gynecological and pediatric medicine, internal medicine, minor surgical services, dentistry, TB services, and pharmacy was generally high across the platforms in the four districts assessed, reflecting the expansion of these services throughout these districts. However, among the facilities reporting availability of antenatal care, routine delivery and major surgical services, substantial gaps were identified in the capacity to actually deliver these services. Furthermore, the services for addressing chronic diseases, such as cardiology, orthopedics, ophthalmology, mental health and cancer, and blood bank/storage unit were predominantly limited to district hospital with large gaps across the other platforms. There are significant implications of these findings for service provision in these districts, and these may also be relevant in the other districts of Bihar.

Poor capacity to deliver chronic disease services: The extremely limited capacity of the current health system to address chronic diseases is a major concern. Chronic diseases currently are the leading cause of death and disability for adults in Bihar, as is the case in other states of India, and are projected to increase further during the next 25 years.[79-84] The distribution of disease conditions for which the patients in the exit survey reported to seek health care services at the sampled facilities also reflects the ongoing epidemiological transition of disease burden from infectious to chronic diseases. With such limited capacity, the coverage and quality of services under the National Programmes for Prevention and Control of Diabetes, CVD and Stroke,[85] Mental Health,[86] Tobacco

Control,[87] Control of Blindness,[88] and for Prevention and Control of Deafness [89] is likely to be poor and of questionable quality.

With the continued primary focus of Bihar's health system on maternal and child health care for service provision and capacity-building without the much needed additional focus on chronic disease service provision or capacity of staff to deliver these services, universal health care cannot be achieved. The shortage of staff and the skill-mix of the staff to be recruited should be done within the context of the current and the projected disease burden in the state. There are several known challenges and possible solutions for the provision of chronic diseases at the district level in India,[90-93] and the Bihar government could utilize these experiences and adapt as necessary.

Limited actual capacity for antenatal care services: Good quality ANC is crucial for prevention and detection of potential causes of obstetric complications and to avert new born deaths and stillbirths via identification of high-risk pregnancies.[94-96] ANC is also an opportunity for health providers to educate and engage with women about how and why to deliver in a facility, the benefits of exclusive breastfeeding, where and when to return for postpartum and postnatal care, and the availability of modern family planning methods.[97-99]

Almost all facilities across the platforms indicated the provision of ANC services. However, only one-fourth of the district hospitals, half of the sub-divisional and referral hospitals, one-third of the community health centres, and 11% of primary health centres actually had basic equipment and tests availability. Such a large gap in the availability of equipment and tests for ANC provision raises concerns about the quality of the ANC service provision in these facilities. This poor quality of ANC services in Bihar is reflected in the latest NFHS-4 survey, with the coverage of good quality ANC services at only 4.6% even though the coverage of at least one ANC visit in Bihar was 58.2%.[100] The Bihar government has the opportunity to address the quality of ANC services through the *Pradhan Mantri Surakshit Matritva Abhiyan* which is aimed at improving the coverage and quality of ANC services available to pregnant women in the country.[101]

Inadequacy of routine delivery care services: In Bihar, 63.8% of deliveries are institutional deliveries as per NFHS-4 survey.[66] Though all the facilities up to additional primary health centres indicated availability of routine delivery services, gap was observed in the availability of essential equipment necessary to provide reasonable quality delivery care with the most notable gaps at the additional primary health centres. An ultrasound machine was available only in half of the district hospitals and in none of the sub-divisional and referral hospitals despite it being an essential item for service provision. Obstetric complications including multiple fetuses, breech presentation of the foetus or cord around the neck of the foetus are known to be major risk factors for neonatal mortality and stillbirths in Bihar,[102, 103] and can be detected prior to delivery if ultrasound is available. A high proportion of referral of complicated cases has been reported from public sector to private sector facilities in Bihar, which could be related to non-availability of equipment or personnel, or capacity of the personnel to deal with complicated cases.[102]

Over the last many years, major emphasis has been applied in Bihar to upgrade the skills of nurses to improve delivery outcomes, thereby, impacting neonatal mortality.[104] Concentrated effort is also needed to ensure that all facilities are fully equipped to optimally provide essential routine delivery services, and to improve the availability and skills of doctors to deal with delivery complications to address neonatal mortality and stillbirth reduction further.[102]

Missing alternative/traditional medicine: None of the facilities except one additional primary health centre reported service provision through alternative medicine. Importantly, there were AYUSH trained doctors available at some of the facilities but they were practicing allopathic medicine (*due to non-availability of alternative medicine drugs)*. AYUSH practitioners are allowed to provide services under NRHM for essential family planning counselling, post-partum, pediatric and obstetric care. Recently, the government of India has also proposed for the AYUSH practitioners to practice allopathic medicine after a short bridging course,[105] specifically to address shortage of allopathic medicine practitioners in rural areas. Several concerns have been raised about this recommendation ranging from poor quality of treatment to less ability of AYUSH practitioners to deal with complications and life-threatening conditions.[106, 107]

In a recent population-based assessment of neonatal morality in Bihar, a significant number of women with complicated deliveries reported that "doctor was available at the time of delivery but did not perform C-section".[102, 103] A deep dive into this issue led to the understanding that the doctor present was more likely to be AYUSH practitioner who was not trained to perform C-section. For such women, the purpose of the availability of doctor was defeated. This also highlights that the patient population is not necessarily able to differentiate the type of doctor and because the AYUSH practitioners prescribe allopathic medicine, patients assume them to be allopathic medicine practitioners.

As the shortage of doctors in rural areas needs to be addressed, the Bihar government could take immediate steps to improve the availability of required drugs for AYUSH practitioners to prescribe alternative medicine drugs. With the general concerns highlighted regarding the practice of allopathic medicine by the AYUSH practitioners, it would be prudent for the Bihar government to address it in the respective HR recruitment policy for the state.

Purpose of sub-divisional and referral hospitals: The availability of services at these two platforms was closer to the community/primary health centres than the district hospital. It is important to note that the CEmoC services were available only at 50% of the sub-divisional hospitals and at none of the referral hospital. Considering the outputs of these platforms, sub-divisional hospitals had average outpatient visits similar to the community/primary health centres whereas the referral hospitals had these higher than the community/primary health centres. Both the sub-divisional and referral hospitals had a higher number of inpatients than those seen at the community/primary health centres. With similar availability of the type of services, it is quite difficult to fully comprehend if the sub-divisional and referral hospitals are indeed being used as "referral point" in place of district hospital or these simply function as extended community/primary health centres. The very limited capacity to address chronic diseases by these platforms are adding to the burden of these patients at the district hospital. To move forward, it is important to have a clear vision and well-defined role of the sub-divisional and referral hospitals in order for these to facilitate service provision below the district level.

Way forward

Much of the health system assessed in these districts caters to maternal and child health with limited focus on chronic diseases. Closing this gap and making sure that all facilities are fully equipped to optimally provide essential services based on the population health needs warrants further policy consideration to meet universal health coverage.

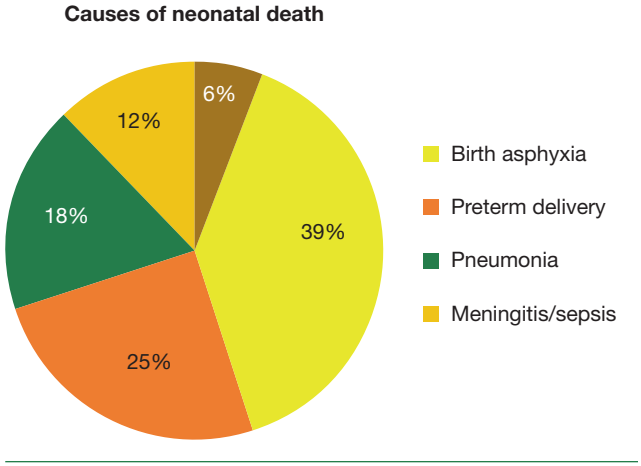
Despite the continued focus on maternal and child health, it is projected that if the current trends continue Bihar would not achieve the SDG neonatal mortality target of 12 neonatal deaths per 1000 live births by 2030 (Figure 60).[108] To attempt reaching the SDG target, Bihar will need specific focus on improving the quality of maternal and child care in addition to increasing the coverage of these services. Specific attention needs to be given to not only the availability of equipment and appropriate staff, but also to the skill mix required to address the current causes of neonatal deaths in order to reduce neonatal mortality (Figure 61).[102] A deep dive into the functioning of referral system is needed to understand why cases are referred to private sector from the public sector in Bihar, which could further guide appropriate planning of resources.

It is imperative that the Bihar health system urgently starts gearing up to address the increasing burden of chronic diseases. With the variety of these diseases and the broader age group that these affect (as compared with maternal and child health), better understanding of issues related

Figure 60: Likelihood of achieving neonatal mortality SDG target by 2030 in Indian states according to the Global Burden of Disease Study 2017 projections based on the current trends[108]

to implementation of the current national programmes on chronic diseases is a must to highlight the gaps that need attention. The state level health system and human resources policies should clearly address how the chronic diseases will be dealt with. Improvement is needed in both the coverage and quality to provide chronic diseases service under the Health and Wellness Centres as part of the Ayushman Bharat.[109] The sub-divisional and referral hospitals could be considered as points of service for chronic diseases instead of burdening the district hospitals.

Figure 61: Causes of neonatal deaths in Bihar in 2016[102]



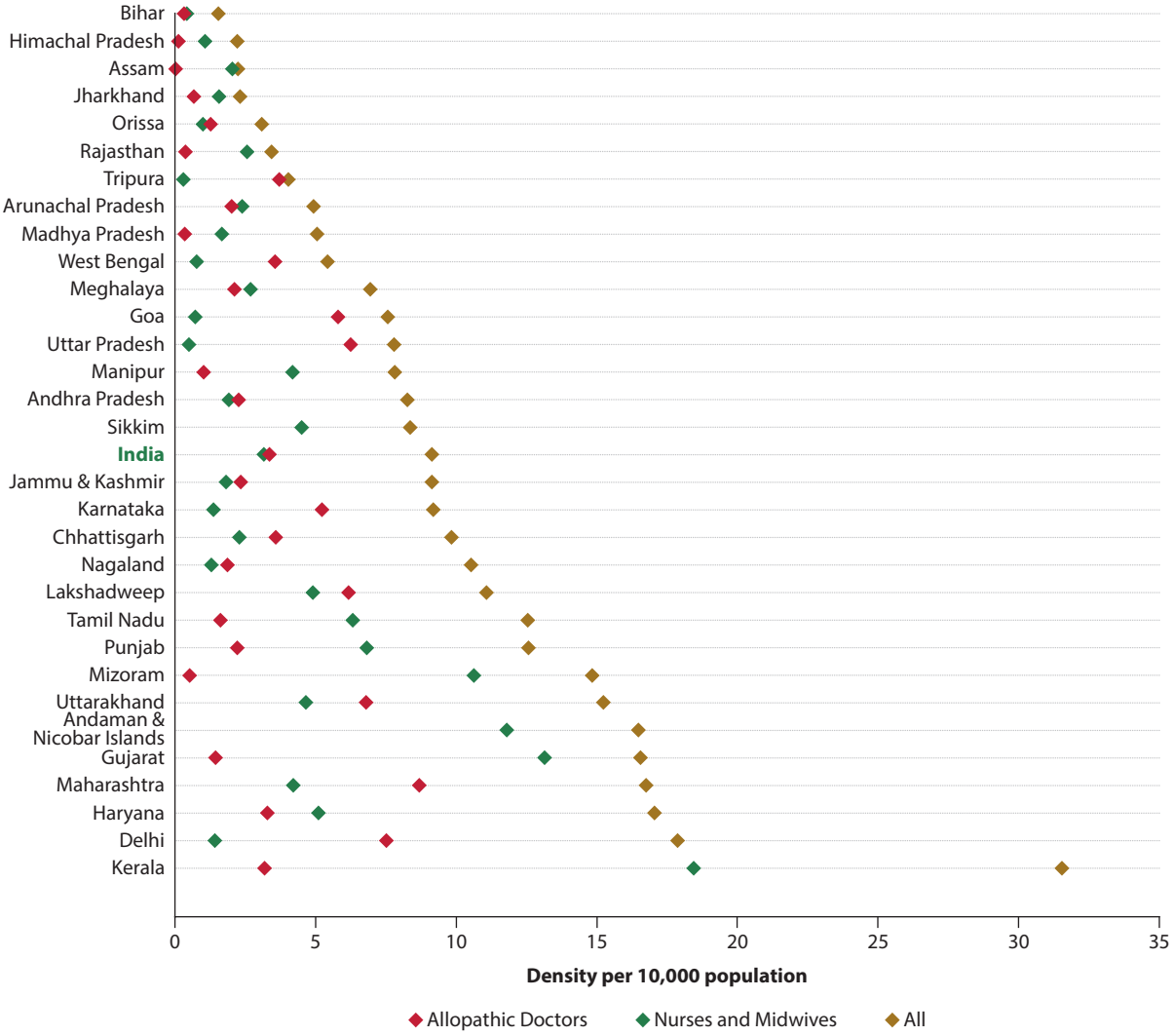
Human Resources

Health workers are central to health systems.[110,111] Progress on the global health goals depends on the effective deployment of capable and motivated health workers in a timely manner to places where they are needed, so that they can provide a full range of high quality health services, respectfully and with accountability. The foundation for this affirmation of the strategic role of health workers were laid in the 2000s.[112-114]

While human resources for health (HRH) policies previously focused on training, recruitment and deployment, recent concerns span issues related to migration, retention, dual practice, accountability, informal markets, gender bias, as well as the need for HRH management and leadership in mixed and often poorly regulated health systems.[115] Most developing countries are challenged by health worker shortage, skill mix imbalance, maldistribution, negative work environment, and weak knowledge base.[110,113] The distribution and qualification of health professionals are serious problems in India when compared with the overall size of the health workers.[116] In addition to availability of HRH (Figure 62), the other important human resources challenges that India faces is increasing the presence of qualified HRH in underserved areas and a more efficient skill mix.[67,68] As seen in Figure 62, Bihar is among the states with the most acute shortage of HRH. The Bihar health system is known to suffer from a cascading adverse impact due to acute staff shortages and the historical cycle of irregular recruitments.

Much is known about the core issues of HRH in Bihar – shortage, absenteeism, skill level and skill mix, contractual employment etc, and in-depth work is currently ongoing to facilitate solutions to address these issues. The interpretation of the findings of this study should be seen within this context as we highlight only issues that were directly assessed in this study. The added value of this study to the HRH understanding in Bihar is that we considered diagnostic technicians, pharmacists, and accountants in our assessment in addition to doctors, nurses/ANMs, and managers which are the cadres mostly considered in HRH related assessments. Provision of health services needs a mix of all cadres to varying degrees and not only doctors and nurses/ANMs. Therefore, by including a variety of cadres and by presenting results for paramedical and non-medical staff, we believe that these data provide a more comprehensive assessment of HRH.

Figure 62: Availability of human resources for health in India in 2005, by state[68]



Shortage of staff: Less availability of staff as against the number of positions sanctioned was documented across all the platforms, and this was the worst at the district and sub-divisional hospitals. Importantly, the referral hospitals reported the least shortage with 77% availability across the cadres, which needs further exploration to understand facilitators for less shortage of staff. We also present the level of shortage of HRH in these facilities based on the IPHS guidelines, which showed acute shortage of staff by cadre as per the guidelines. These findings indicate that in addition to attention to improving availability of doctors and nurses, it is important that the system considers a holistic approach across cadres to address HRH shortage in Bihar. Despite the shortage of doctors, it is interesting to note that almost all patients who were interviewed in the exit survey had managed to see a doctor on the day of interview. The interaction with doctor was an important factor in deciding the level of satisfaction of patients with the services provided.

Ageing staff: Across platforms, a little over half of the doctors and nurses/ANMs, and 62% of the pharmacists were aged 45 years or more. This is a reflection of no or very less recruitment over the recent years in Bihar. This is also reflected in years since pre-service training as a significantly higher

proportion of these staff were trained 20 years ago or more. Such ageing staff coupled with relatively lesser number of in-service training suggests that these staff may not be sufficiently trained to practice currently relevant patient care guidelines. A comprehensive training strategy under which the medical and paramedical staff are provided requisite training to provide up-to-date clinical care and management would be useful for the state to consider.

Gender and caste of staff: Women made up half of all the staff interviewed as all the nurses/ANMs were women. There was very poor representation of women across all cadres other than nursing/ANM, reflecting the opportunities available to them. Those belonging to the other backward caste and general category accounted for 70% of the health facility staff in these facilities. Caste has been and remains integral to the political discourse in the state, and the mix seen at health facilities is a reflection of the Bihar's society and opportunities. Affirmative action may be necessary to address the gender and caste mix but it cannot be in isolation to social development, and hence, may be beyond the scope of health system. This study was not designed to measure if there were any implications of the gender or caste mix between doctors/managers and other health facility staff on the functioning or outputs of the facility or motivation levels of staff.

Contractual employment: Nearly 40% of the staff reported to be contractual employees, with the least contractual employment documented for the nurses/ANMs. All managers were contractual. Interestingly, the contractual employees were relatively younger than the regular employees, highlighting the contractual recruitments done recently in Bihar health system under the NRHM. The necessity to engage in contractual employment by the government of Bihar or the accountability of staff by type of employment is beyond the scope of this assessment. But of importance to note in this assessment are the reasons for joining services with the government of Bihar and the satisfaction score except for salary were not different between the regular and contractual employees across the cadres. The only major difference was the lower level of satisfaction related to salary and opportunity in the contractual employees as compared with the regular employees, which may need attention from the government.

Satisfaction among staff: The most striking finding from assessment of satisfaction among the staff was the similarity across the cadres, type of employment, platforms, and districts. The themes of job, team work and miscellaneous had reasonably high levels of satisfaction among the staff interviewed. Salary and opportunity related themes highlighted significant dissatisfaction among the staff, and this dissatisfaction was higher in the contractual than the regular staff. The expectation of higher salaries, less opportunities for learning and promotion were highlighted. It is important to note that 93.5% of staff reported not having received even one promotion since the start of their employment with the Government of Bihar.

Way forward

Health workers' motivation, daily routines and negotiations, and training and working environments are at the centre of successes and failures of health interventions, health system functioning and broader social development.[114, 115] Therefore, it is imperative for the HRH policy-making in Bihar to broaden the perspective beyond the doctors and nurses/ANMs to be more inclusive of the variety of health workers who play a role in health service provision.

The lack of coherence between the health policies and HRH strategy was one of the major causes for the failure to meet the Millennium Development Goals.[114] Historic and orthodox

conceptualisations – dominated by 'manpower planning', 'brain drain', 'task-shifting' and 'crisis' – have perpetuated models where decision-makers portray health workers as a function or cost of achieving health targets, health outcomes and, most recently, universal health coverage.[114] Health workers' lives and livelihoods, their contributions and commitments, and their individual and collective agency are ignored. The manner in which the Bihar government will recognise and address the HRH related issues will decide how much of universal health coverage and the SDGs it is likely to meet for its population.

Efficiency of Facilities

Despite the small sample size in this study, the findings indicate low technical efficiency with only 25% of all the facilities assessed having an efficiency score >70%. This efficiency score reflects the relationship between the facility-based resources and the facility's total patient volume in the years of this assessment. With this information, we estimated that with the available resources the facilities could substantially increase the number of patients seen and services provided – on an average by 1.3 times for all platforms together - based on the observed levels of inputs.

While these findings generally contrast with more prevalent view of the health facility capacity in Bihar, and what is considered as performance of a facility based on outputs only, these findings are similar to those reported under the ABCE study on technical efficiency of public sector facilities in six other Indian states.[58-62] The policy implications of these efficiency results are both numerous and diverse, but they should be viewed with a few caveats. A given facility's efficiency score captures the relationship between the observed outputs for the given inputs, but it does not reflect the quality of services provided or how efficiently the patients are seen on a given day. The robustness of the efficiency scores estimated in this study rely on the availability, adequacy and quality of the data available in the health system. On the other hand, quantifying facility-based levels of efficiency provide data-driven, rather than anecdotal, understanding of how much the Bihar health facilities could potentially expand service provision without necessarily increasing personnel or other resources in parallel.

We found a pattern between the neonatal and under-5 mortality rates at the district level with that of the average efficiency score of the facilities in the district. Samastipur district, representing high delivery and low immunisation coverage indicators among the four sampled districts, had the highest average efficiency score and the least neonatal and under-5 mortality rates. This pattern needs to be explored further in a larger sample of facilities across more states to fully understand implications of efficiency on outcomes.

In addition to the finding of potential to increase outputs with the available resources, the data collection related to the efficiency also sheds light on other areas that need attention to improve efficiency estimates or the understanding of points of inefficiency.

Availability and accountability of staff: It is well known that in the public sector in Bihar, lesser number of work hours spent in seeing patients either due to poor accountability of the available staff or much time spent in administrative work by them could potentially be a major factor in less outputs for the available resources. The inputs for the efficiency model consider only the number of available staff and not the time that they spend in patient care or at the facility. Though this study was not designed to assess how much time the staff actually spent in patient care or at the

facility on a given day, we did find the system of attendance tracking weak. In many facilities, the team found the sensor-attendance system was made dysfunctional by staff so that the system is unable to record their absence from the health facility. A significant number of doctors who were posted at rural facilities remained on duty for 2-3 days continuously at a stretch based on informal understanding with the other facility doctor to deal with the rural posting. Such arrangements have the potential to affect not only the number but also the quality of service provision.

Costs of care: Average facility expenditure per year differed across platforms, and was the highest at district hospitals as expected. We were unable to estimate the cost of care by type of services (such as outpatients, inpatients, deliveries, immunisation, etc) or by type of disease/condition (such as TB, diabetes, etc) as such data are not readily available at the facilities. Intensity of resource use is usually highly contingent on the severity of disease. Estimating such cost of care and identifying differences in patient costs across the type of platforms is critical for identifying areas to improve cost-effectiveness and expand less costly services, especially for hard-to-reach populations. Nevertheless, these results on expenditures offer insights into the state's health financing landscape, a key component to health system performance, in terms of cost to facilities and service production. While these costs do not reflect the quality of care received or the specific services provided for each visit, they can enable a compelling comparison of overall health care expenses across districts in Bihar. Future studies should aim to capture information on the quality of services provided, as it is a critical indicator of the likely impact of care on patient outcomes.

Health information system: This study was dependent on the data availability at the facilities for the various inputs and outputs. Because of the vast extent of data that were collected for two financial years across the facilities, there are several lessons regarding the common bottlenecks within the health information system, both at the facility level and at the state level. In general, there is weak staff capacity for data capture, data management and use (interpretation or planning), and data validation at all levels. No system of regular review of data at the facility level that could guide planning or improvement of service provision was observed. It is not possible to assess the extent of duplication in outputs either by patient or by disease/condition/departments as data are not captured or collated in such a manner in the HMIS. Therefore, data interpretation is possible only in terms of the number of visits and not in terms of the number of unique patients.

Expenditure tracking: In general, the expenditure documentation had the most bottlenecks with these data spread across various sources for a given facility. For example - it is not possible to document the expenditures at a given facility without procuring relevant data from the facility, a higher level of facility (block level), district health society, and at times from the state. The most limited capacity was to capture the expenditure on what was directly spent by the state on pharmaceuticals, medical consumables and supplies. In order to have robust estimates of how much is being spent on a given facility, the government should consider tracking expenditure by facility across the platforms. Such a system will also facilitate robust ongoing estimates for technical efficiency of facilities to monitor progress. It is important to point out that the timeliness of the availability of funds to expend, and utilising the available funds play a major role in how inputs are utilised. Delays in availability of funds from the state treasury to the district and less utilisation of available NRHM funds has been documented for Bihar,[117] and the state is set to lose some funds under NRHM.[118] However, assessment of delays and flow was beyond the scope of this study.

Health facility as a whole: No outputs from a health facility can be considered in isolation from their impact on the rest of the health system in which they operate. For example, the performance

of hospital support services, such as diagnostic departments, will affect the efficiency of functional areas such as surgical services; or the outcome of a surgery may have important implications for future hospital readmissions. Therefore, efficiency of a facility can be improved only if there is effective coordination between discrete and relevant stakeholders. The failure to coordinate may in itself be an important cause of inefficiency. Linking patient data across multiple departments is an important prerequisite for beginning to address this issue to improve efficiency. It also further highlights the recommendation made earlier under the human resources to expand the focus beyond doctors and nurses/ANMs to improve service provision and efficiency of the facilities.

Way forward

It is important that the manner in which performance of a facility is assessed be changed from it being "simply based on outputs" to reflect "how efficiently the inputs are utilised to provide outputs". As the efficiency depends on outputs and inputs, the recommendations made in the previous sections are relevant to facilitate improvements in outputs and inputs. In addition, this section highlights that though shortage of staff needs to be addressed, it is important to simultaneously improve the availability and accountability of staff for patient care services to optimise service provision. Availability of robust data would allow for better understanding of the cost of patient care services in Bihar.

The choice of efficiency estimation in this study was technical efficiency as compared with allocative efficiency.[119] Of interest was how far the system is maximizing its outputs with the available level of inputs, to understand the operational performance of the entity, rather than its strategic choices about the outputs it produces or the inputs it consumes. On the other hand, allocative efficiency can be used to scrutinize either the choice of outputs or the choice of inputs. On the output side, it examines whether limited resources are directed towards producing the 'correct' mix of health care outputs. On the input side it guides decisions about what to include or exclude from the package of benefits offered. The state can aspire to explore allocative efficiency of the system as well with better availability of relevant data.

The quickest way for a facility to improve efficiency is to simply reduce the level of inputs. While this may improve a facility's efficiency ranking in the short term, indiscriminately reducing health-producing inputs can in the long term lead to reductions in both allocative and technical efficiency. Highly productive parts of the health system may be affected just as much as inefficient departments. The inefficiencies may lead to unnecessarily severe reductions in health outcomes and still worse levels of efficiency. It is therefore important to clearly distinguish expenditure reduction and cost savings from efficiency improvement, and to note that any expenditure reduction should be carefully targeted to reduce the sources of allocative and technical inefficiency.

Patient Perspectives

Patient satisfaction is an important indicator of patient perception of the quality of services provided by the healthcare sector. With the development priorities for the government of India clearly highlighting the need to increase user participation in health care service delivery for better accountability,[120] understanding how patients perceive quality of the existing public health services encompassing various dimensions of care such as time to receive medical attention,

staff behaviour etc, could contribute to developing strategies to improve performance and utilization of the public health system.[121] Evaluation of services by patients is important for purposes of monitoring, increasing accountability, recognizing good performance and adapting patient-centric services, and for utilization of services, and compliance to treatment. This study examined patient perspectives at public facilities; a major strength of this study is that patient satisfaction was assessed across the various levels of public sector health care. The type of platform accounted for significant variance in the multilevel model of patient satisfaction.

Findings indicate that patients were generally satisfied with the doctor who treated them but the satisfaction was lower with the facility infrastructure as many were not satisfied with the cleanliness or privacy provisions at the facility they visited. This finding has been previously reported from India[58-62, 122]. The private hospitals have been observed to offer a higher regard for patient privacy than in public hospitals[123]. Holding other factors constant, the health status of patient, type of facility where treatment was sought, interaction with doctor on that day, cleanliness of facility, and availability of prescribed medicines were the factors determining the patients giving a score more than the mean satisfaction score. No demographic factors were determinants of a higher level of patient satisfaction.

Importantly, the overall patient satisfaction score with the facility was lower than that with the medical doctor. The patients were satisfied with the respect provided by the doctor during their interaction but indicated that the doctors could do better with the clarity of explanations that they provide and the time they give to the patients to ask questions. In general, a paternalistic communication style is followed by health providers in India similar to other south-Asian countries,[124, 125] and health providers, doctors in particular, are not trained in communication skills to reach out to patients in different circumstances.[126-128] It may be prudent to invest in building such skills in health providers that could result in more quality patient-provider interactions.[129, 130]

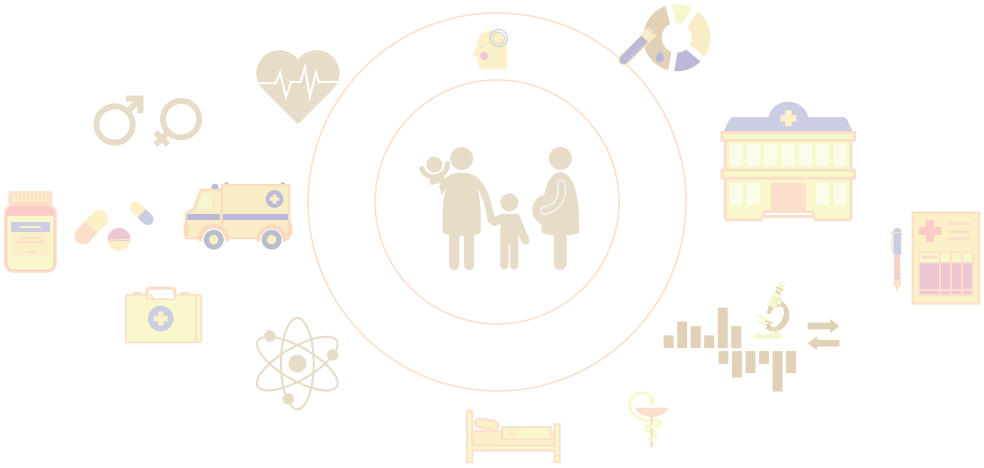
A few limitations of this assessment should be considered. Assessment of patient satisfaction by specific symptoms/disease condition was not possible due to insufficient numbers under various categories. Also, the patient's rating of a provider could have been influenced by their experience with another provider they met on the same day. The study was not designed to capture patients who would have stopped visiting the sampled health facilities because of bad experience.

In summary, with the ongoing emphasis on efficiency, effectiveness and accountability to strengthen the Indian public health system, it is imperative that such sub-optimal patient satisfaction levels are taken into account with the understanding that the expectations of patients would differ over time. Incorporating a regular patient feedback system can convey an increased accountability to patients, identify factors that increase utilization and quality of services of the public hospitals, and can facilitate improved utilization of resources.

Summary

This study was designed to provide policymakers with new insights into the efficiency of the public health system in four districts of Bihar. We hope that these findings will not only prove useful for policymaking, but will also inform broader efforts to mitigate factors that impede the efficiency of the delivery of health services in the state. It is with this type of information that the individual building blocks of health system performance, and their critical interaction with each

other, can be strengthened. Analyses that take into account a broader set of the state's facilities, including private facilities, may offer an even clearer picture of the levels and trends in capacity, efficiency, and cost. Continued monitoring of the strength and efficiency of service provision is critical for optimal health system performance and the equitable provision of cost-effective interventions throughout the state, which can be crucial in achieving universal health coverage to which India aspires.



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Annexure 1: Sampling Criteria for Study Districts

Bihar district sampling			
		% Fully vaccinated with BCG, measles, and three doses each of DPT and polio vaccine (excluding polio vaccine given at birth)	
% Health personnel includes doctor, auxiliary nurse midwife, nurse, midwife, lady health visitor, and other health personnel. If the respondent mentioned more than one person attending during delivery, only the most qualified person	Low (71.6% or less)	**Low (63.2% or less)**	**High (more than 63.2%)**
		Araria	Arwal
		Darbhanga	Gaya
		Jamui	Katihar
		Kishanganj	Purnea
		Lakhisarai	Saharsa
		Madhepura	Supaul
		Madhubani	
		Muzaffarpur	
		West Champaran	
		East Champaran	
		Sheohar	
		Sitamarhi	
	High (More than 71.6%)	***Samastipur***	***Aurangabad***
		Saran	Banka
			Begusarai
			Bhagalpur
			Bhojpur
			Buxar
			Gopalganj
			Jehanabad
			Kaimur
			Khagaria
			Munger
			Nalanda
			Nawada
			Patna
			Rohtas
			Sheikhpura
			Siwan
			Vaishali

Annexure 2: Replacement Criteria for Health Facility

The following criteria were considered to replace a sampled facility, if needed:

- ***Criterion 1:*** There are instances of two health facilities of different levels functioning in the same premises in Bihar. In such a scenario, the higher level facility was sampled and resampling was done for lower level facility.
- ***Criterion 2:*** A sampled facility was replaced if the facility was functional (provided services) for less than two financial years.
- ***Criterion 3:*** A sampled facility was replaced if it did not have either financial records or output records available for the two financial years of interest. This replacement was done through re-sampling process for that level of platform.

Of the total of 84 health facilities sampled in the ACCO study, 26 facilities were replaced as shown in Table below.

Table: Facility sample, by platform, for the ACCO study and replacement

Facility Type	Final Sample	Replaced Sample
District Hospital	4	0
Sub-divisional Hospital	4	0
Referral Hospital	4	0
Primary Health Centre/Community Health Centre	24	7
Additional Primary Health Centre	24	11
Sub Centre	24	8
Total Health Facilities	**84**	**26**

The reasons for replacement are shown in the Table below.

Reason for replacement of sampled facilities

District	Sampled Facility	Replaced facility	Criterion for replacement*
Aurangabad	PHC Haspura	PHC Madanpur	Criterion 1
	APHC Mauari	APHC Teldiha	Criterion 1
	SC Badokhar	SC Manika	Criterion 1
	APHC Chhuchia Dulare	APHC Pawai	Other**
East Champaran	PHC Banjaria	PHC Chiraiya	Criterion 3
	APHC Semra	APHC Sikarganj	Criterion 3
	SC Chaitaha	SC Chamahi	Criterion 3
	PHC Kotwa	PHC Mehasi	Criterion 3
	APHC Ahiraulia	APHC Rajepur	Criterion 3
	SC Dumra	SC Partapur	Criterion 3

District	Sampled Facility	Replaced facility	Criterion for replacement*
	APHC Puran Chapra	APHC Kaithwaiya	Criterion 2
	APHC Siswa Bazar	APHC Saraiya	Criterion 3
	SC Laukaria	SC Jokiyari	Criterion 2
Purnea	PHC Banmankhi	PHC Baisa	Criterion 1
	APHC Sarsi	APHC Sirsi	Criterion 1
	SC Borarahi	SC Mirpur	Criterion 1
	PHC Dhamdaha	PHC Jalagarh	Criterion 1
	APHC Rangpura	APHC Sarsoauni	Criterion 1
	SC Kukron	SC Ramdeli	Criterion 1
	PHC Rupouli	PHC Sri Nagar	Criterion 1
	APHC Navtolia	APHC Khutti Haseli	Criterion 1
	SC Maini	SC Devi Nagar	Criterion 1
Samastipur	APHC Dasrur	APHC Kishanpur Baikunth	Other***
	PHC Patori	PHC Mohanpur	Criterion 1
	APHC Dhamaun	APHC Rasalpur	Criterion 1
	SC Jorpura	SC Bingama	Criterion 1

** Criterion 1 – Two health facilities of different levels functioning in the same premises in Bihar; Criterion 2 - Sampled facility functional for less than two financial years; Criterion 3 - Sampled facility did not have either financial records or output records available for the two financial years of interest;*

*** This facility is situated in left wing extremism affected areas and was not physically functional. It was advised by the officials to avoid visiting this facility;*

**** There is no building for APHC Dasrur. Only land is available for this facility, the staffs were working at PHC.*

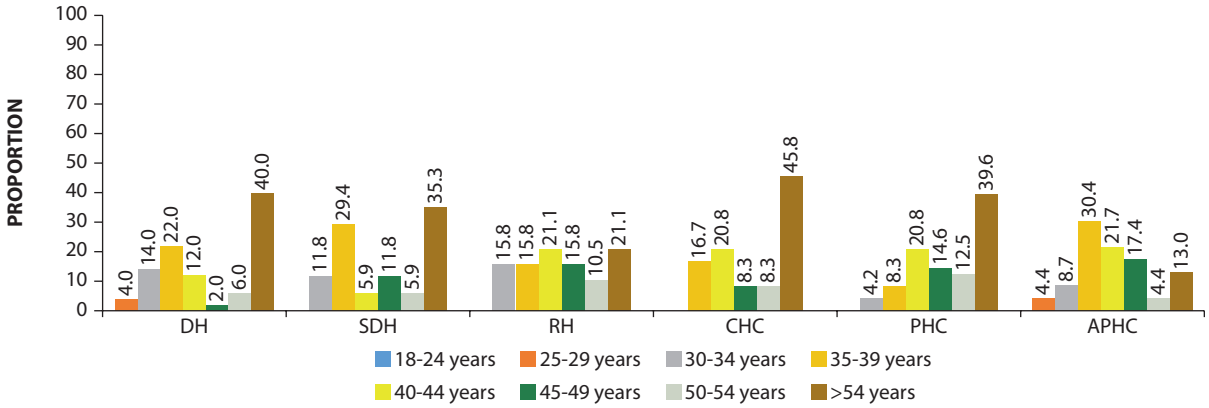
Annexure 3: Strength of Staff, by Cadre and Facility

Facility	Doctors		Nurses/ANMs		Paramedical staff		Non-medical staff	
	Sanctioned	Filled/Posted against sanctioned	Sanctioned	Filled/Posted against sanctioned	Sanctioned	Filled/Posted against sanctioned	Sanctioned	Filled/Posted against sanctioned
District Hospital								
DH Aurangabad	65	17 (26.2%)	117	13 (11.1%)	53	8 (15.1%)	101	34 (33.7%)
DH Purnea	73	30 (41.1%)	229	69 (30.1%)	102	37 (36.3%)	183	53 (29.0%)
DH Samastipur	46	23 (50.0%)	55	52 (94.5%)	34	6 (17.6%)	69	19 (27.5%)
DH East Champaran	98	31 (31.6%)	225	17 (7.6%)	65	15 (23.1%)	108	41 (38.0%)
Total	**282**	**101 (35.8%)**	**626**	**151 (24.1%)**	**254**	**66 (26.0%)**	**461**	**147 (31.9%)**
Sub-divisional Hospital								
SDH Daudnagar	20	7 (35.0%)	22	0 (0.0%)	11	1 (9.1%)	11	6 (54.5%)
SDH Damdaha	32	13 (40.6%)	50	7 (14.0%)	20	0 (0.0%)	8	2 (25.0%)
SDH Pusa	30	9 (30.0%)	51	14 (27.5%)	25	4 (16.0%)	27	17 (63.0%)
SDH Pakridayal	10	7 (70.0%)	9	4 (44.4%)	9	3 (33.3%)	25	12 (48.0%)
Total	**92**	**36 (39.1%)**	**132**	**25 (18.9%)**	**65**	**8 (12.3%)**	**71**	**37 (52.1%)**
Referral Hospital								
RH Navinagar	9	4 (44.4%)	4	2 (50.0%)	6	4 (66.7%)	25	23 (92.0%)
RH Rupauli	5	3 (60.0%)	4	2 (50.0%)	12	9 (75.0%)	25	23 (92.0%)
RH Tajpur	10	8 (80.0%)	4	4 (100.0%)	6	4 (66.7%)	19	12 (63.2%)
RH Dhaka	10	8 (80.0%)	6	6 (100.0%)	12	9 (75.0%)	22	18 (81.8%)
Total	**34**	**23 (67.6%)**	**18**	**14 (77.8%)**	**36**	**26 (72.2%)**	**91**	**76 (83.5%)**
Community Health Centre								
CHC Barun	14	7 (50.0%)	16	0 (0.0%)	27	8 (29.6%)	15	8 (53.3%)
CHC Deo	11	5 (45.5%)	2	2 (100.0%)	8	4 (50.0%)	17	15 (88.2%)
CHC Madanpur	5	4 (80.0%)	6	6 (100.0%)	5	3 (60.0%)	14	11 (78.6%)

Facility	Doctors		Nurses/ANMs		Paramedical staff		Non-medical staff	
	Sanctioned	Filled/Posted against sanctioned	Sanctioned	Filled/Posted against sanctioned	Sanctioned	Filled/Posted against sanctioned	Sanctioned	Filled/Posted against sanctioned
CHC Obra	14	6 (42.9%)	16	0 (0.0%)	24	2 (8.3%)	16	7 (43.8%)
CHC Rafiganj	5	5 (100.0%)	2	2 (100.0%)	7	3 (42.9%)	14	10 (71.4%)
CHC Baisa	15	5 (33.3%)	19	3 (15.8%)	27	6 (22.2%)	22	17 (77.3%)
CHC Bhawanipur	14	3 (21.4%)	16	0 (0.0%)	21	2 (9.5%)	14	10 (71.4%)
CHC Hasanpur	13	2 (15.4%)	16	4 (25.0%)	16	1 (6.3%)	16	8 (50.0%)
CHC Mohiuddinpur	6	6 (100.0%)	3	2 (66.7%)	11	2 (18.2%)	16	11 (68.8%)
CHC Sarairanjan	4	4 (100.0%)	7	7 (100.0%)	16	6 (37.5%)	15	13 (86.7%)
CHC Chiraiya	5	3 (60.0%)	7	4 (57.1%)	11	1 (9.1%)	14	11 (78.6%)
CHC Kalyanpur	6	2 (33.3%)	8	4 (50.0%)	13	1 (7.7%)	19	12 (63.2%)
CHC Mehashi	8	4 (50.0%)	3	3 (100.0%)	12	3 (25.0%)	24	13 (54.2%)
CHC Pahadpur	7	4 (57.1%)	7	4 (57.1%)	10	1 (10.0%)	26	18 (69.2%)
CHC Patahi	13	4 (30.8%)	19	3 (15.8%)	31	5 (16.1%)	40	22 (55.0%)
Total	**140**	**64 (45.7%)**	**147**	**44 (29.9%)**	**239**	**48 (20.1%)**	**282**	**186 (66.0%)**
Primary Health Centre								
PHC Goh	10	5 (50.0%)	2	1 (50.0%)	7	3 (42.9%)	20	13 (65.0%)
PHC Barhara Kothi	5	3 (60.0%)	4	4 (100.0%)	8	3 (37.5%)	16	11 (68.8%)
PHC Jalalgarh	4	4 (100.0%)	3	3 (100.0%)	7	7 (100.0%)	17	15 (88.2%)
PHC Krityanandnagar	6	6 (100.0%)	3	2 (66.7%)	7	2 (28.6%)	19	17 (89.5%)
PHC Shrinagar	5	3 (60.0%)	4	3 (75.0%)	8	4 (50.0%)	23	8 (34.8%)
PHC Mohanpur	6	3 (50.0%)	3	3 (100.0%)	3	2 (66.7%)	10	6 (60.0%)
PHC Shivajinagar	5	3 (60.0%)	3	3 (100.0%)	9	4 (44.4%)	13	10 (76.9%)
PHC Warisnagar	8	5 (62.5%)	2	2 (100.0%)	19	6 (31.6%)	19	11 (57.9%)
PHC Raxaul	6	6 (100.0%)	3	3 (100.0%)	17	6 (35.3%)	28	14 (50.0%)
Total	**55**	**38 (69.1%)**	**27**	**24 (88.9%)**	**85**	**37 (43.5%)**	**165**	**105 (63.6%)**

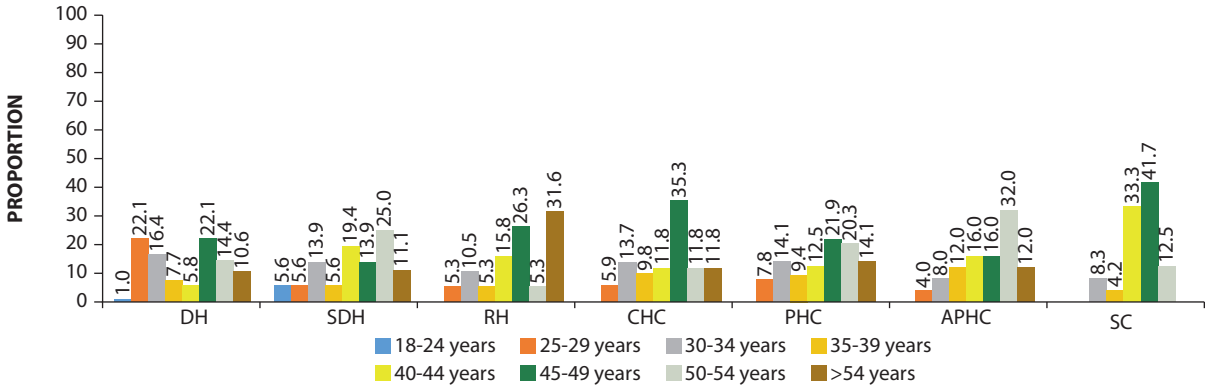
Annexure 4: Age Distribution of Staff Across Each Platform, by Cadre

Doctor



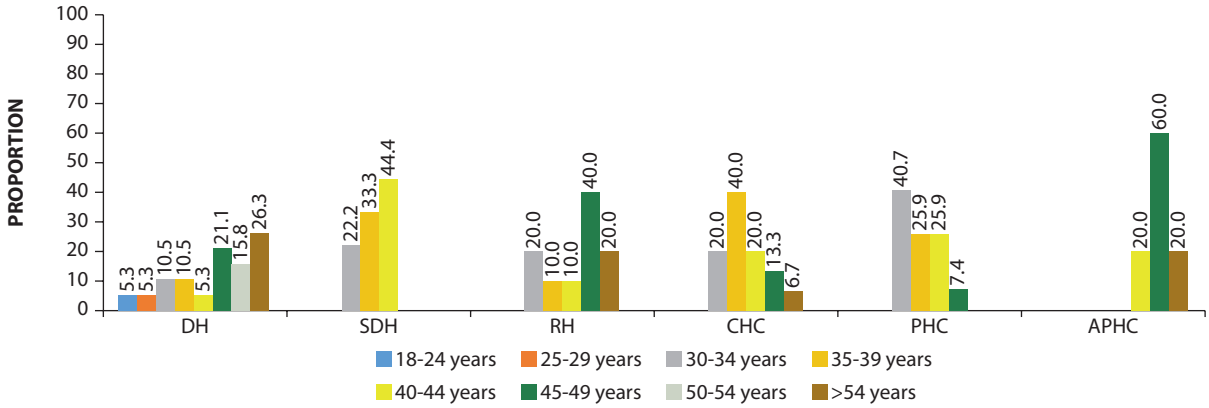
DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre; APHC: Additional primary health centre

Nurse



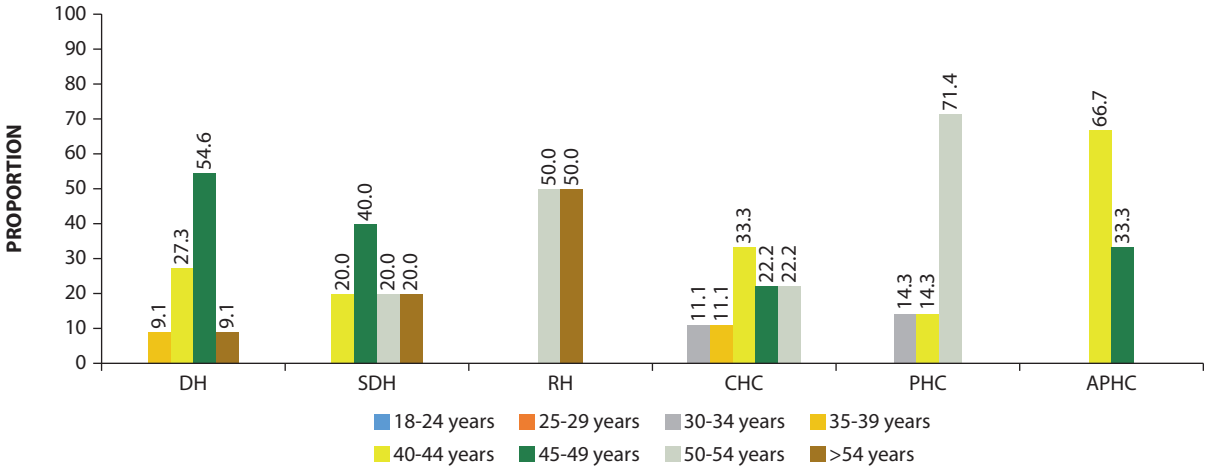
DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre; APHC: Additional primary health centre; SC: Sub centre

Diagnostic technician



DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre; APHC: Additional primary health centre

Pharmacist



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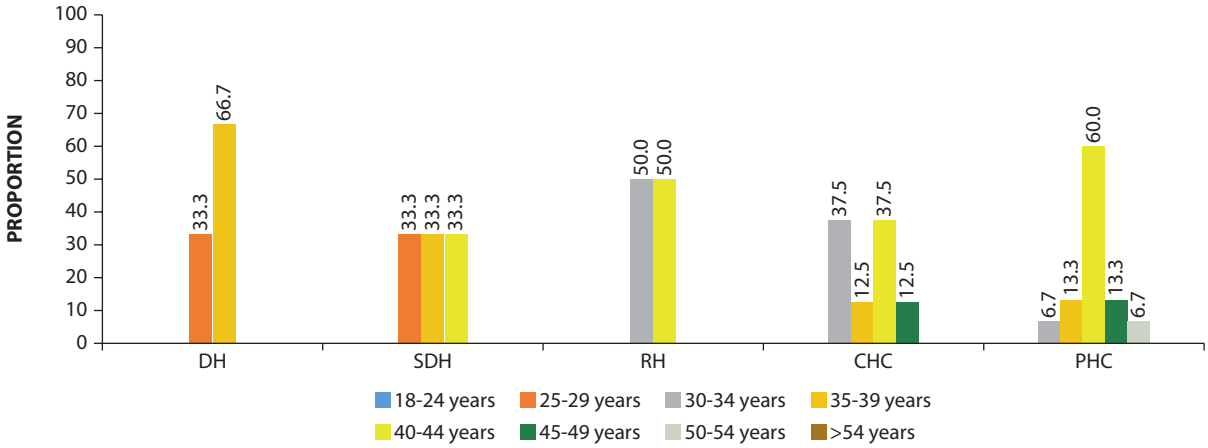
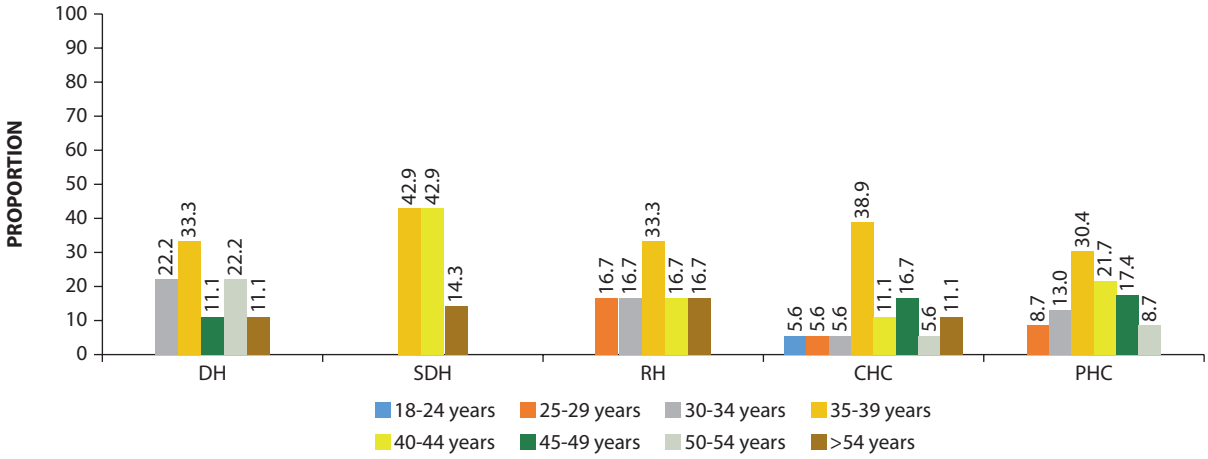
Manager



DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre

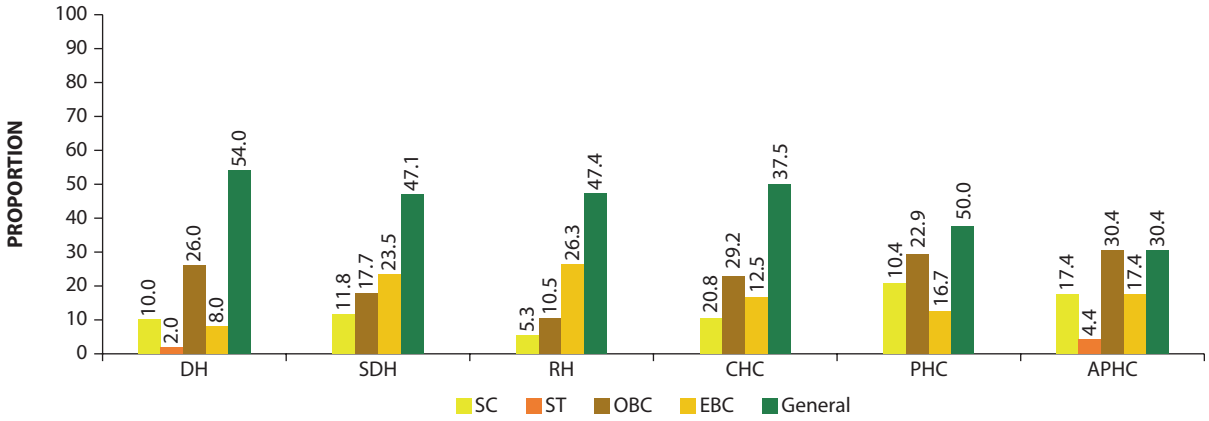
Accountant



DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre

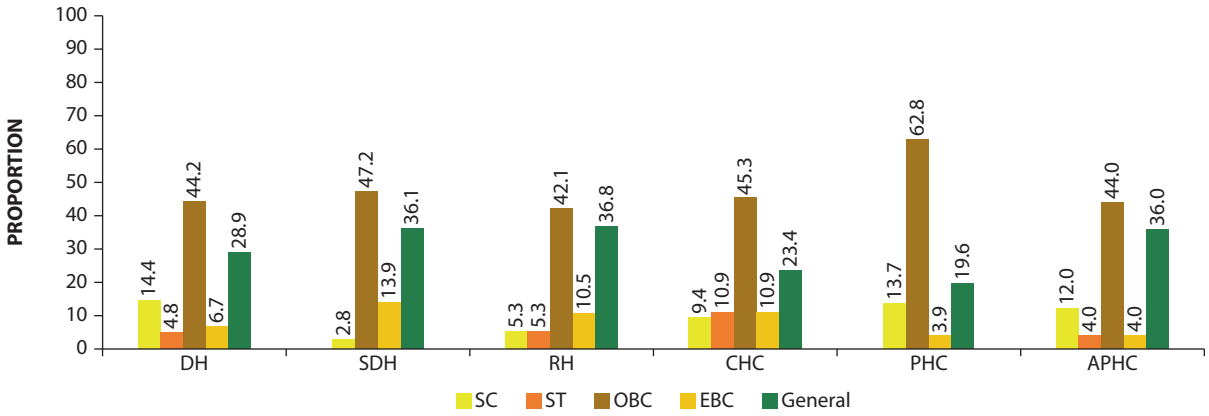
Annexure 5: Caste Distribution of Staff Across Each Platform, by Cadre

Doctor



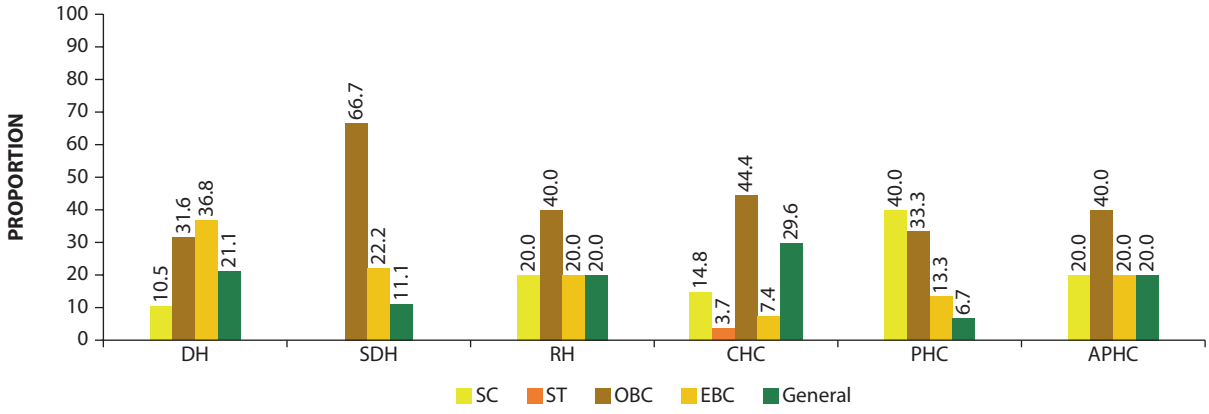
SC: Schedule caste; ST: Schedule tribe; OBC: Other backward caste; EBC: Extremely backward caste

Nurse



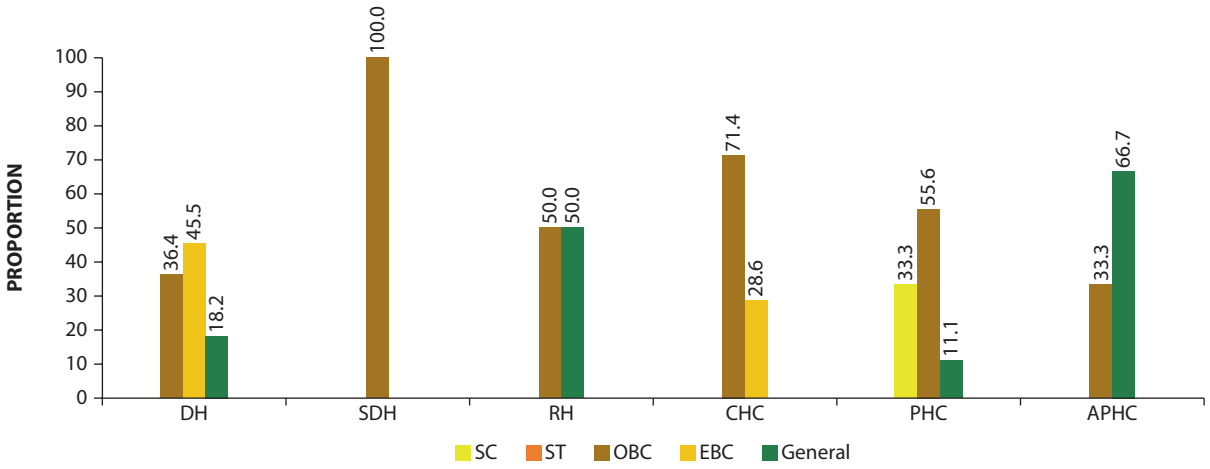
SC: Schedule caste; ST: Schedule tribe; OBC: Other backward caste; EBC: Extremely backward caste

Diagnostic technician



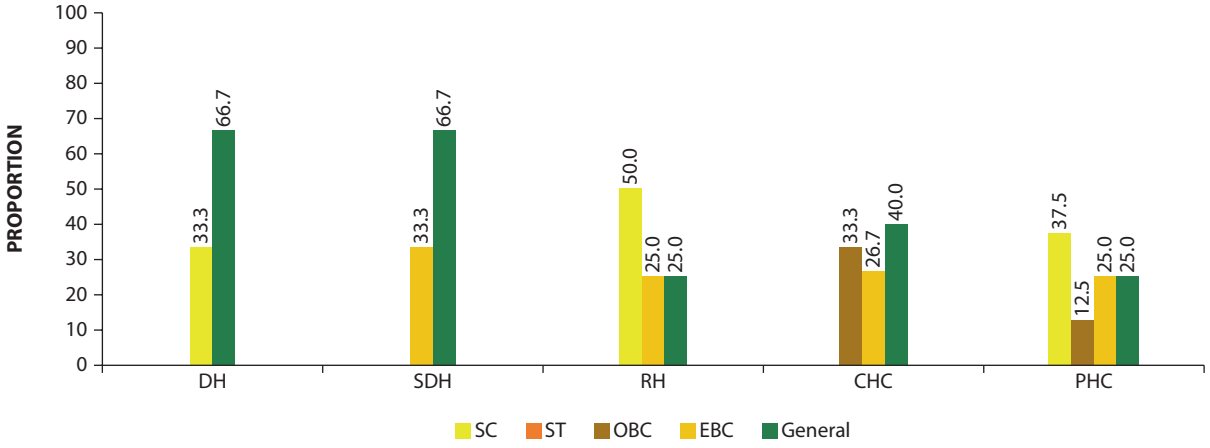
SC: Schedule caste; ST: Schedule tribe; OBC: Other backward caste; EBC: Extremely backward caste

Pharmacist



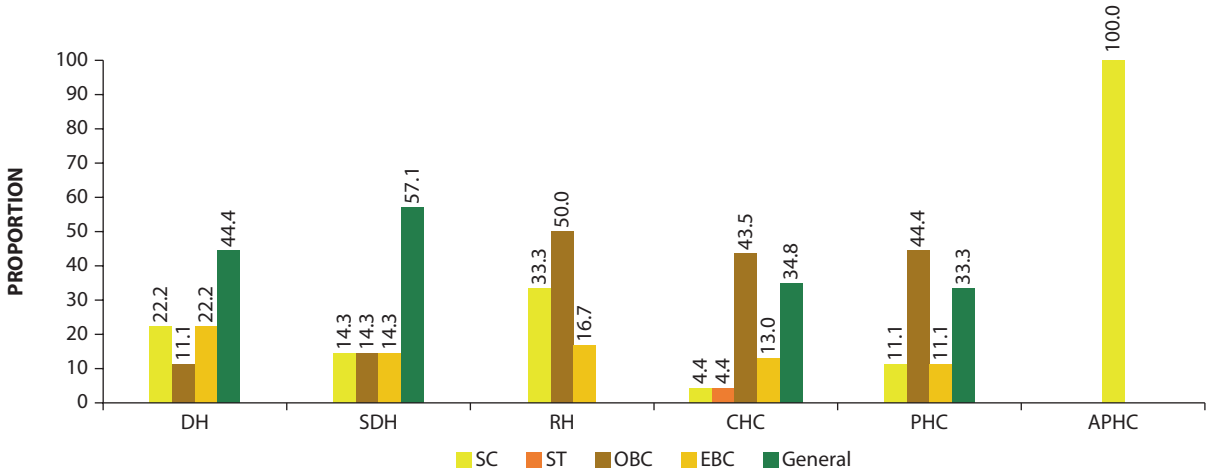
SC: Schedule caste; ST: Schedule tribe; OBC: Other backward caste; EBC: Extremely backward caste

Manager



SC: Schedule caste; ST: Schedule tribe; OBC: Other backward caste; EBC: Extremely backward caste

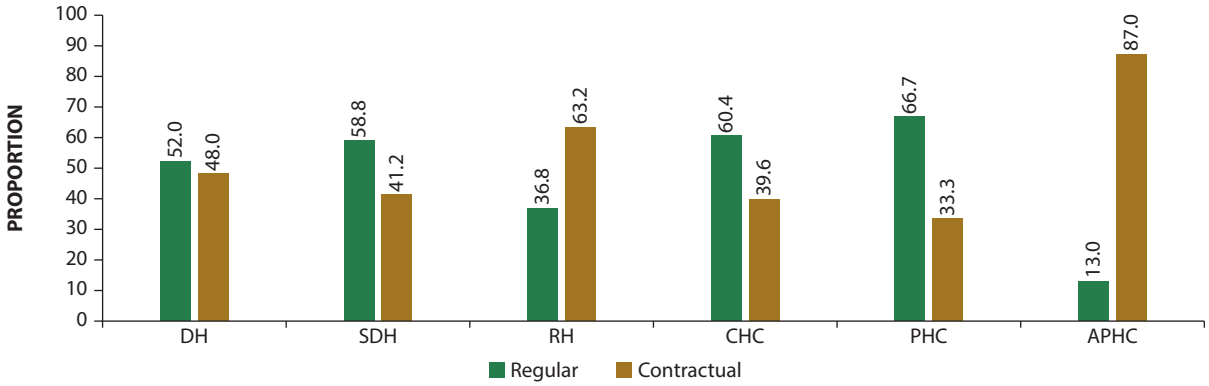
Accountant



SC: Schedule caste; ST: Schedule tribe; OBC: Other backward caste; EBC: Extremely backward caste

Annexure 6: Type of Employment Across Each Platform, by Cadre

Doctor



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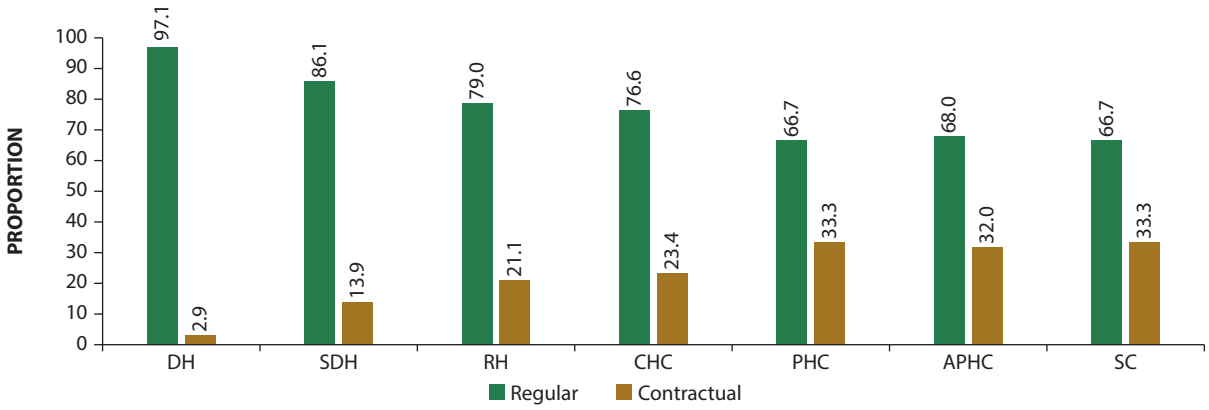
Nurse



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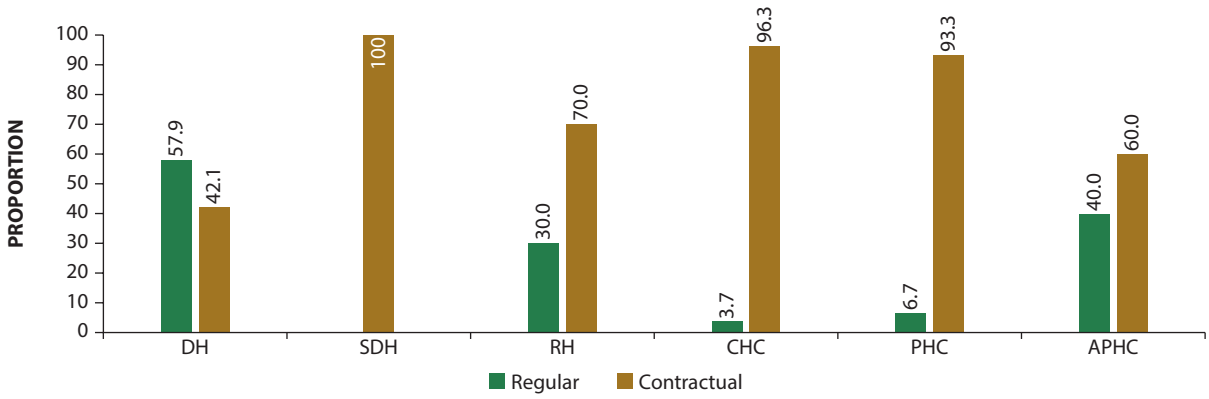
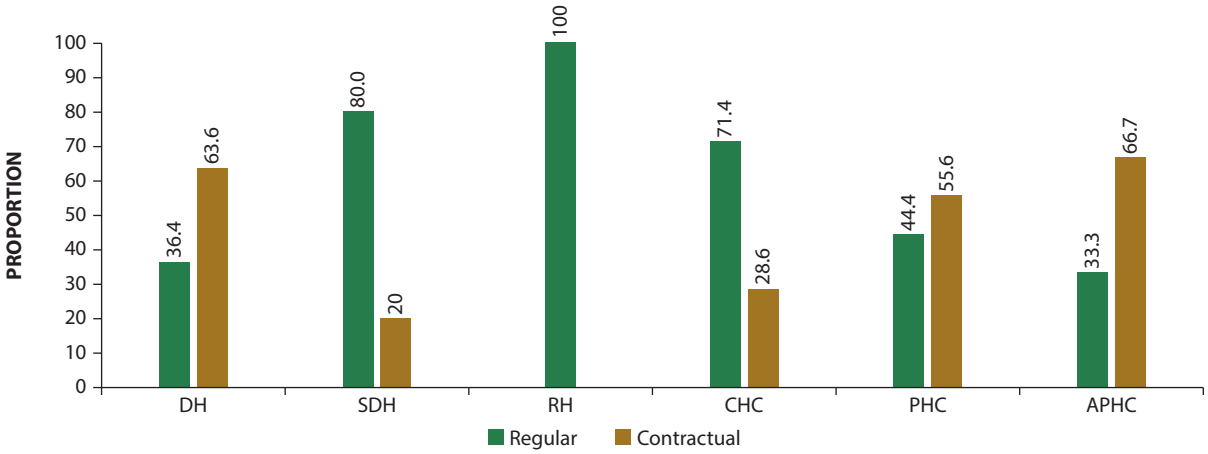
Diagnostic technician



DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre; APHC: Additional primary health centre

Pharmacist



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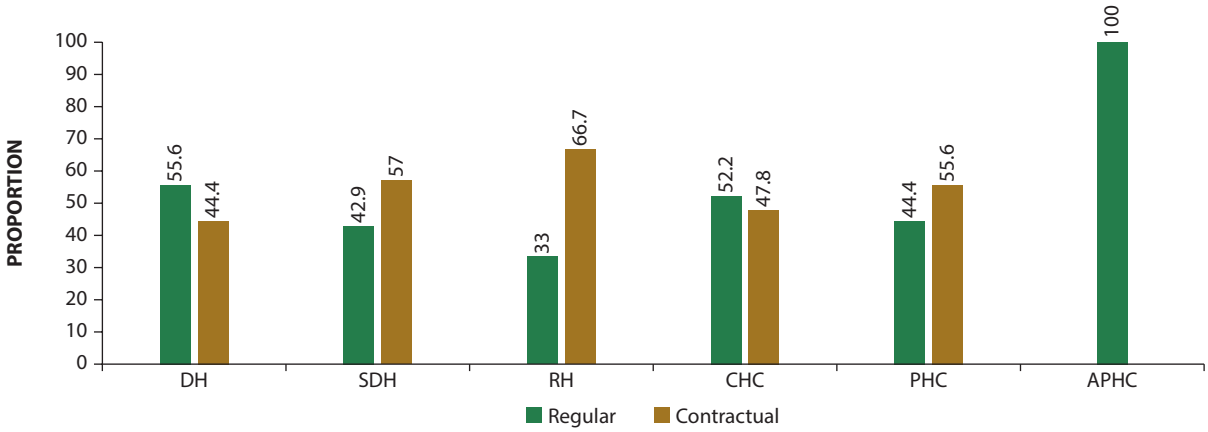
Accountant



DH: District hospital; SDH: Sub-divisional hospital; RH: Referral hospital; CHC: Community health centre; PHC: Primary health centre; APHC: Additional primary health centre

Annexure 7: Outputs by Facilities in Each Platform for the Years 2016-17 and 2017-18

Facility name	2016-17			2017-18		
	OP visits	IP visits	Immunization doses	OP visits	IP visits	Immunization doses
District Hospital						
DH Aurangabad	368,405	16,005	NA	357,015	19,196	NA
DH Purnea	322,335	1,12,578	NA	394,965	84,687	NA
DH Samastipur	151,355	28,853	NA	150,139	26,202	NA
DH East Champaran	182,193	31,490	NA	160,824	19,246	NA
Sub-divisional Hospital						
SDH Daudnagar	8,586	440	NA	11,396	374	NA
SDH Damdaha	144,172	6,776	NA	124,225	8,241	NA
SDH Pusa	32,204	4,394	NA	37,193	6,206	NA
SDH Pakridayal	94,920	3,616	NA	88,145	3,765	NA
Referral Hospital						
RH Navinagar	83,207	4,940	NA	86,527	2,991	NA
RH Rupauli	142,026	15,007	NA	125,227	11,083	NA
RH Tajpur	46,634	9,590	NA	72,913	10,054	NA
RH Dhaka	140,353	6,654	NA	80,237	5,737	NA
Community Health Centre						
CHC Barun	63,182	4,278	13,057	57,987	2,489	14,415
CHC Deo	205,295	2,841	58,038	236,847	1,789	62,807
CHC Madanpur	72,389	2,511	9,466	76,912	7,713	16,403
CHC Obra	173,133	3,741	66,739	168,519	3,865	81,698
CHC Rafiganj	55,681	7,338	29,290	73,750	4,073	39,638
CHC Baisa	92,678	8,313	9,672	151,635	8,346	12,416
CHC Bhawanipur	68,255	11,706	16,170	66,601	11,294	21,426
CHC Hasanpur	74,030	11,861	18,612	84,790	8,444	28,022
CHC Mohiuddinpur	64,252	5,438	13,775	58,741	5,969	17,700
CHC Sarairanjan	76,278	7,451	15,322	72,302	7,903	17,889
CHC Chiraiya	73,733	3,433	10,791	45,677	3,333	10,988
CHC Kalyanpur	39,411	2,893	11,276	33,228	2,700	12,857
CHC Mehashi	52,289	2,288	13,843	42,243	1,935	14,514
CHC Pahadpur	69,375	5,764	9,772	40,938	6,033	13,569
CHC Patahi	61,207	2,762	4,685	45,762	4,401	5,810

Facility name	2016-17			2017-18		
	OP visits	IP visits	Immunization doses	OP visits	IP visits	Immunization doses
Primary Health Centre						
PHC Goh	72,389	3,361	14,773	75,153	2,938	18,066
PHC Barhara Kothi	97,161	8,720	10,507	65,895	3,498	9,535
PHC Jalalgarh	79,615	3,448	11,105	67,352	3,693	12,171
PHC Krityanandnagar	60,800	3,672	9,656	76,805	3,644	14,973
PHC Shrinagar	68,042	7,149	7,435	57,364	7,355	8,472
PHC Mohanpur	91,548	2,213	42,582	45,683	2,278	13,488
PHC Shivajinagar	54,762	2,600	12,607	59,221	2,488	13,193
PHC Warisnagar	23,831	3,800	16,638	39,210	8,587	18,560
PHC Raxaul	116,692	3,534	25,080	91,181	4,009	30,112

Annexure 8: Number of Outpatient Visits and Inpatients per Staff in 2016-17 and 2017-18, by Facility

Platform/facility	Outpatient visit per staff		Inpatients per staff	
	2016-17	2017-18	2016-17	2017-18
District Hospital				
DH Aurangabad	4,723	4,577	205	246
DH Purnea	1,705	2,090	596	448
DH Samastipur	1,514	1,501	289	262
DH East Champaran	1,752	1,546	303	185
Average	***2,424***	***2,429***	***348***	***285***
Sub-divisional Hospital				
SDH Daudnagar	307	407	16	13
SDH Damdaha	5,149	4,437	242	294
SDH Pusa	732	845	100	141
SDH Pakridayal	3,516	3,265	134	139
Average	***2,426***	***2,238***	***123***	***147***
Referral Hospital				
RH Navinagar	2,249	2,339	134	81
RH Rupauli	3,464	3,054	366	270
RH Tajpur	1,666	2,604	343	359
RH Dhaka	3,423	1,957	162	140
Average	***2,700***	***2,488***	***251***	***213***
Community Health Centre				
CHC Barun	2,430	2,230	165	96
CHC Deo	7,332	8,459	101	64
CHC Madanpur	3,016	3,205	105	321
CHC Obra	8,244	8,025	178	184
CHC Rafiganj	2,062	2,731	272	151
CHC Baisa	2,990	4,891	268	269
CHC Bhawanipur	3,413	3,330	585	565
CHC Hasanpur	3,365	3,854	539	384
CHC Mohiuddinpur	3,060	2,797	259	284
CHC Sarairanjan	2,543	2,410	248	263
CHC Chiraiya	3,687	2,284	172	167

Platform/facility	Outpatient visit per staff		Inpatients per staff	
	2016-17	2017-18	2016-17	2017-18
CHC Kalyanpur	1,971	1,661	145	135
CHC Mehashi	2,092	1,690	92	77
CHC Pahadpur	2,569	1,516	213	223
CHC Patahi	1,800	1,346	81	129
Average	***3,372***	***3,362***	***228***	***221***
Primary Health Centre				
PHC Goh	2,335	2,424	108	95
PHC Barhara Kothi	4,224	2,865	379	152
PHC Jalalgarh	2,654	2,245	115	123
PHC Krityanandnagar	1,900	2,400	115	114
PHC Shrinagar	2,722	2,295	286	294
PHC Mohanpur	5,722	2,855	138	142
PHC Shivajinagar	2,608	2,820	124	118
PHC Warisnagar	993	1,634	158	358
PHC Raxaul	3,890	3,039	118	134
Average	***3,005***	***2,509***	***171***	***170***

Annexure 9: Range for Each Type of Expenditure, by Platform between 2016-17 and 2017-18

Platform	Range of average expenditure in 2016-2018 (in INR)			
	Personnel	Pharmaceuticals and consumables	Other	Total
District Hospital	(46,502,421-134,340,196)	(9,657,089-27,106,196)	(49,725,303-60,977,196)	(120,388,742-202,098,196)
Sub-divisional Hospital	(1,255,151-21,128,910)	(2,312,339-9,161,855)	(4,053,885-30,603,339)	(8,203,908-60,894,104)
Referral Hospital	(12,204,707-33,284,377)	(2,171,823-11,147,616)	(15,613,297-20,899,416)	(37,646,404-55,788,844)
Community Health Centre	(12,590,563-28,920,557)	(326,484-4,955,009)	(11,940,523-27,856,905)	(28,832,474-58,243,079)
Primary Health Centre	(10,43,331-29,431,530)	(6,038,872-3,233,252)	(10,20,685-28,570,159)	(2,359,532-54,636,406)

Annexure 10: The Average Outputs and Inputs for the Facilities with the Lowest and Highest Efficiency Scores, by Platform

Indicators	District Hospital		Sub-divisional Hospital		Referral Hospital		Community Health Centre		Primary Health Centre	
	Lowest	Highest	Lowest	Highest	Lowest	Highest	Lowest	Highest	Lowest	Highest
Average efficiency score (%)	**27%**	**45%**	**58%**	**88%**	**19%**	**76%**	**32%**	**72%**	**44%**	**80%**
Average annual outputs										
Outpatient visits	150,747	362,710	9,991	134,199	59,774	133,627	36,320	221,071	31,521	103,937
Inpatients	17,801	98,633	407	7,509	3,966	13,045	2,112	11,500	2,246	7,252
Average annual input										
Personnel expenditure (INR)	46,502,421	134,340,232	1,255,151	21,128,910	12,204,707	332,843,771	12,590,563	28,920,557	10,430,331	29,431,530
Pharmaceuticals and consumables expenditure (INR)	9,657,089	27,106,143	2,312, 340	9,161,856	2,171,823	11,147,616	326,484	4,955,010	603,872	3,233,252
Other expenditure (INR)	40,725,303	60,977,262	4,053,885	30,603,340	15,613,297	20,899,417	11,940,523	27,856,905	10,209,685	28,570,159
Beds	95	374	20	46	20	30	18	38	6	26
Doctors	17	31	7	13	4	8	2	7	3	6
Nurses/ANMs	17	69	5	14	4	6	2	9	2	10
Para-medical staff	6	37	3	4	4	9	1	8	2	7
Non-medical staff	19	53	4	17	12	23	7	22	6	17

Annexure 11: Potential Additional Outputs Possible, by Platform

Additional outputs based on 100% technical efficiency, by platform

Platform	Additional outputs	
	Outpatient visit (% increase from the current output)	Inpatients (% increase from the current output)
District Hospital	2,113,042 (302.5%)	280,804 (166.0%)
Sub-divisional Hospital	135,757 (150.2%)	9,073 (53.7%)
Referral Hospital	641,628 (165.1%)	61,351 (185.8%)
Community Health Centre	1,257,776 (100.7%)	66,143 (81.2%)
Primary Health Centre	479,083 (77.1%)	24,899 (64.7%)
All the above facilities	4,627,286 (129.5%)	442,270 (130.5%)

Additional outputs based on the highest technical efficiency, by platform

Platform*	Additional outputs	
	Outpatient visit (% increase from the current output)	Inpatients (% increase from the current output)
District Hospital	381,137 (36.5%)	33,948 (20.1%)
Sub-divisional Hospital	86,793 (32.1%)	5,941 (35.1%)
Referral Hospital	397,525 (102.3%)	38,988 (118.0%)
Community Health Centre	544,910 (43.6%)	24,163 (29.7%)
Primary Health Centre	261,111 (42.0%)	12,343 (32.1%)
All the above facilities	1,671,476 (46.8%)	115,383 (34.0%)

** Highest technical efficiency for DH is 45%, SDH is 88%, RH is 76%, CHC is 72%, and PHC is 80%*

Additional outputs based on average technical efficiency, by platform

Platform*	Additional outputs	
	Outpatient visit (% increase from the current output)	Inpatients (% increase from the current output)
District Hospital	29,467 (2.8%)	-16,177 (-9.6%)
Sub-divisional Hospital	7,128 (2.6%)	846 (5.0%)
Referral Hospital	231,094 (59.5%)	23,740 (71.9%)
Community Health Centre	132,319 (10.6%)	-134 (-0.2%)
Primary Health Centre	42,106 (6.8%)	-274 (-0.7%)
All the above facilities	442,113 (12.4%)	8,002 (2.4%)

** Average efficiency for DH is 34%, SDH is 68%, RH is 60%, CHC is 55%, and PHC is 60%*

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