Research

CRISIL
An S&P Global Company

Assessment of the Healthcare Delivery Market in India

March 2022

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1 Macroeconomic overview of India

1.1 A review of India's GDP growth

GDP grew at 6.6% CAGR between fiscals 2012-20

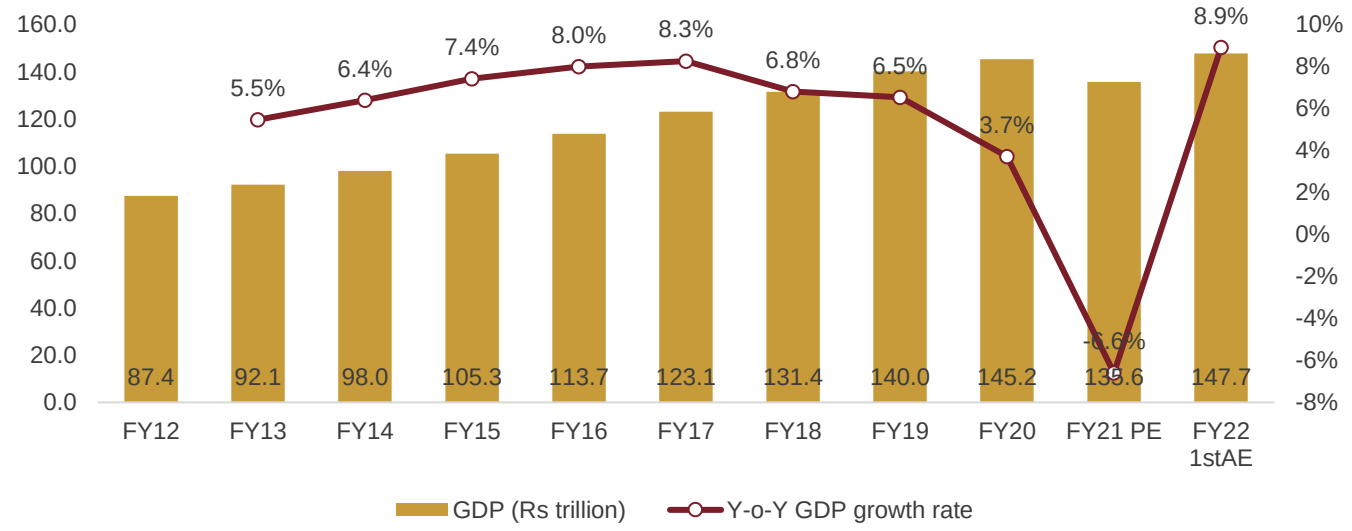
In 2015, the Ministry of Statistics and Programme Implementation (MoSPI) changed the base year for calculating India's GDP between fiscals 2005 and 2012. Based on this, the country's GDP increased at an eight-year CAGR of 6.6% to Rs 145 trillion in fiscal 2020 (USD 2.1 trillion as per fiscal 2021 average currency conversion rate) from Rs 87.4 trillion in fiscal 2012 (USD 1.8 trillion as per fiscal 2012 average currency conversion rate).

Fiscal 2021 has been a challenging year for the Indian economy, which was already experiencing a slowdown before the pandemic struck. GDP contracted 6.6% (in real terms) last fiscal, after growing 3.7% in fiscal 2020. At Rs 135.6 trillion (USD 1.8 trillion as per fiscal 2021 average currency conversion rate) in fiscal 2021, India's GDP (in absolute terms) went even below the fiscal 2019 level of Rs 140 trillion (USD 2.0 trillion as per fiscal 2019 average currency conversion).

Economy grew strongly in first half of fiscal 2022 after shrinking in first half of fiscal 2021

After contracting in the first half because of the Covid-19 pandemic, the economy rebounded in the second half, growing 0.5% and 1.6% year-on-year in the third and fourth quarters, respectively. While the economy shrank in fiscal 2021, agriculture and allied activities, and electricity, gas, water supply and other utility services were the outliers, logging positive growth. On the other hand, contact-intensive trade, hotels and transport sectors, and services related to broadcasting were hit the most and continued to shrink in all the quarters. Construction – a labor-intensive sector – was also severely hit in the first half but rebounded in the second half. In Q1 FY22, the economy grew strongly by 20.1% compared to Q1 FY21. Similarly, it grew by 8.4% in Q2 FY22, compared to the same quarter previous financial year.

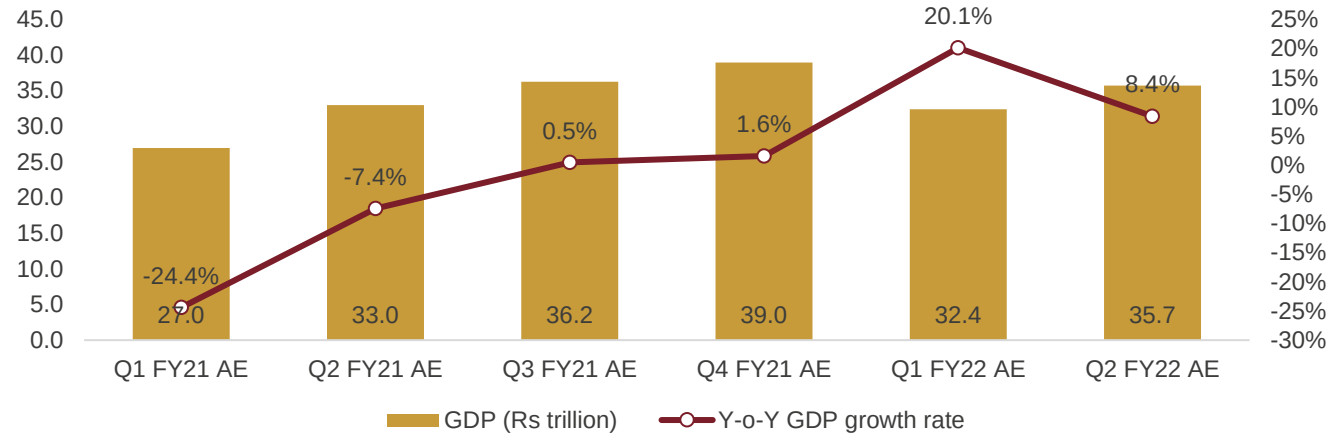
Real GDP growth in India (new GDP series)



Note: PE: Provisional estimates, 1stAE: 1st Advanced estimates

Source: First advance estimates of Annual National Income 2021-22, Central Statistics Office (CSO), MoSPI, CRISIL Research

Quarter-wise real GDP growth in FY21 and H1 FY22



Note: AE: Advance estimates

Source: First advance estimates of Annual National Income 2021-22, Central Statistics Office (CSO), MoSPI, CRISIL Research

Looked at from the supply side i.e., GVA, a much better measure of the economic performance for last fiscal, the economy shrank a lesser 4.8% (compared with 3.8% growth in fiscal 2020). In absolute terms, real GVA was Rs 125.9 trillion last fiscal, down from Rs 127.3 trillion in fiscal 2019.

GVA at basic prices (constant FY12 prices)

Rs trillion	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21RE	CAGR
GVA at basic prices	81.1	85.5	90.6	97.1	104.9	113.3	120.3	127.3	132.2	125.9	5%
Y-o-y growth (%)		5.4%	6.1%	7.2%	8.0%	8.0%	6.2%	5.8%	3.8%	-4.8%	

Note: CAGR is between fiscal 2012 and 2021, PE: Provisional estimates, RE: Revised estimates

Source: CRISIL Research

Fiscal 2022 GDP growth expected to be 8.9%

India is getting back on its feet slowly, with divergent growth trends. Though data suggests there has been some pick-up in recent months, recovery is weak and uneven. And indeed, the scars of the pandemic continue to run deep for small businesses, the urban poor and most of the services sector.

Fiscal 2022 is also seen emerging as a story of two halves. The first half has been characterized by a base effect-driven recovery with over one billion Covid-19 vaccine doses administered till November 2021. Real GDP rose to Rs 35.7 lakh crore in the second quarter of this fiscal from Rs 32.4 lakh crore in the first quarter and Rs 32.9 lakh crore in the second quarter of the previous fiscal. However, we note that even as the economy rebounds, it has barely crossed the level it was at two years back (i.e., Rs 35.6 lakh crore in the second quarter of fiscal 2020 But the second half should see a more broad-based growth, as vaccine rollout and herd immunity support sectors that are lagging. The gains made by the economy in the fourth quarter of fiscal 2021 seem to have fizzled out in the first quarter of fiscal 2022 because of the fierce second wave of Covid-19, leading to localised lockdowns in most states. At the same time, monetary policy has begun normalising, and some tightness in domestic financial conditions is inevitable. Against this backdrop, policy support remains critical, apart from action in the external environment.

In fiscal 2021, the policy response to the pandemic focused more on damage control and measures to support the economy. In the current fiscal, the government is expected to normalise some of the extraordinary or unconventional policy moves, while trying to ensure there is smooth revival in growth. This will pertain to most of

the services sectors, especially contact-based travel, tourism, and entertainment. Also, stronger global growth should support India's exports to some extent. Revival will not be uniform across sectors, though. So far, the rural economy has been more resilient than the urban economy.

CRISIL forecasts India's GDP growth to rebound to 8.9% in this fiscal 2022, on the back of following drivers:

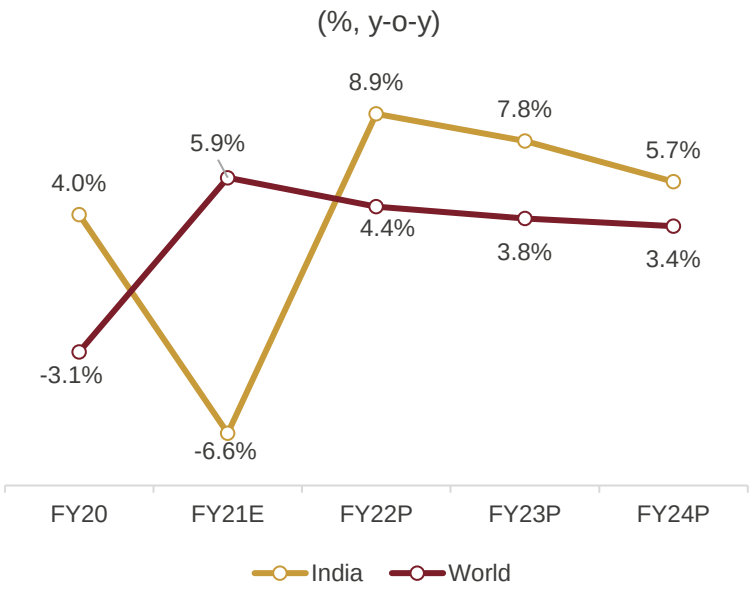
1. Weak base: GDP contracted 6.6% in fiscal 2021, providing a statistical push to growth this fiscal

2. Global upturns: Higher global growth in 2021 — in world GDP by 5.9%, advanced economies 5% and emerging economies 6.5% — should lift exports

3. Covid-19 curve: An active vaccination rollout and, at the same time, learning to live with the virus should broaden growth this fiscal, especially in the services and unorganised sectors

4. Fiscal push: Consumption recovery will be gradual as the propensity to consume is expected to revive only slowly given the impaired purchasing power stemming from higher inflation. That said, continued fiscal support, largely in the form of government capex should have a multiplier effect on consumption.

India to surpass global GDP growth in next three fiscals



GDP growth is expected to rebound to 8.9% this fiscal on the back of a very weak base and the rising-global-tide effect

CRISIL sees India's GDP growth rebounding to 8.9% this fiscal due to a very weak base, flattening of the Covid-19 curve, rollout of vaccinations, investment-focused government spending, and benefit from the 'rising global tide lifts all boats' effect. Beyond fiscal 2022, India is seen growing faster than the world. Over fiscals 2023-25, growth is seen averaging at ~6.0% annually.

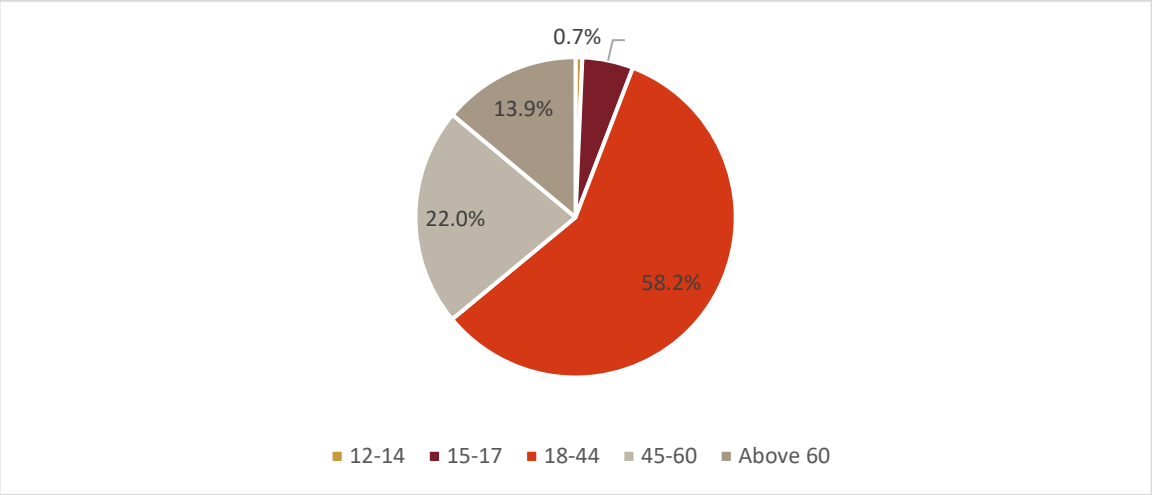
Note: Forecasts for World are for calendar year; FY20 corresponds to 2019 and so on; P: Projected;; India numbers for FY20 and FY21 are based on MoSPI's latest GDP estimates and FY22 onwards are CRISIL Research's forecast. World GDP growth rates are for calendar years from IMF world economic outlook updates January 2022 and October 2021.
Source: S&P Global Ratings, CRISIL, IMF

India administered over 1.83 billion covid vaccination doses till March 28, 2022

India has completed 2nd dose vaccination for 827 million + of its citizens by March 28, 2022 and has administered total 1.83 billion+ doses since the nationwide immunization drive was launched on 16 January 2021. First dose contributes to ~54% of administered vaccination doses while second dose has 45% share and the remaining 1% is with precaution dose. Age-group wise, 58.0% of the doses were administered to people with 18-44 years age group. Majority of vaccine dosage were delivered to this age bracket (18-44) bracket which is the work class group from economic growth perspective.

Emergency authorization approval for children covid vaccination was granted in Aug 2021, and India rolled out its first vaccine for children aged between 15-17 on January 3, 2022.

Age-group wise COVID-19 vaccination status (As of March 28, 2022, from the start of vaccination drive)



Source: COWIN Dashboard, CRISIL Research

Key fiscal measures announced by the Centre to deal with the pandemic's impact

To mitigate the pandemic's negative impact on the economy, the Central government announced a Rs 20.9 trillion package on May 12, 2020 amounting to 10% of the country's nominal GDP. The package is a mix of fiscal and monetary measures (to revive growth in the short term) and reforms (to boost long-term economic prospects). Liquidity support has been a major part of India's response so far. Globally, too, liquidity measures have played a lead role in policy response. The immediate fiscal cost to be borne by the government would be ~Rs 2.6 trillion, or 1.2% of nominal GDP. Further, execution of the government's measures to revive the economy and pace of implementation of the announced reforms are key monitorables.

Budget allocation for healthcare aimed towards strengthening preventive and curative health and well-being of the country

The healthcare budget has increased year-over-year, with budget for MoHFW clocking an 11% CAGR between fiscal 2011 and fiscal 2022. Fiscal 2022, especially, has seen a significant rise on account of the high expenses associated with tackling the Covid-19 pandemic. In recent years, the utilisation rate has been 100% or above, as has been the case since fiscal 2016.

The latest budget involves a Rs 365.8 billion allocation to the National Health Mission, which accounts for nearly 50% of the total budget of the MoHFW. Apart from the budget for the ministry, health research has been allocated Rs 26.6 billion. The recent budget has tried to incorporate different aspects of healthcare, namely preventive, curative and wellbeing. The recent budget also saw the introduction of a new scheme, Pradhan Mantri AtmaNirbhar Swasth Bharat Yojana (one of the largest government health infrastructure schemes in India), which will entail an outlay of Rs 641.8 billion over 6 years. The objective of the scheme is to strengthen the country's healthcare systems. Apart from the allocation to the MoHFW, latest budget also included Rs 350.0 billion for the Covid-19 vaccine and Rs 131.9 billion as finance commission grant for health.

Key budget proposals

- Budgetary allocation towards health and well-being increased to Rs 2.2 trillion in fiscal 2022

- Rs 350.0 billion towards vaccination in fiscal 2022

Health and Wellbeing – Expenditure for fiscal 2022

Ministry/departments	Actuals FY20 (Rs. billion)	BE FY21 (Rs. billion)	RE FY21 (Rs. billion)	BE FY22 (Rs. billion)
Healthcare	**643.3**	**671.1**	**829.3**	**1,221.2**
D/o health & family welfare	624.0	650.1	788.6	712.7
D/o health research	19.3	21.0	40.6	26.6
Vaccination				350.0
FC grants for health				131.9
Well-being	**219.3**	**273.4**	**199.5**	**1,017.2**
M/o Ayush	17.8	21.2	23.2	29.7
D/o drinking water & sanitation	182.6	215.2	170.2	600.3
Nutrition	18.8	37.0	6	27.0
FC grants for water and sanitation				360.2
Overall (health and well-being)	**862.6**	**944.5**	**1,028.7**	**2,238.5**

BE: Budget Estimates; RE: Revised Estimates; FC grants: Finance Commission grants
Source: Budget document

VGF support will aid in the development of hospitals and healthcare centres under public-private partnership (PPP)

India's Covid-19 emergency response and health system preparedness package of Rs 150.0 billion was announced in three phases until Mar 2024 to address immediate needs in the wake of the pandemic. A separate health-worker life insurance cover of Rs 5.0 million under Pradhan Mantri Garib Kalyan Yojana (PMGKY) was also announced to offer support to families of frontline health workers fighting the virus.

In addition to emergency funding for the pandemic response, the economic package includes long-term measures to improve healthcare infrastructure. The government's emphasis on healthcare offers substantial opportunities for private investment to create affordable healthcare facilities and services. To boost private investment in social infrastructure, the government has announced an outlay of Rs 81.0 billion with viability-gap funding (VGF) limits enhanced from 20% to 30% of project cost for both the Central and state governments to attract private investments in the social infrastructure space.

VGF support will aid in the development of hospitals and healthcare centres under public-private partnership (PPP). It creates an investment opportunity of Rs 150-200 billion under the social-infrastructure space. Support to private investments via enhanced VGF will help grow the current health infrastructure by 4-5%. Increased public expenditure on health (National Health Policy targets public health expenditure at 2.5% of GDP by 2025) also means increased government focus on development of health systems and research centres. Development of healthcare infrastructure will gain preference in the current situation with a rise in healthcare spending / demand in India.

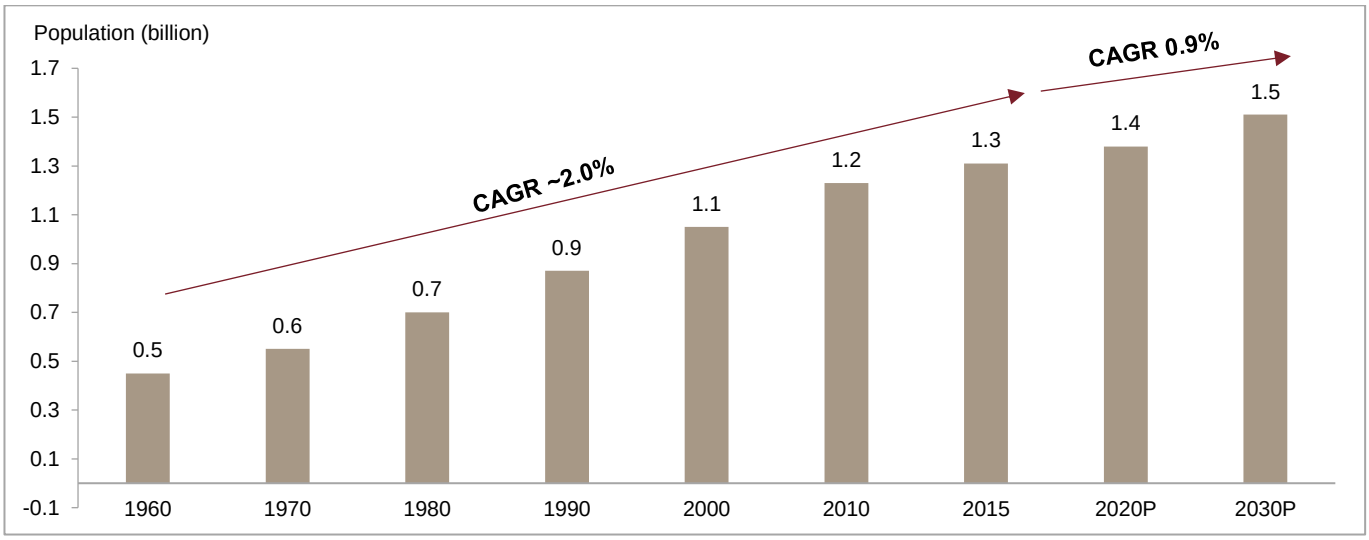
1.2 Fundamental growth drivers of GDP

By 2030, India's population is projected to touch 1.5 billion

India's population clocked a ~1.6% CAGR from 2001 to 2011 to ~1.2 billion and comprised nearly 246 million households, as per Census 2011.

According to the 'World Urbanization Prospects: The 2018 Revision' by the United Nations, India and China, the top two countries in terms of population, accounted for nearly 37% of the world's population in 2015. The report projects India's population to increase at 1% CAGR to 1.5 billion by 2030, making it the world's most populous country, surpassing China (with 1.4 billion people by 2030).

India's population growth



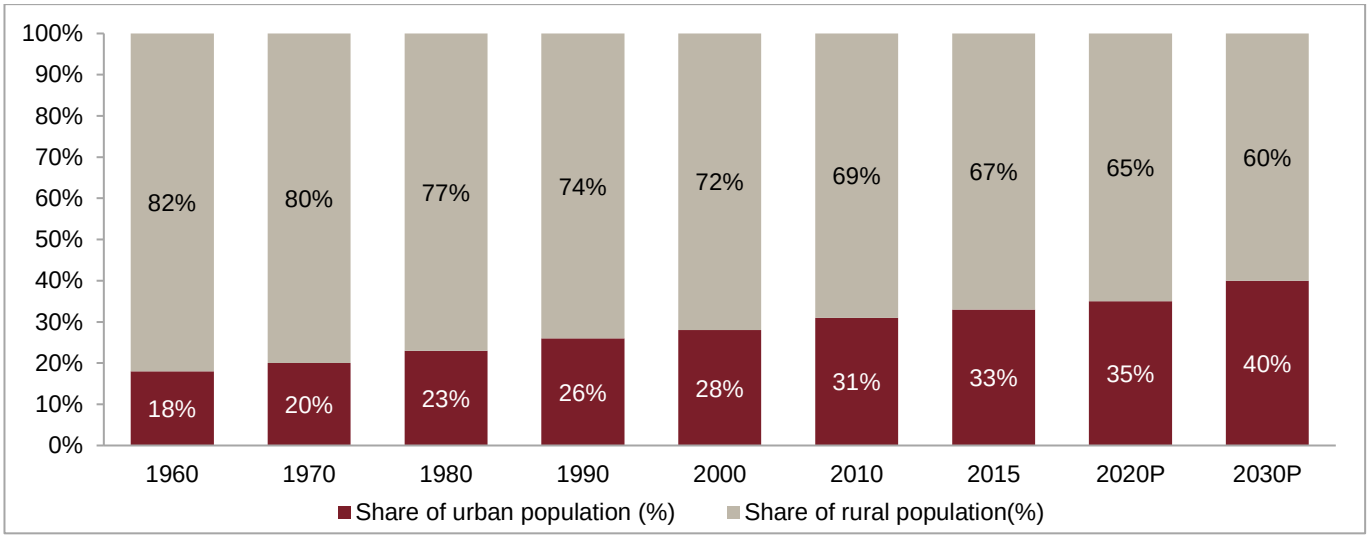
P: Projected

Source: World Urbanization Prospects: The 2018 Revision, United Nations, CRISIL Research

Urbanisation likely to reach 40% by 2030

According to 'World Urbanization Prospects: The 2018 Revision by the United Nations', in 2018, China had the largest urban population, with 837 million urban dwellers, accounting for 20% of the global total. China was followed by India, with 461 million urban dwellers, and the US, with 269 million urban dwellers. The share of India's urban population, in relation to its total population, has been rising over the years and it was ~31% in 2010. This trend will continue, with the United Nations report projecting nearly 40% of the country's population will live in urban areas by 2030.

India's urban versus rural population



P: Projected

Source: World Urbanization Prospects: The 2018 Revision, United Nations, CRISIL Research

People from rural areas move to cities for better job opportunities, education and quality of life. The entire family or only a few individuals (generally an earning member or students) may migrate, while the rest of the family continues to live in the native, rural house.

India's per capita income rose at a healthy pace between fiscals 2012 and 2020

India's per capita income, a broad indicator of living standards, rose from Rs 63,462 in fiscal 2012 to Rs 94,556 in fiscal 2020, at 5.1% CAGR. This growth was led by better job opportunities, propped up by overall GDP growth. Moreover, population growth remained fairly stable at ~1% CAGR.

Per capita net national income at constant prices

	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21AE
Per capita net national income (Rs)	63,462	65,538	68,572	72,805	77,659	82,931	87,828	92,241	94,556	85,929
On-year growth (%)	2.1	3.3	4.6	6.2	6.7	6.8	5.9	5.0	2.5	-9.1

AE: Advance estimates

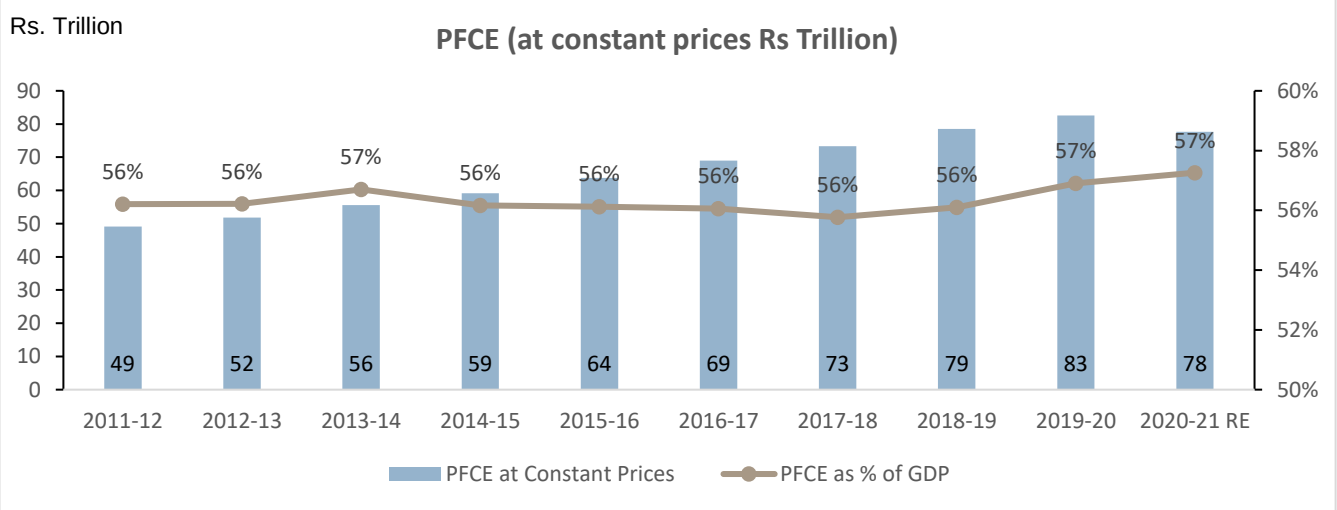
Source: Second advanced estimates of Annual National Income, 2020-21, CSO, MoSPI, CRISIL Research

1.3 Review of private final consumption growth

Private final consumption expenditure to maintain dominant share in GDP

Private final consumption expenditure (PFCE) at constant prices clocked 6.7% CAGR between fiscals 2012 and 2020, maintaining its dominant share in the GDP pie, at ~57% or Rs 82.6 trillion. Factors contributing to this growth included good monsoons, wage revisions due to the implementation of the Pay Commission's recommendations, benign interest rates, and low inflation. PFCE declined in fiscal 2021 on account of the pandemic, where consumption demand was impacted on account of strict lockdown, employment loss, limited disposable spending and disruption in demand-supply dynamics.

PFCE (at constant prices)



Note: RE: Revised estimates

Source: First Revised estimates of Annual National Income 2021-22, Central Statistics Office (CSO), MoSPI, CRISIL Research

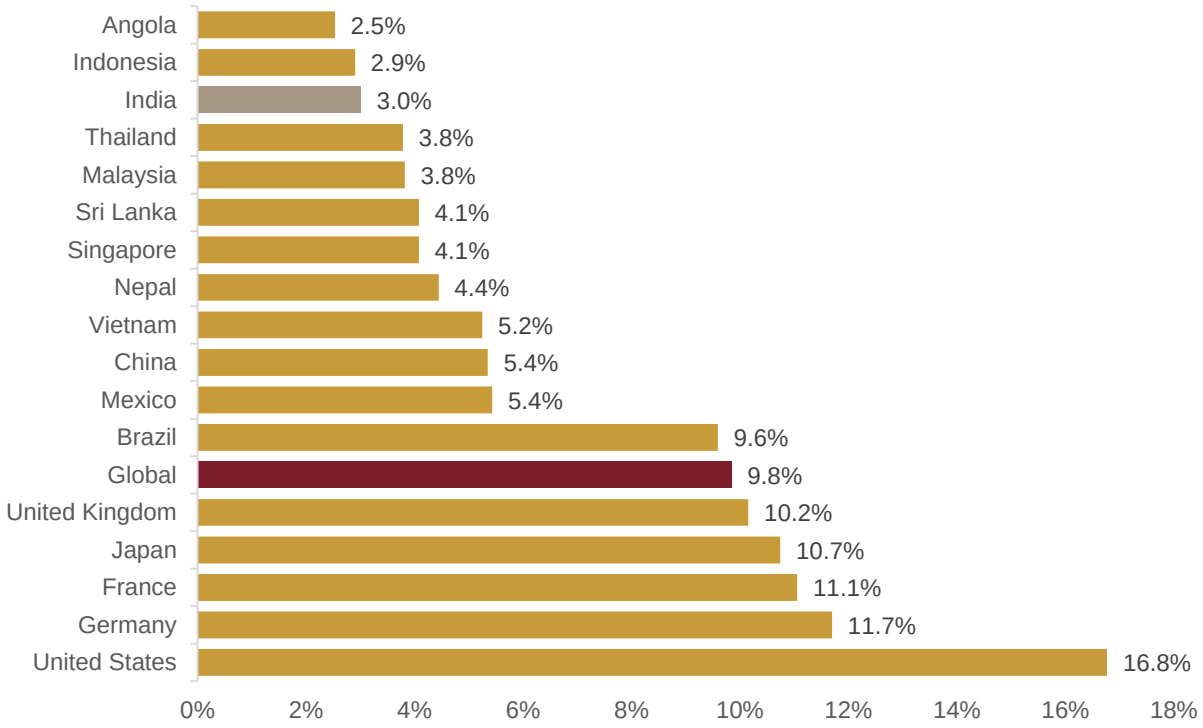
1.4 Social and healthcare related parameters

Along with the structural demand existing in the country and the potential opportunity it provides for growth, provision of healthcare in India is still riddled with many challenges. The key challenges are inadequate health infrastructure, unequal quality of services provided based on affordability and healthcare financing.

India lags peers in healthcare expenditure

Global healthcare spending has been rising faster in keeping with the economic growth. As the economy grows, public and private spending on health increases, too. Also, greater sedentary work is giving rise to chronic diseases, which is also pushing up healthcare spending. Fast-growing economies with low spending on health are seeing chronic diseases increase dramatically as they move up the income ladder. Developed economies such as United states, Germany, France, Japan, United Kingdom, spend higher on healthcare as compared to developing nations such as India, Thailand, Vietnam, Indonesia, etc. China spent lower on healthcare as compared to global average spending of 9.8% in 2019

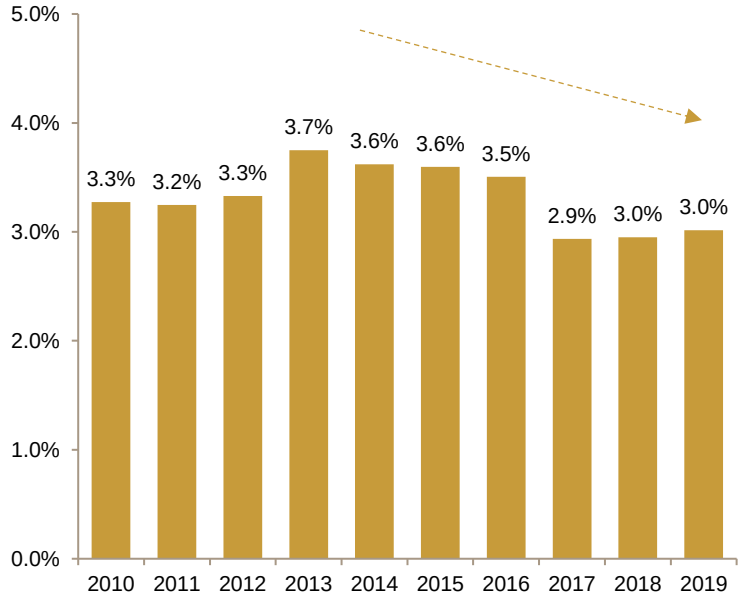
Total healthcare expenditure as % of GDP (2019)



Source: Global Health Expenditure Database, World Health Organization; CRISIL Research
World Health Organization Global Health Expenditure database. The data was retrieved on January 30, 2022.

India spends too little on healthcare

Current healthcare expenditure (CHE) as % of GDP in India (2010-2019)



Per capita current expenditure on health in USD (2019)

India	63.8
China	535.1
Brazil	853.4
Korea	2,624.5
Singapore	2,632.71
United Kingdom	4,312.9
Japan	4,360.5
France	4,491.7
Australia	5,427.5
Germany	5,440.3
Canada	5,048.4
United States	10,921.0

Source: Global Health Expenditure Database- World Health Organisation, CRISIL Research

According to the Global Health Expenditure Database compiled by the WHO, in CY 2019, India's expenditure on healthcare was 3.0% of GDP. In fiscal 2019, India's real GDP was Rs 139.8 trillion (constant fiscal 2012 prices) and healthcare expenditure is estimated at ~Rs 4.9 trillion. As of 2019, India's healthcare spending as a percentage of GDP trails not just developed countries, such as the US and UK, but also developing countries such as Brazil, Nepal, Vietnam, Singapore, Sri Lanka, Malaysia, and Thailand.

India's current healthcare expenditure has decreased over 2013-18. India spending on healthcare is very low and almost 55% is out-of-pocket expenditure by the public. The high OOPE healthcare expenditure is primarily due to under-penetration of healthcare and insurance services and lower public spending on healthcare.

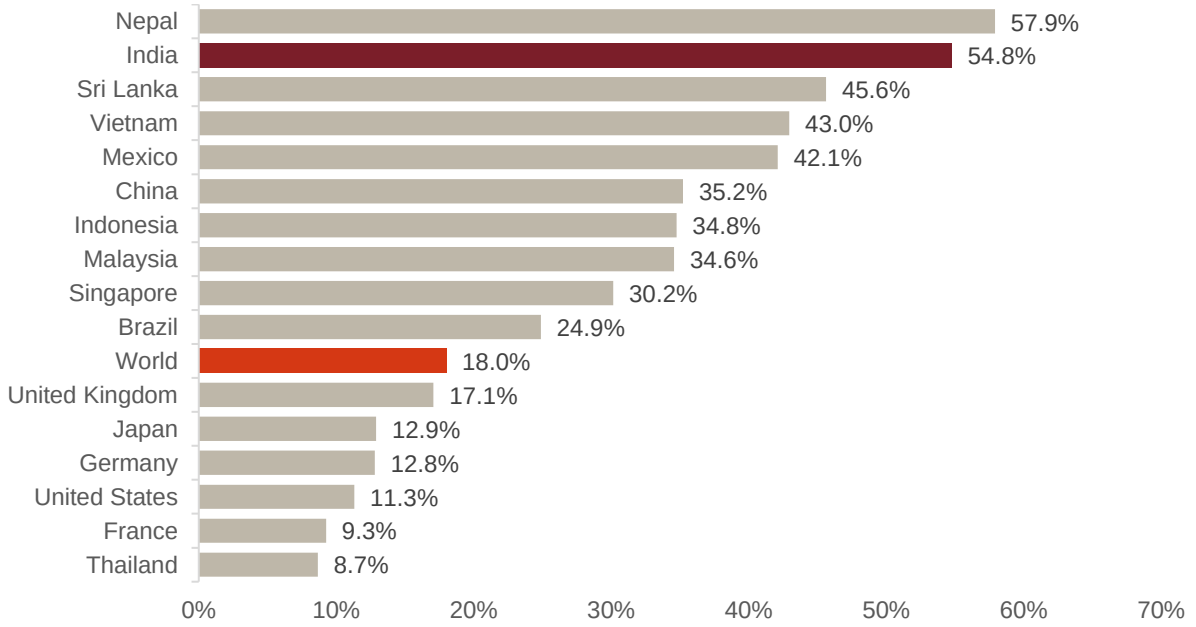
Further, India's public spending on healthcare services remains much lower than its global peers. For example, India's per-capita total expenditure on healthcare (at an international dollar rate, adjusted for purchasing power parity) was only $64 in 2019 versus the US's $10,921, the UK's $4,313 and Singapore's $2,634.

India has one of the highest share of out-of-pocket expenditure in healthcare

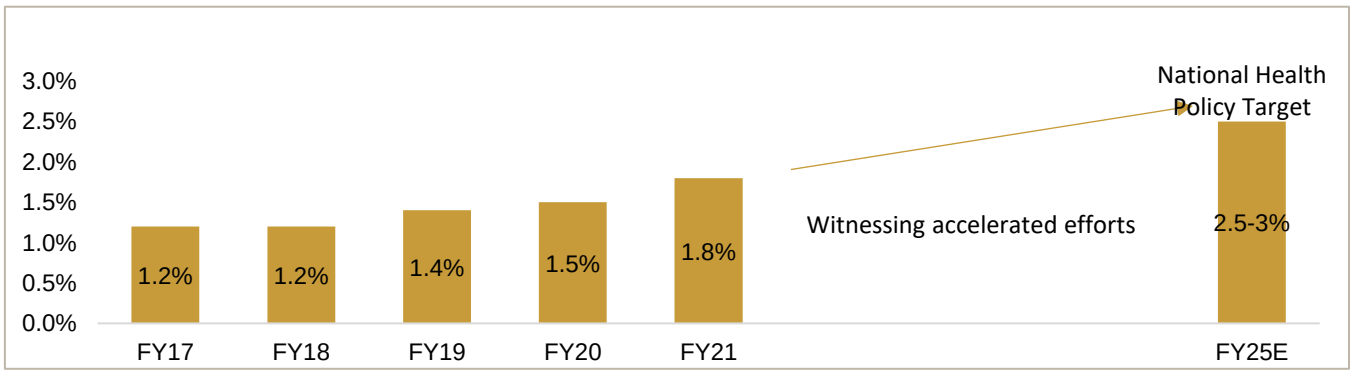
The Government of India spends little in healthcare given the size of the economy, which drives the higher out-of-pocket expenditure in India. Despite the decline in the past few years, India's OOPE as percent of current health spending is 55%, significantly above the average for lower-middle income countries, and amongst the highest in the world. As per NITI Aayog estimates at least 30% of the population is devoid of any health protection through insurance. Estimates based on NSSO's 75th round survey indicate this section may be larger than 30% of the population around ~50%. As per economic survey data for FY2021-22, 80-85% of the in-patient hospitalisations did not have any coverage. This explains the higher share of OOPE in health care expenditure. The government of India has introduced schemes such as Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (ABPMJAY), state

sponsored health insurance (AB-PMJAY State Extension Schemes), Employees' State Insurance Scheme (ESIS), Central Government Health Scheme to increase the coverage of medical insurance.

Out-of-pocket expenditure (% of current health expenditure)



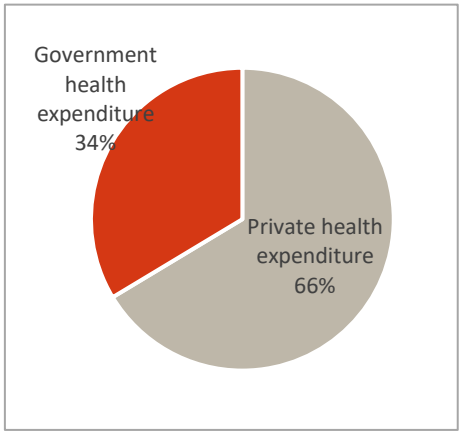
Expenditure on health by center and state government as % of GDP in India (2017 onwards)



Source: National health profile, budget documents, CRISIL Research

Public healthcare expenditure is low, with private sector accounting for a lion's share

General expenditure on health as % of CHE (2019)



India's current healthcare expenditure (CHE) is skewed more towards private expenditure compared with public expenditure. Government expenditure on healthcare has remained range-bound at 20-30% of the current healthcare expenditure from calendar year 2010 to 2016. Over the recent few year share of government expenditure has crossed 30%. The rest of the expenditure is private in nature (expenditure from resources with no government control such as voluntary health insurance, and the direct payments for health by corporations (profit, not-for-profit and non-government organisations) and households. However, the government aims to increase public healthcare expenditure to 2.5-3% of GDP by 2025 from the current 2%, as per the National Health Policy.

Source: Global Health Expenditure Database- World Health Organisation, CRISIL Research

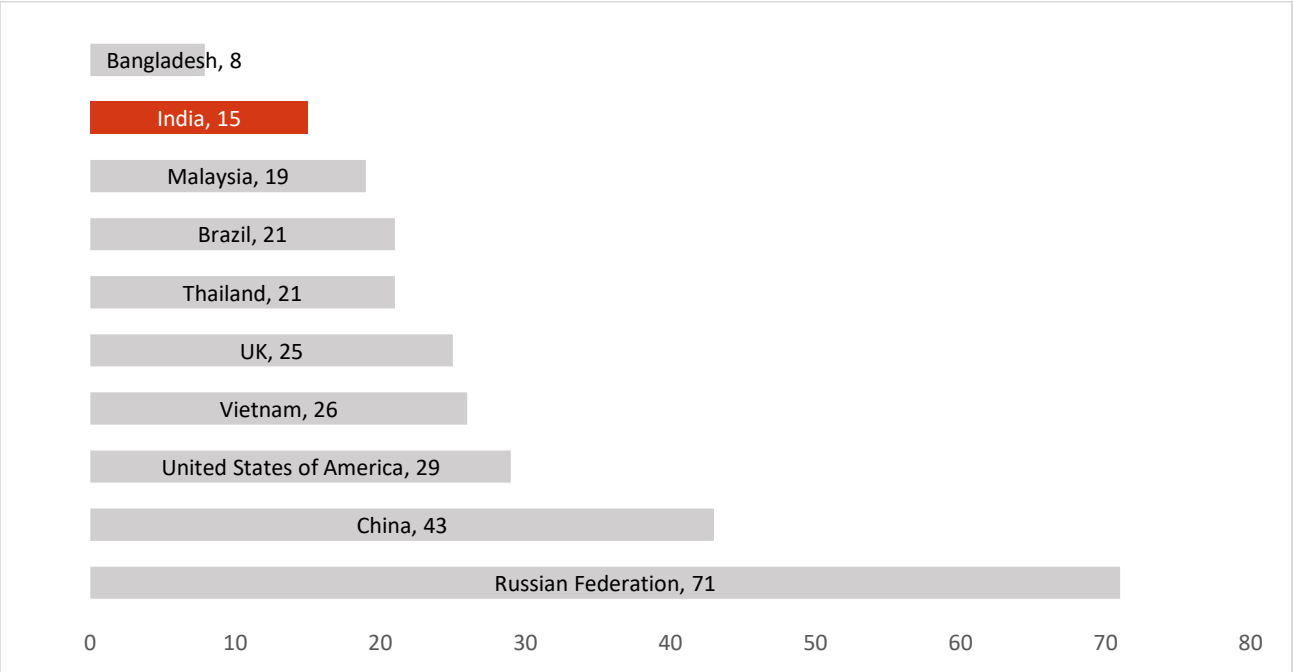
In India, out-of-pocket (OOP) expenditure on health accounted for nearly 55% of total health expenditure as of 2019 (the second highest among all the other countries compared above). Insurance earlier did not cover out-patient treatments (Insurance companies started covering OPD treatments under health insurance only recently). Hence, OOP expenditure on out-patient treatments is greater than in-patient treatments.

Nearly 17% of the rural population and 13% of the urban population are dependent on borrowings for funding their healthcare expenditure. And nearly 80% of the rural population and 84% of the urban population use their household savings on healthcare-related expenditure as per "Health in India – 2018, NSS 75th Round. Health expenditure contributes to nearly 3.6% and 2.9% of rural and urban poverty, respectively. And annually, an estimated 60 to 80 million people fall into poverty due to healthcare-related expenditure. However, with Pradhan Mantri Jan Arogya Yojana (PMJAY), the affordability aspect of healthcare expenditure is expected to be taken care of to some degree, especially for the deprived population.

Health infrastructure of India in dire need of improvement

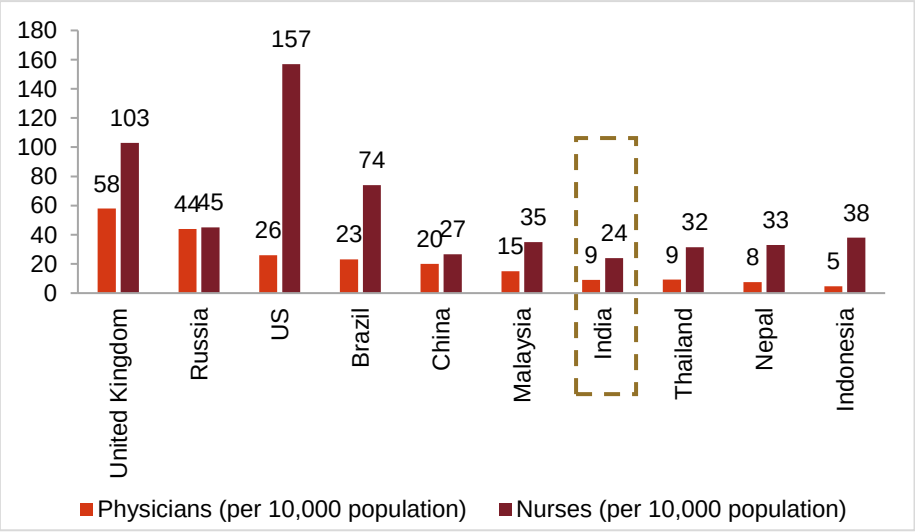
The adequacy of a country's healthcare infrastructure and personnel is a barometer of its quality of healthcare. India accounts for nearly a fifth of the world's population, but has an overall bed density of merely 15, with the situation being far worse in rural than urban areas. India's bed density not only falls far behind the global median of 29 beds, it also lags that of other developing countries such as Brazil (21 beds), Malaysia (19 beds), and Vietnam (26 beds).

Bed densities across countries - hospital beds (per 10,000 population)



Note: India bed density is estimated by CRISIL Research
Source: World Health Organization Database, CRISIL Research

Healthcare personnel: India vs other countries



The paucity of healthcare personnel compounds the problem. At nine physicians and 24 nursing personnel per 10,000 population, India trails the global median of 18 physicians and 39 nursing personnel. Even on this parameter, India lags developing countries such as Brazil (23 physicians, 74 nurses), Malaysia (15 physicians, 35 nurses) and other South East Asian countries.

Source: WHO World Health Statistics 2021

Physicians (per 10,000 population)	
World average	India
~18	9

Nurses (per 10,000 population)	
World average	India
39	24

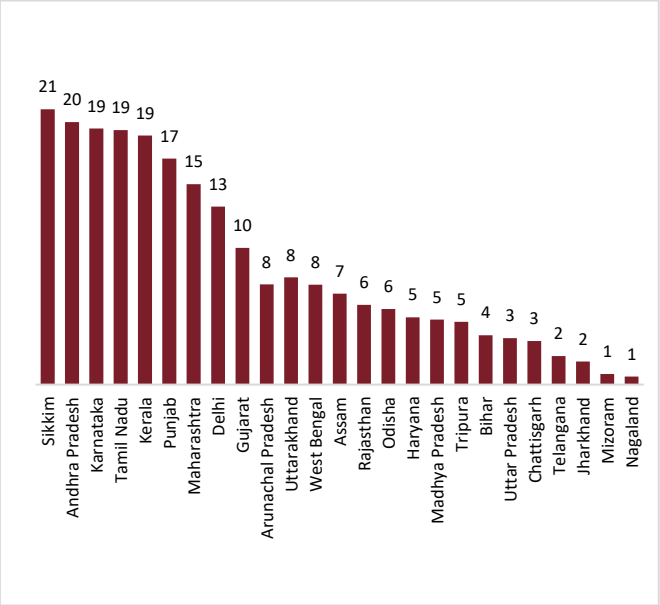
Source: WHO World Health Statistics 2021

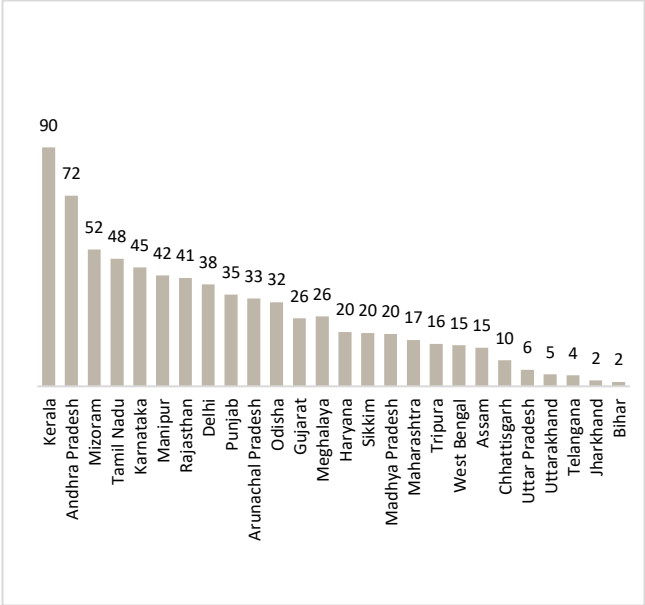
North India regions including Haryana, Uttar Pradesh and Uttarakhand have lower than average doctor and nurse density per 10,000 population

Availability of allopathic medical practitioners, dental surgeons and nurses per lakh population has improved over the years. The number of doctors with recognized medical qualifications (under I.M.C Act) registered with state medical councils/the Medical Council of India rose to 1,234,205 in CY 2019 from 827,006 in CY 2010. There are 21,17,6489 registered nurses and registered midwives (RN & RM), 8,79,508 auxiliary nurse midwives and 56,644 lady health visitors serving in the country as on December 31, 2018.

Select state count of doctors possessing recognised medical qualifications (under I.M.C Act) per 10,000 population - 2010 to 2019

Select state count of registered nurses per 10,000 population in India as on December 31, 2018





Note: 17 states under the non-special category given by the Reserve Bank of India (except Goa) along with our key states of study have been considered above. Amongst our key states, doctor numbers for Manipur and Meghalaya are not available, while nurse numbers for Nagaland are not available

Source: National Health Profile 2020, CRISIL Research

Region wise doctor and nurse density

Region	States covered for doctors and nurses data	Avg. doctors per 10,000	Avg. registered nurses per 10,000
East India	Bihar, Jharkhand, Odisha, West Bengal, Sikkim, Arunachal Pradesh, Assam, Tripura, Mizoram, Nagaland, Manipur, Meghalaya	4.4	9.2
North India	Punjab, Uttarakhand, Uttar Pradesh, Haryana	5.3	10.4
Central India	Chhattisgarh, Madhya Pradesh	4.5	17.2
West India	Maharashtra, Gujarat, Rajasthan	11.2	26.3
South India	Andhra Pradesh, Karnataka, Tamil Nadu, Kerala, Telangana	16.8	51.4

Note: 17 states under the non-special category given by the Reserve Bank of India (except Goa) along with our key states of study have been considered above. Amongst our key states, doctor numbers for Manipur and Meghalaya are not available, while nurse numbers for Nagaland are not available

Source: National Health Profile 2020, CRISIL Research

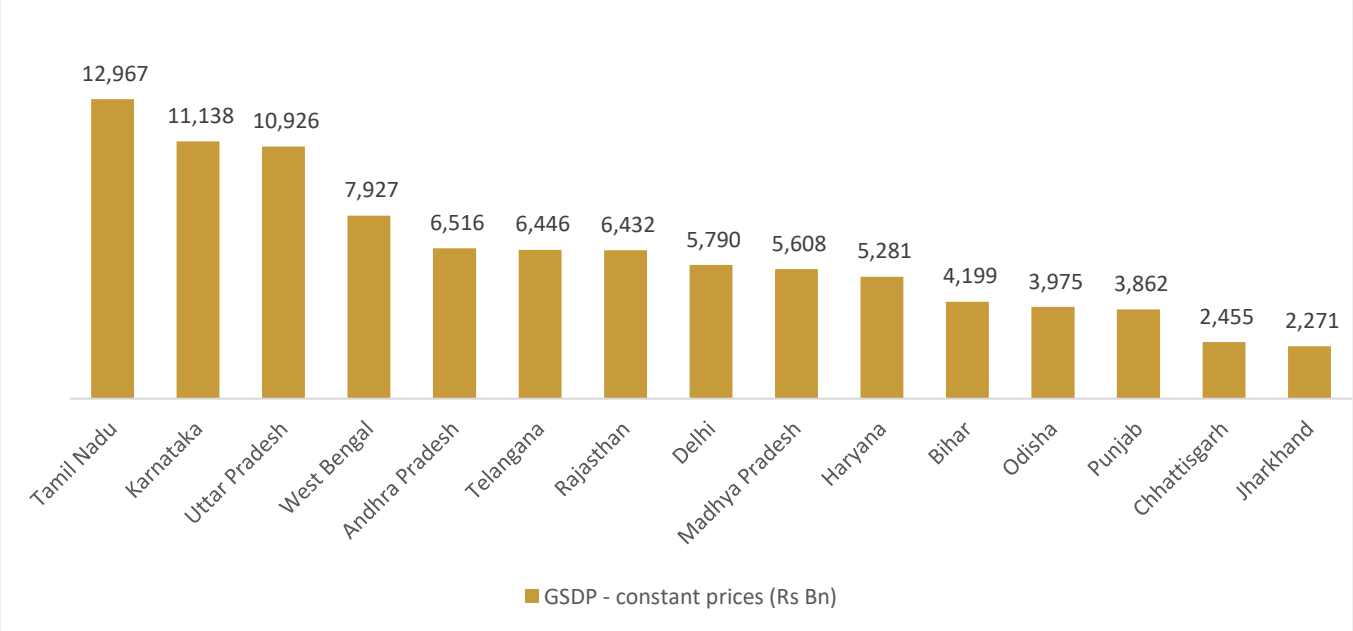
1.5 State-wise macroeconomic indicators

In the section hereby, CRISIL Research will focus on how macroeconomic performance evolved in fiscal 2020 among the non-special category of states and compare them with expenditure patterns specially related to healthcare. 17 states under the non-special category given by the Reserve Bank of India (except Goa) and Delhi, Uttarakhand have been considered for the analysis. These 17 states include Andhra Pradesh, Bihar, Chhattisgarh, Gujarat, Haryana, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Telangana, Uttar Pradesh, West Bengal. For fiscal 2021, data for Maharashtra, Gujarat, Kerala and Uttarakhand is not available

Delhi has the highest per capita NSDP as of fiscal 2021; Uttar Pradesh ranked 3rd in state wise GSDP

In fiscal 2021, Tamil Nadu, Karnataka and Uttar Pradesh were top-rankers in terms of gross state domestic product (GSDP) at constant prices among the non-special states considered in our analysis. The Northern states such as Haryana, Punjab and Bihar had low per capita GSDP in fiscal 2021 implying growth potential in those states. In terms of per-capita NSDP, Delhi & Haryana had the best per-capita NSDP in fiscal 2021 while Uttar Pradesh and Bihar had per-capita NSDP which was lower than the average of all states considered in our analysis.

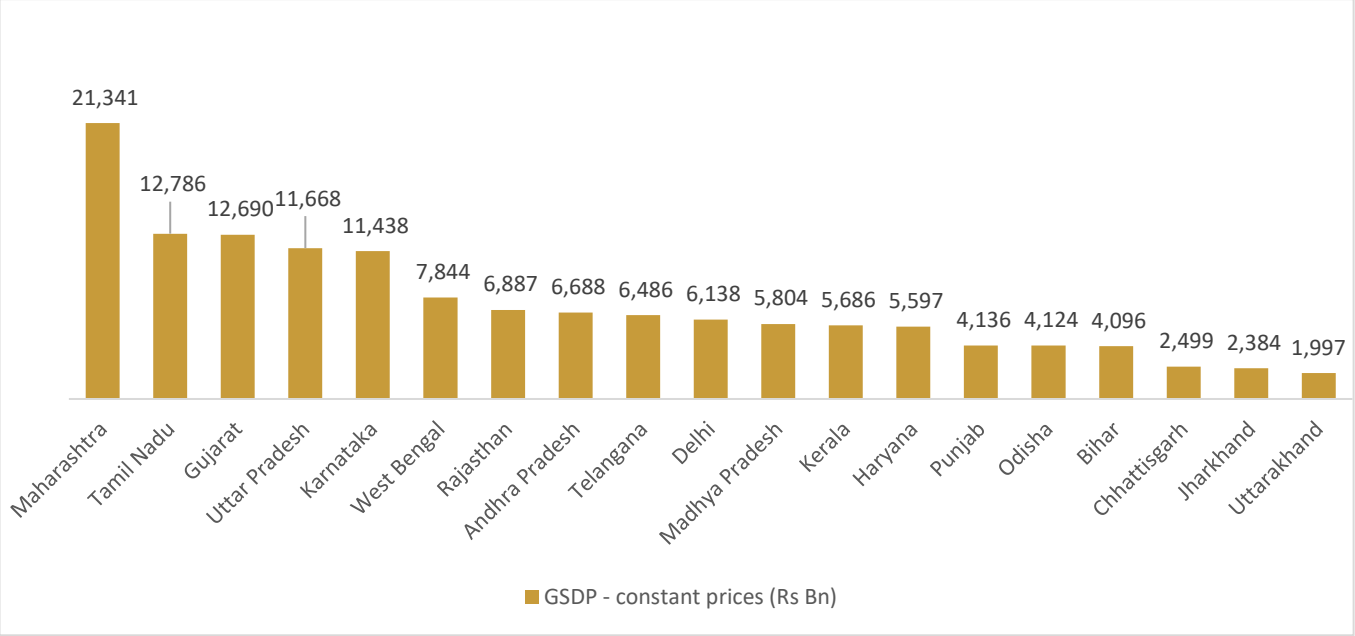
State-wise GSDP at constant prices as of fiscal 2021



Note: 17 states as classified by the RBI under non-special category and Delhi, Uttarakhand have been considered for this analysis. FY21 data not available for Gujarat, Kerala, Maharashtra and Uttarakhand

Source: CSO, CRISIL Research

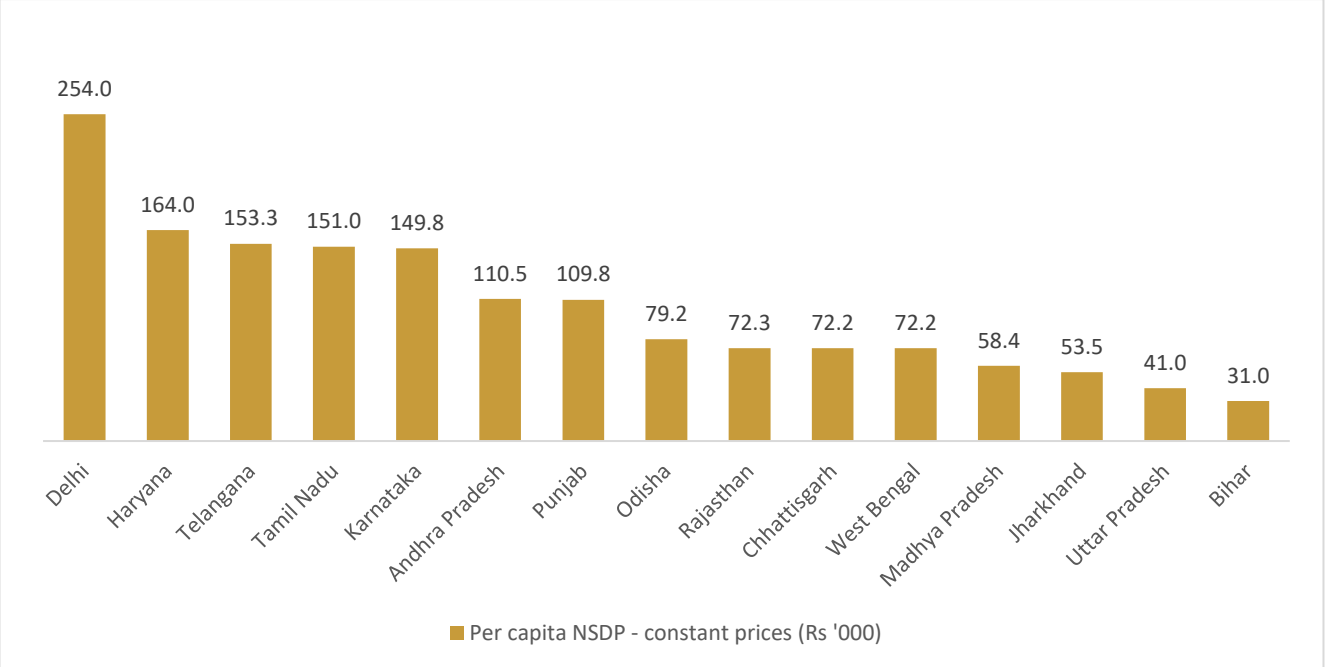
State-wise GSDP at constant prices as of fiscal 2020



Note: 17 states as classified by the RBI under non-special category and Delhi, Uttarakhand have been considered for this analysis.

Source: CSO, CRISIL Research

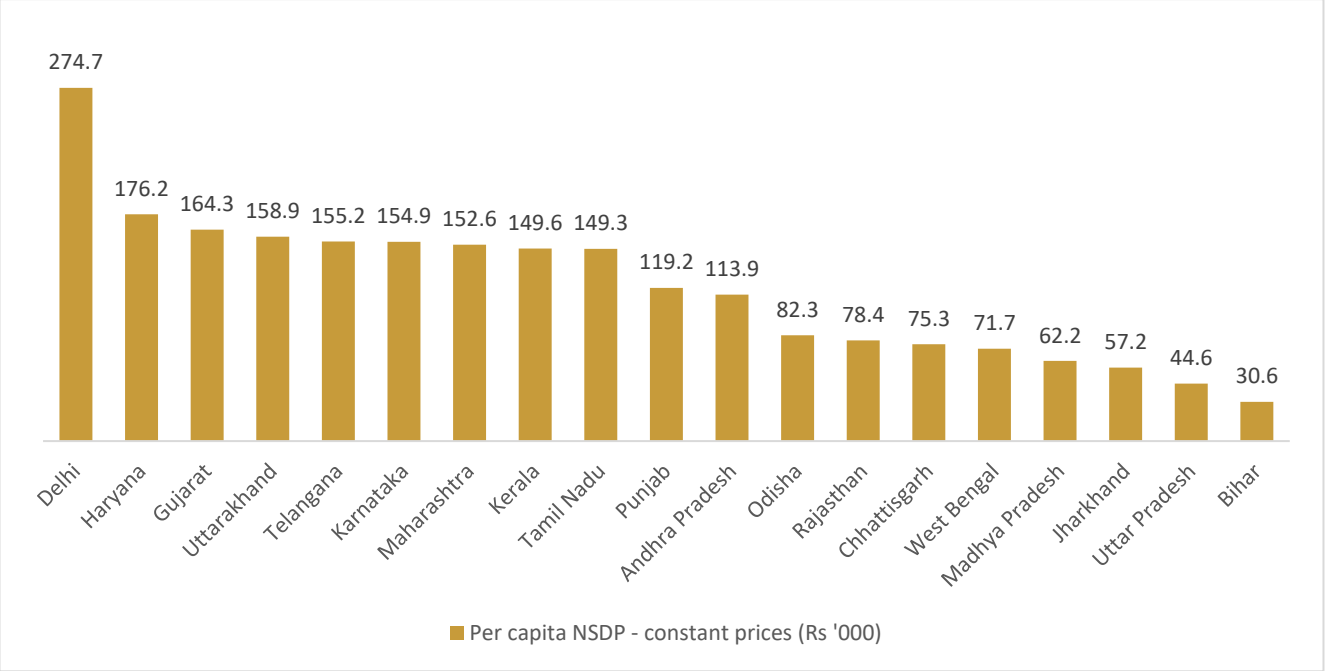
State-wise per capita NSDP at constant prices as of fiscal 2021



Note: 17 states as classified by the RBI under non-special category and Delhi, Uttarakhand have been considered for this analysis. FY21 data not available for Gujarat, Kerala, Maharashtra and Uttarakhand

Source: CSO, CRISIL Research

State-wise per capita NSDP at constant prices as of fiscal 2020



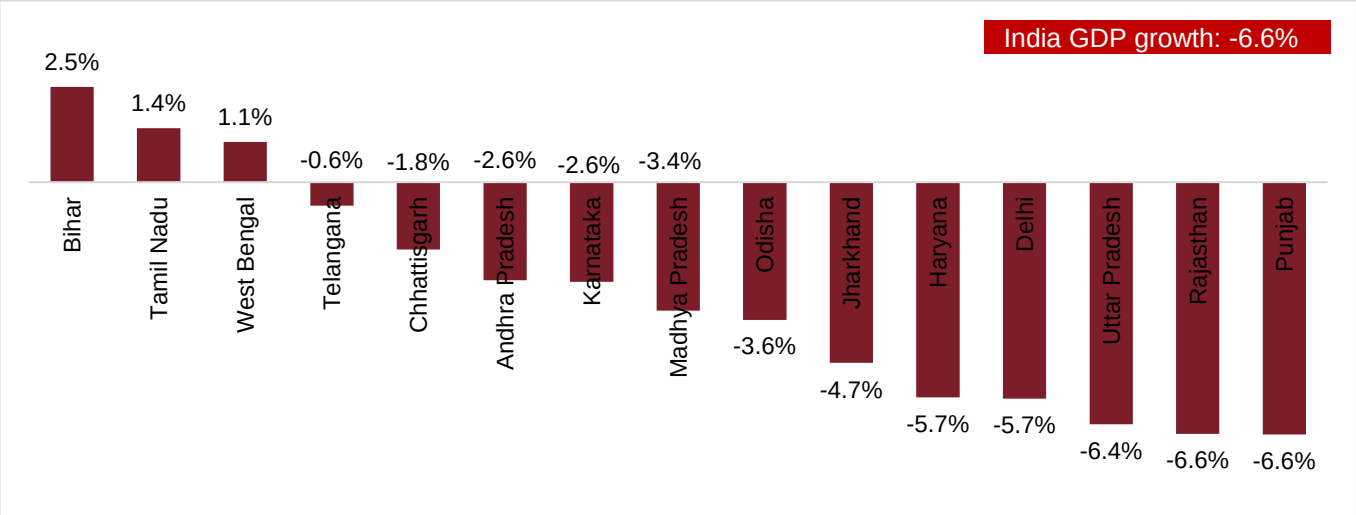
Note: 17 states as classified by the RBI under non-special category and Delhi, Uttarakhand have been considered for this analysis.

Source: CSO, CRISIL Research

Bihar, Tamil Nadu & West Bengal ranked top 3 in terms of GSDP growth in fiscal 2021

In fiscal 2021, Bihar (2.5%), Tamil Nadu (1.4%) and West Bengal (1.1%) ranked top three in terms of y-o-y GSDP growth among the non-special states considered in our analysis. GSDP growth of these three states in fiscal 2021 was positive, even though India GDP fell by 6.6% in the given fiscal due to Covid-19 pandemic.

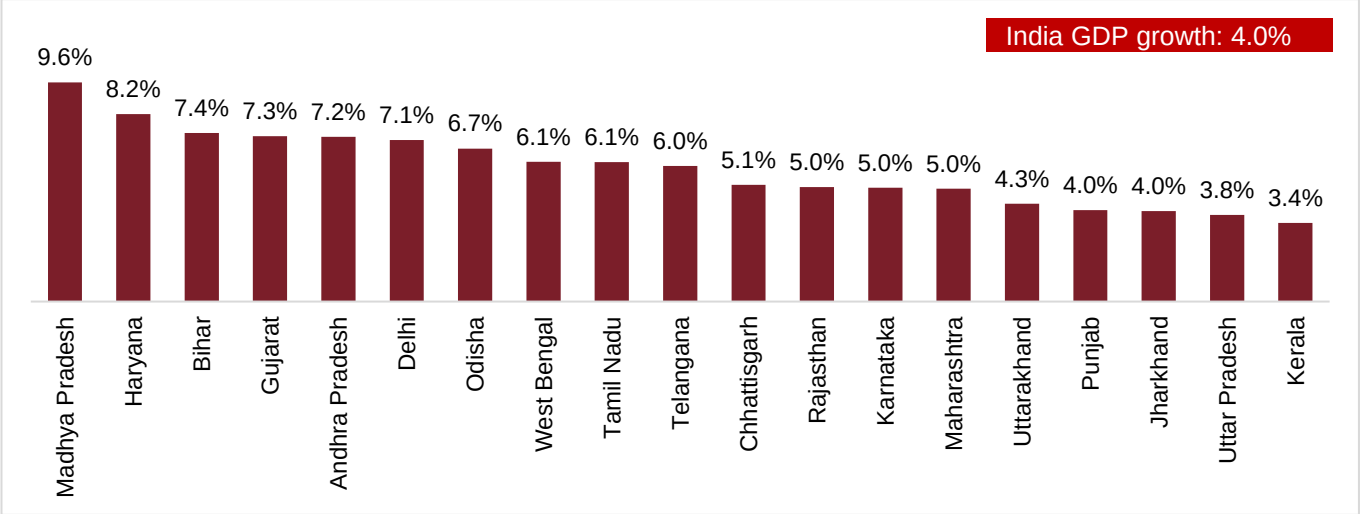
GSDP growth across states in FY21



Note: 17 states as classified by the RBI under non-special category and Delhi, Uttarakhand have been considered for this analysis. FY21 data not available for Gujarat, Kerala, Maharashtra and Uttarakhand

Source: CSO, CRISIL Research

GSDP growth across states in FY20



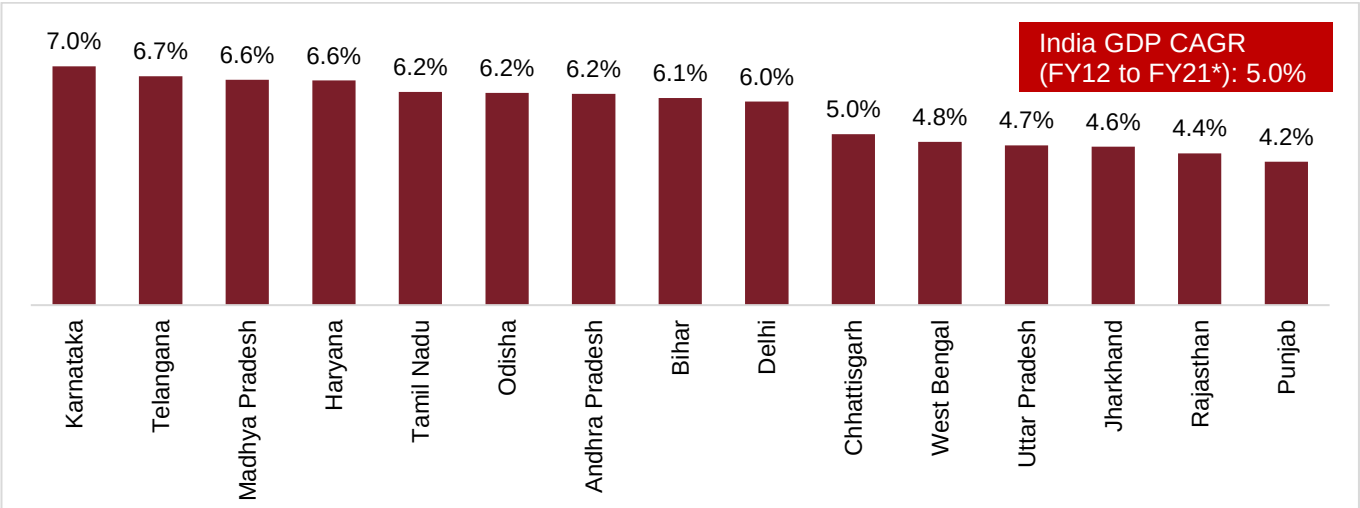
Note: 17 states as classified by the RBI under non-special category and Delhi, Uttarakhand have been considered for this analysis.

Source: CSO, CRISIL Research

Uttar Pradesh clocked 4.7% GSDP growth during period fiscal 2012 to 2021 marginally lower than all India CAGR of 5.0%

Between fiscals 2012 and 2021, Karnataka (7.0%), Telangana (6.7%), Madhya Pradesh (6.6%) and Haryana (6.6%) were the high growing states, followed by Tamil Nadu and Odisha. Jharkhand, Rajasthan and Punjab had ranked at the bottom in the past nine years. Delhi has clocked a CAGR of 6.0% for GSDP during the period fiscal 2012 to fiscal 2021

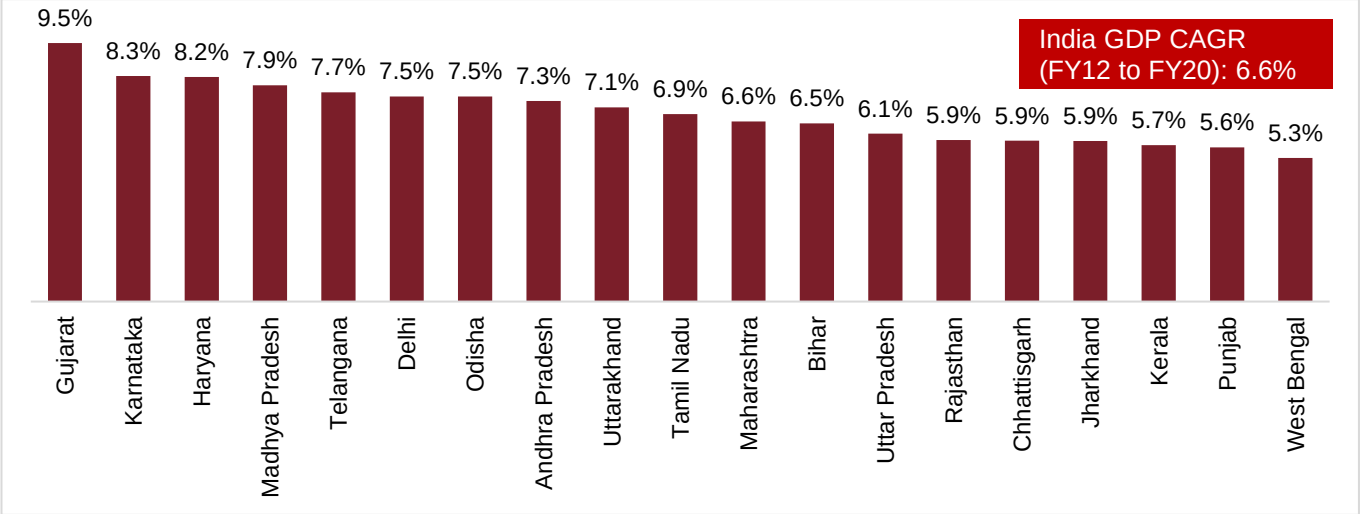
GSDP growth between FY12 and FY21 (CAGR, %)



*Note: 17 states as classified by the RBI under non-special category and Delhi, Uttarakhand have been considered for this analysis. FY21 data not available for Gujarat, Kerala, Maharashtra and Uttarakhand. *FY21 advanced estimates figures used to calculate India GDP CAGR*

Source: CSO, CRISIL Research

GSDP growth between FY12 and FY20 (CAGR, %)



Note: 17 states as classified by the RBI under non-special category and Delhi, Uttarakhand have been considered for this analysis.

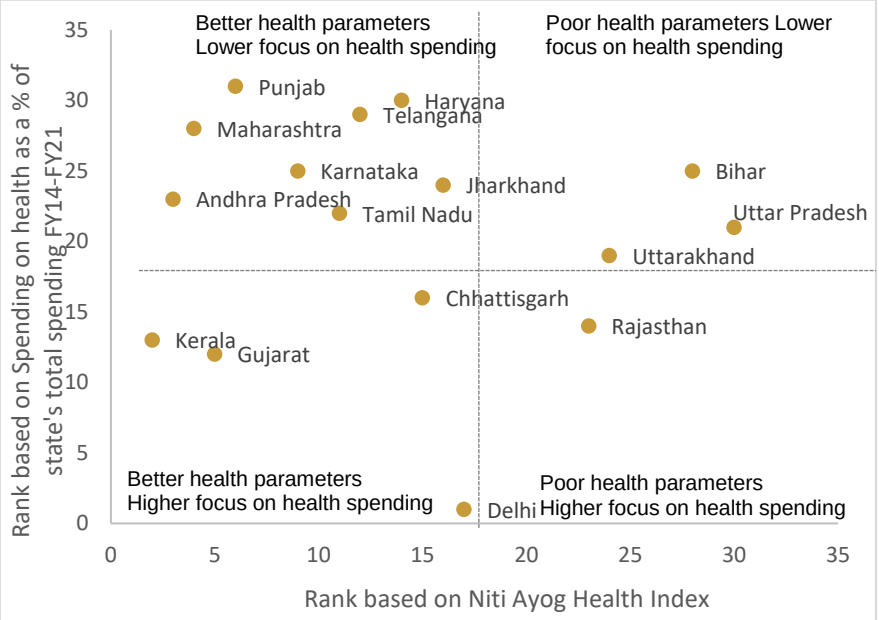
Source: CSO, CRISIL Research

Delhi has a higher focus on health spending, while states such as Kerala, Andhra Pradesh and Maharashtra have better health parameters amongst the states under study

As per the scale used, 1 indicates the highest rank and 31 the lowest. The scatter plots that follow juxtapose the latest available rankings on each of these metrics from independent sources (X-axis) with our rankings based on the states' spending towards healthcare as a percentage of its total spending (Y-axis).

Delhi leads the country in terms of focus on healthcare expenditure. States such as Uttar Pradesh, Bihar and Uttarakhand had lower rank in terms of health parameters.

State-wise rank on healthcare spending versus rank on health index



State	2021 healthcare expenditure#
Delhi	12.6
Chhattisgarh	6.8
Rajasthan	6.0
Gujarat	5.9
Tamil Nadu	5.9
Kerala	5.8
Jharkhand	5.4
Karnataka	5.2
Andhra Pradesh	5.2
Haryana	5.2
Bihar	5.0
Uttar Pradesh	5.0
Uttarakhand	4.7
Maharashtra	4.5

Note: Spending on healthcare as a % of state's total spending refers to 'Expenditure on Medical and Public Health and Family Welfare - As Ratio to Aggregate Expenditure'.

** Based on National Institution for Transforming India (NITI) Aayog publication named 'Healthy States: Progressive India; Report on the Ranks of States and Union Territories: Health Index – June 2019'.*

 # Healthcare expenditure refers to 'Expenditure on Medical and Public Health and Family Welfare - As Ratio to Aggregate Expenditure' as of FY21

Source: Budget documents of the state governments, NITI Aayog, CRISIL Research

Categorisation of states on incremental performance and overall performance* (based on health index scores in NIITI Aayog report 'Healthy States: Progressive India; Report on the Ranks of States and Union Territories: Health Index – June 2019')

Incremental Performance	Overall performance		
	Aspirants	Achievers	Front-runners
Not Improved (0 or less)	Madhya Pradesh Odisha Uttarakhand Uttar Pradesh Bihar Arunachal Pradesh Sikkim	West Bengal Meghalaya	Kerala Punjab Tamil Nadu
Least Improved (0.01-2.0)	Nagaland	Chhattisgarh	Gujarat Himachal Pradesh Mizoram
Moderately Improved (2.01-4.0)	Tripura	Manipur	Maharashtra Jammu & Kashmir Karnataka Telangana
Most Improved (more than 4.0)	Rajasthan	Haryana Jharkhand Assam	Andhra Pradesh

Note: The states are categorised on the basis of Reference Year Index score range: Front-runners: top one-third (Index score >58.88), Achievers: middle one-third (Index score between 43.74 and 58.88), Aspirants: lowest one-third (Index score <43.74). The states are categorised into four groups based on incremental performance: 'Not Improved' (<=0 incremental change), 'Least Improved' (0.01 to 2.0 points increase), 'Moderately Improved' (2.01 to 4.0 points increase), and 'Most Improved' (>4 points increase).

** Based on National Institution for Transforming India (NITI) Aayog publication named 'Healthy States: Progressive India; Report on the Ranks of States and Union Territories: Health Index – June 2019'*

Source: NITI Aayog, CRISIL Research

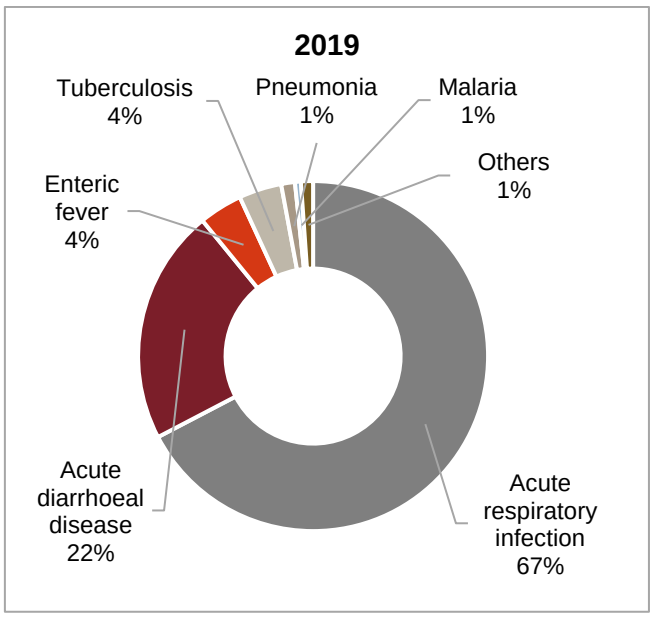
1.6 Disease profile in India

A review of communicable diseases in India

Overall, communicable diseases have been decreasing in India, especially with a considerable fall in cases and deaths due to malaria, dengue, chikangunya, chicken pox, encephalitis, and viral meningitis.

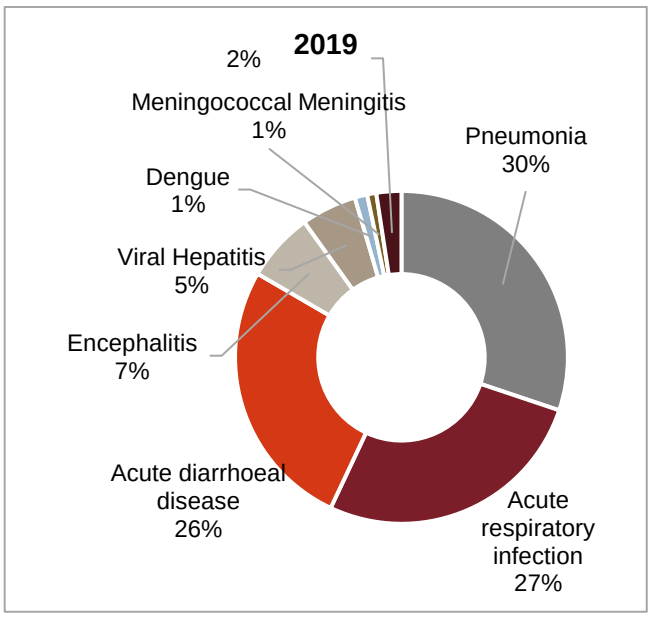
Morbidity reported on major communicable diseases

Among the various communicable diseases reported by states/union territories (UTs) in 2019, the following communicable diseases accounted for the maximum percentage of cases reported



Mortality reported on major communicable diseases

Among the various communicable diseases reported by states/UTs in 2019, the following communicable diseases accounted for the maximum percentage of deaths reported

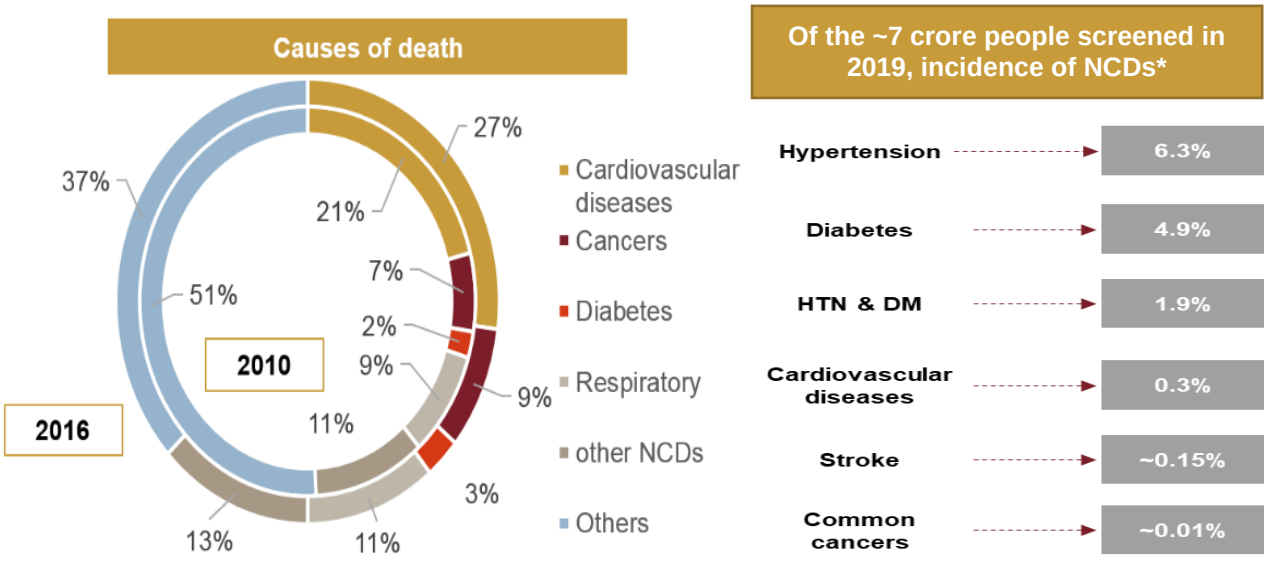


Source: National Health Profile-2020, CRISIL Research

Pneumonia deaths were the highest in 2019. During the year, acute respiratory infection was one of the most prevalent diseases in India both in terms of morbidity as well as reason for deaths; it was followed by acute diarrhoeal disease. Taken together, pneumonia, acute respiratory infection and acute diarrhoeal disease accounted for 83% of deaths during 2019. Communicable diseases such as enteric fever, tuberculosis, pneumonia, malaria and others formed a smaller share of the total morbidity reported during 2019.

A review of non-communicable diseases in India

Disease epidemiology shifting towards lifestyle diseases



*Note: * Hypertension figure includes people diagnosed with just diabetes as well as people diagnosed with both ty*

Source: WHO global burden of disease, National Health Profile-2019, National Health Profile -2020, CRISIL Research

As opposed to the decreasing rate in communicable diseases, lifestyle-related illnesses or non-communicable diseases (NCDs) have been increasing rapidly in India over the past few years. The contribution of NCDs to the disease profile rose from 30% in 1990 to 55% in 2016. Statistics show these illnesses accounted for nearly 62% of all deaths in India in 2016.

As per the World Economic Forum, the world will lose nearly $30 trillion by 2030 for treatment of NCDs and India's share of this burden will be $5.4 trillion.

In 2016, of the total disease burden, the contribution of the group of risks (unhealthy diet, high blood pressure, high blood sugar, high cholesterol, and overweight) which mainly cause ischemic heart disease, stroke and diabetes rose to nearly a quarter. Looking at individual risk factors, smoking tended to be more frequent in poorer, rural areas, whereas higher body mass index, high blood glucose, and elevated systolic blood pressure were directly related to greater household wealth and an urban setting. The highest risks were concentrated in the three northern states (Himachal Pradesh, Punjab, and Uttarakhand), northeastern states (except Assam), and the southern states, but has increased in all other states as well. Cases of cardiovascular diseases (CVDs) rose to nearly 64 million in 2015 from 38 million in 2005.

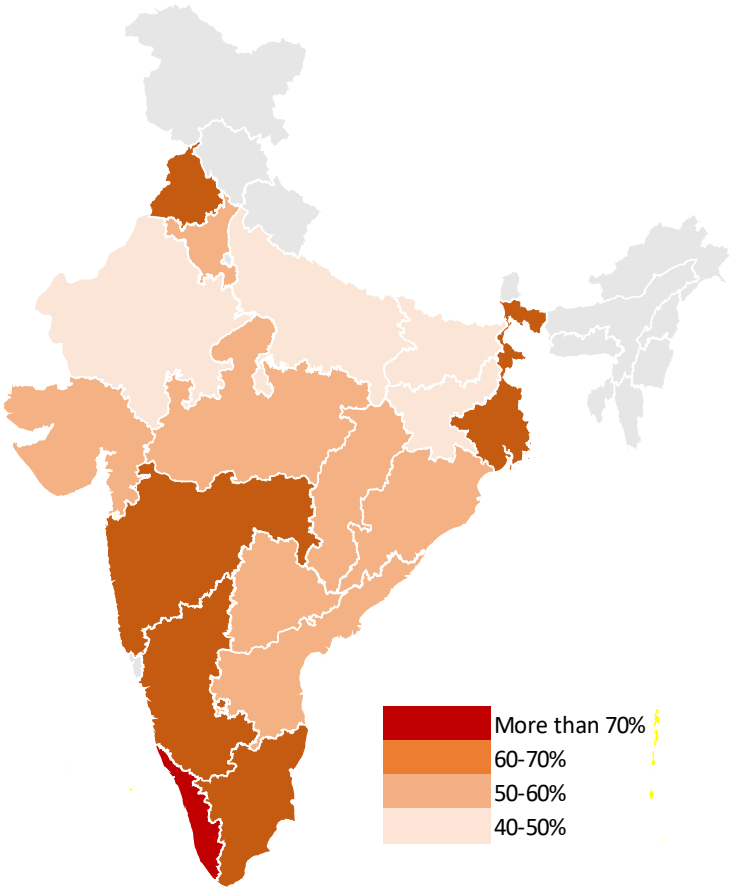
Uttar Pradesh has the second lowest proportion of NCDs in the range of 47-48%

According to reports, the proportion of NCDs in the country's disease burden has increased. Disability-adjusted life years (DALYs) represent the total number of years lost to illness, disability, or premature death within a given population. Of the total disease burden in India measured as DALYs, the share of communicable, maternal, neonatal, and nutritional diseases (termed infectious and associated diseases in this summary for simplicity) dropped to 33% in 2016 from 61% in 1990. There was a corresponding increase in the contribution of non-communicable diseases from 30% of the total disease burden in 1990 to 55% in 2016, and of injuries from 9% to 12%. The wide variations between the states in this epidemiological transition are reflected in the range of the

contribution of major disease groups to the total disease burden in 2016: 48% to 75% for non-communicable diseases, 14% to 43% for infectious and associated diseases, and 9% to 14% for injuries.

The contribution of most of the major non-communicable disease groups to the total disease burden has increased all over India since 1990, including cardiovascular diseases, diabetes, chronic respiratory diseases, mental health and neurological disorders, cancers, musculoskeletal disorders, and chronic kidney disease. Among the leading non-communicable diseases, the largest disease burden or DALY rate increase from 1990 to 2016 was observed for diabetes at 80% and ischaemic heart disease at 34%. In 2016, three of the five leading individual causes of disease burden in India were non-communicable, with ischaemic heart disease and chronic obstructive pulmonary disease being the top two causes and stroke the fifth leading cause.

State-wise proportion of total disease burden from NCDs in 2016



State	NCDs *
Kerala	74.6%
Punjab	66.0%
Tamil Nadu	65.3%
Maharashtra	63.1%
West Bengal	62.7%
Karnataka	62.0%
Andhra Pradesh	59.7%
Telangana	59.2%
Haryana	58.8%
Gujarat	56.7%
Odisha	52.1%
Madhya Pradesh	50.5%
Chhattisgarh	50.4%
Rajasthan	49.3%
Jharkhand	48.3%
Uttar Pradesh	47.9%
Bihar	47.6%

** Proportion of total disease burden from NCDs in 2016.*

Indian Council of Medical Research (ICMR), Public Health Foundation of India (PHFI), and the Institute for Health Metrics and Evaluation (IHME) published report titled 'India: Health of the Nation's States – The India State-Level Disease Burden Initiative'.

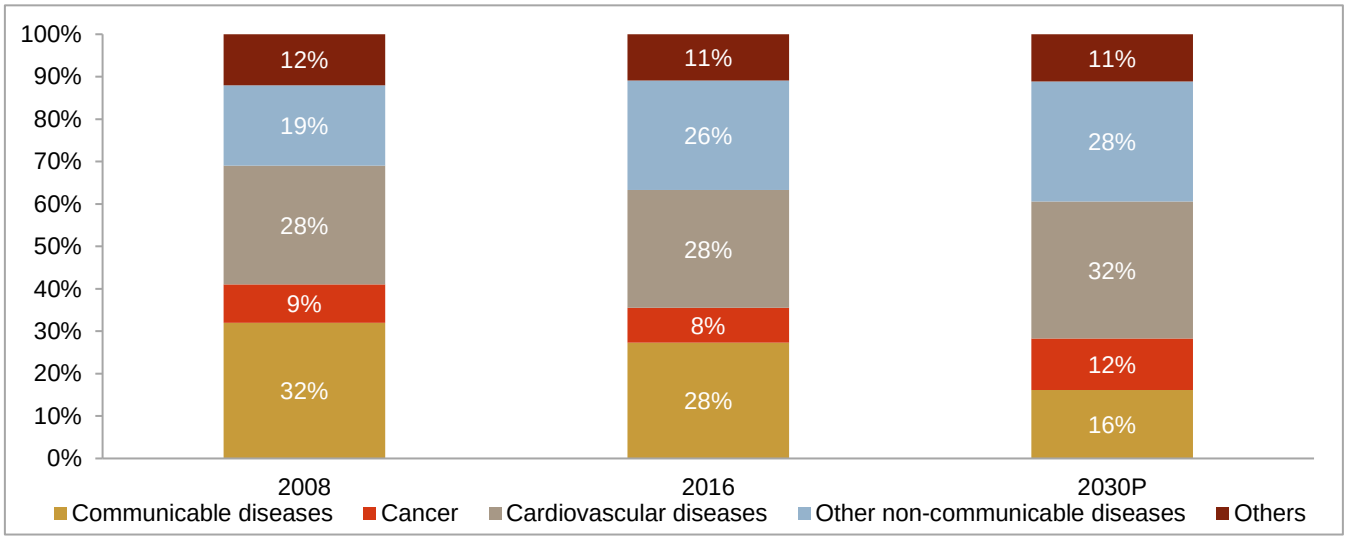
17 states under the non-special category given by the Reserve Bank of India (except Goa) have been considered for the analysis viz Andhra Pradesh, Bihar, Chhattisgarh, Gujarat, Haryana, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Telangana, Uttar Pradesh and West Bengal

Source: ICMR, PHFI, IHME, MoHFW, CRISIL Research

Non-communicable diseases: A silent killer

CRISIL Research believes NCDs exhibit a tendency to increase in tandem with rising income levels. WHO projects an increasing trend in NCDs by 2030, following which CRISIL forecasts demand for healthcare services associated with lifestyle-related diseases such as cardiac ailments, cancer and diabetes to rise. Another emerging market in the country is orthopaedics, which currently comprises a very small proportion compared with NCDs but has a potential market in the country. The orthopaedics market can be classified into four different segments, viz., knee, hip, trauma, and spine, of which the knee replacement market holds the biggest share, followed by trauma and spine. Hip replacement in India is still a very small segment compared with knee replacement in contrast to the worldwide trend.

Causes of death in India

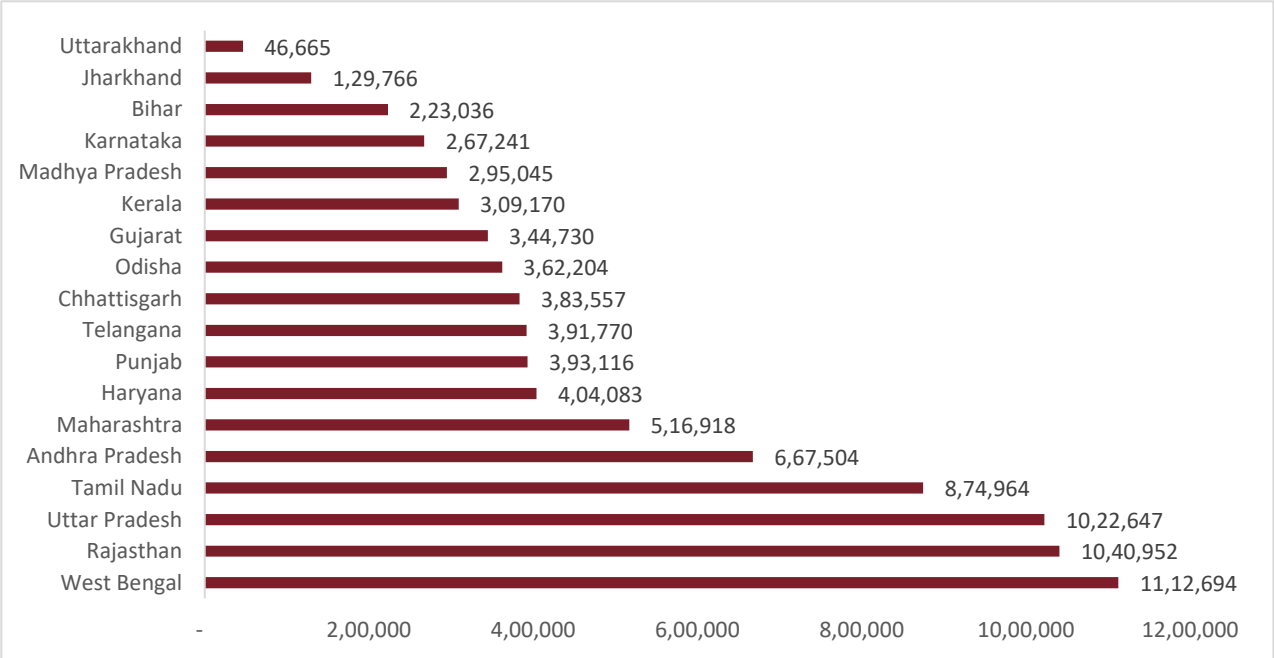


Source: WHO global burden of disease, India: Health of the Nation's States, CRISIL Research

Uttar Pradesh had the third highest number of NCDs in 2019

As per the National Health Profile 2020, out of 68,262,672 patients who attended NCD clinics in 2019, 6.25% were diagnosed with hypertension, 4.9% with diabetes, 1.9% with HTN & DM, 0.3% with CVDs, 0.15% with stroke and 0.01% with common cancers. Out of the 17 states compared, West Bengal, Rajasthan and Uttar Pradesh topped the number of persons diagnosed with NCDs out of those screened in CY2019 whereas Jharkhand, Bihar, Madhya Pradesh & Karnataka were at the bottom.

State-wise number of persons diagnosed with NCDs in CY 2019



17 states under the non-special category given by the RBI (except Goa) have been considered for analysis - Andhra Pradesh, Bihar, Chhattisgarh, Gujarat, Haryana, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Telangana, Uttar Pradesh, and West Bengal along with Delhi, Uttarakhand. Also, some data points for Delhi were not reported, while some other were not available

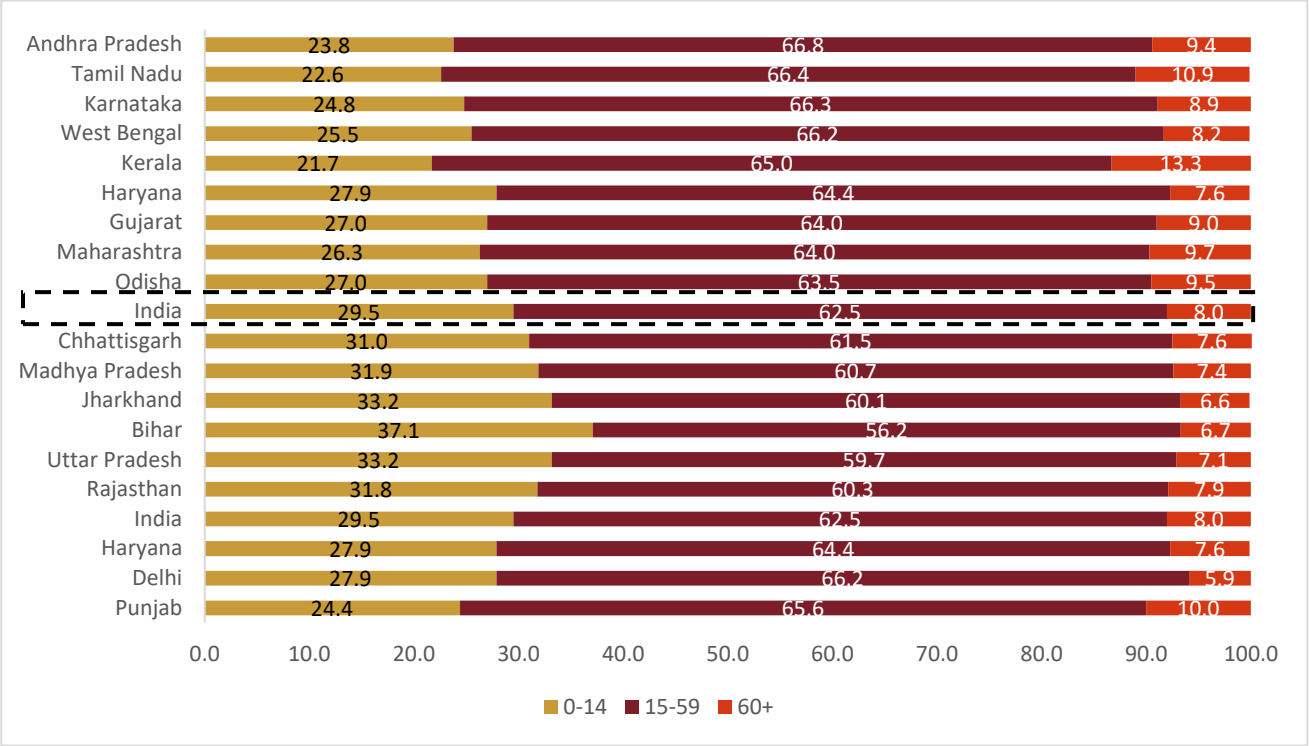
Data for National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) from January 2019 to December 2019.

Source: NHP 2019, CRISIL Research

Uttar Pradesh has a larger share of population in the age bracket 0-14 than the national average, while Haryana and Delhi have larger share of population in age bracket 15-59 years than India average

As per Census 2011 data, India's age-wise national average statistics indicates that 29.5% people fall in the 0-14-year group, 62.5% in the 15-59-year bracket and 8% are 60+. States with higher proportion of population in age group 60+ would require larger health infrastructure as compared to states with population younger age profiles. Delhi and Haryana have 65.9% and 64.4% of the population respectively aged between 15-59 years, higher than the India average of 62.5%. In Uttar Pradesh, share of people in age group 0-14 years is higher than the national average by ~3.7% and ~60% of the people aged 15-59 years.

State-wise age group-wise population for 2011

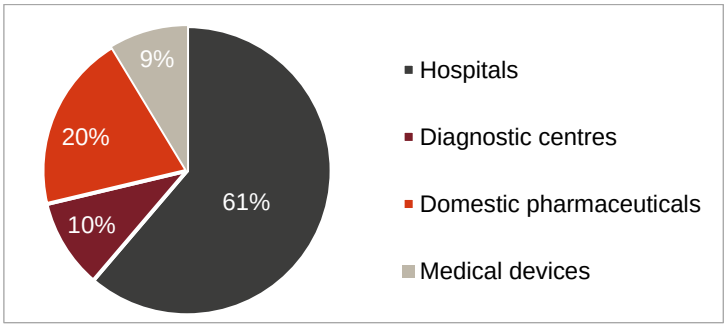


17 states under the non-special category given by the RBI (except Goa) have been considered for the analysis, along with Delhi additionally - Andhra Pradesh, Bihar, Chhattisgarh, Gujarat, Haryana, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Telangana, Uttar Pradesh, and West Bengal along with Delhi, Uttarakhand. Census 2011 data not available for Uttarakhand for population by age group

Source: Census 2011, CRISIL Research

2 Structure of the healthcare delivery industry in India

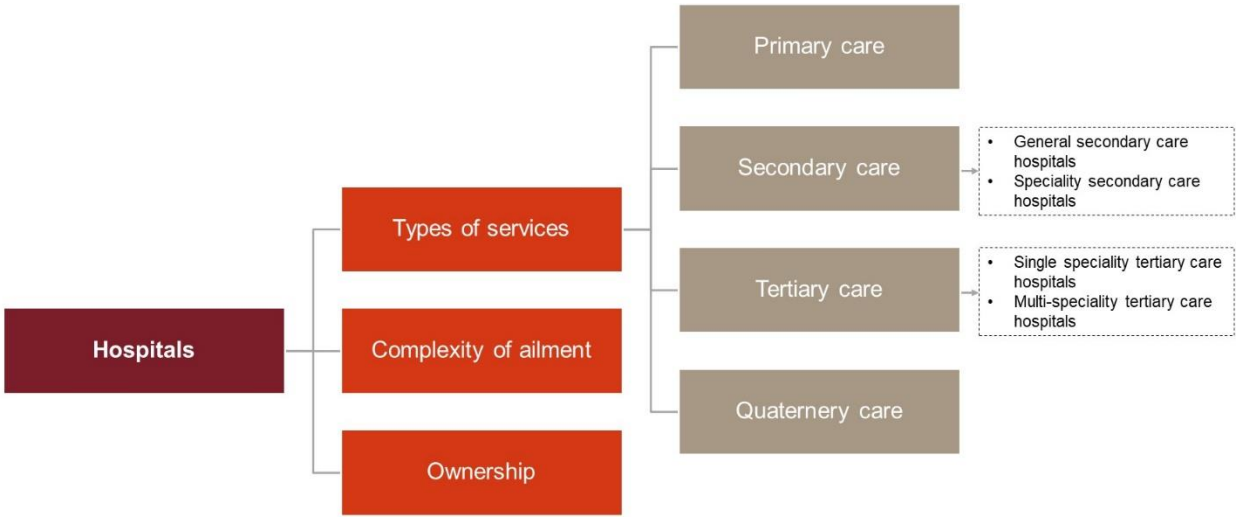
2.1 Overview



CRISIL Research estimates the healthcare delivery market, consisting of hospitals and diagnostic centres, to account for a major share of the healthcare pie (71%), followed by domestic pharmaceuticals (20%) and medical devices market (9%) as of fiscal 2020.

Source: CRISIL Research

2.2 Classification of hospitals



Classification of hospitals based on services offered

Primary care/ dispensaries/ clinics

Primary care facilities are outpatient units that offer basic, point-of-contact medical and preventive healthcare services, where patients come for routine health screenings and vaccinations. These do not have intensive care units (ICU) or operation theatres. Primary care centres also act as feeders for secondary care/ tertiary hospitals, where patients are referred to for treatment of chronic/ serious ailments.

Secondary care

Secondary care facilities diagnose and treat ailments that cannot be treated in primary care facilities. These act as the second point of contact in the healthcare system. There are two types of secondary care hospitals - general and specialty care.

- General secondary care hospitals

These hospitals are approached for common ailments, and attract patients staying within a radius of 30 km. The essential medical specialties in general secondary care hospitals include: internal medicine, general surgery, obstetrics and gynaecology, paediatrics, ear-nose-throat (ENT), orthopaedics, and ophthalmology. Such a hospital typically has one central laboratory, a radiology laboratory, and an emergency care department. Generally, secondary care hospitals have 50-100 in-patient beds, a tenth of which are allocated for the ICU segment. The remaining beds are equally distributed between the general ward, semi-private rooms, and single rooms.

- Specialty secondary care hospitals

  These hospitals are located in district centres, treating patients living within a radius of 100-150 km. They usually have an in-patient bed strength of 100-200, 15% of which are reserved for critical care units. The balance is for private rather than general ward beds. Apart from medical facilities offered by a general secondary care hospital, specialty secondary care hospitals treat ailments related to gastroenterology, cardiology, neurology, dermatology, urology, dentistry, and oncology. These hospitals may also offer some surgical specialties, but they are optional. Diagnostic facilities in a specialty secondary care hospital include: a radiology department; biochemistry, haematology and microbiology laboratories; and a blood bank. They also have a separate physiotherapy department.

Tertiary care

Tertiary care hospitals provide advanced healthcare services, and consist of the following:

- Single-specialty tertiary care hospitals

  These treat a particular ailment (such as cardiac, cancer, etc). Prominent facilities in India include: Escorts Heart Institute & Research Centre (New Delhi); Tata Memorial Cancer Hospital (Mumbai); HCGEL Oncology (Bengaluru); Sankara Nethralaya (Chennai); National Institute of Mental Health & Neuro Sciences (NIMHANS, Bengaluru); and Hospital for Orthopaedics, Sports Medicine, Arthritis and Trauma (HOSMAT, Bengaluru).

- Multi-specialty tertiary care hospitals

  These hospitals offer all medical specialities under one roof and treat complex cases such as multi-organ failure, high-risk, and trauma cases. Most of these hospitals derive a majority of their revenue through referrals.

  Such hospitals are located in state capitals or metropolitan cities and attract patients staying within a 500 km radius. The number of inpatient beds range from 150 , which can go up to 1,500 beds, which can go up to 1,500 beds. About one-fourth of the total beds are reserved for patients in need of critical care. Medical specialties offered include: cardio-thoracic surgery, neurosurgery, nephrology, surgical oncology, neonatology, endocrinology, plastic and cosmetic surgery, and nuclear medicine. In addition, these hospitals have histopathology and immunology laboratories as a part of its diagnostic facilities. Lilavati Hospital and Hiranandani Hospital in Mumbai, Apollo Multispecialty Hospital in Kolkata, Yatharth Super Specialty Hospitals in Noida, Greater Noida and Noida Extension are multi-specialty tertiary care hospitals.

Quaternary care hospitals

Quaternary care hospitals are an extension of tertiary care in reference to advanced levels of medicine which are highly specialised and not widely accessed, and usually only offered in a very limited number of hospitals. Experimental medicine and some types of uncommon diagnostic or surgical procedures are considered quaternary care

Classification of hospitals by facilities/ services offered

	Primary care	Secondary care	Tertiary care
Services	Provides all services as required for the first point of contact	Provides all services as required, including organised medical research	Provides all services as required, including provision for experimental therapeutic modalities and organised research in chosen specialities
Multi-disciplinary	Yes	Yes	Single- or multi-speciality
Type of service	Only medical services and excludes surgical services	Overall medical and surgical services	Complex surgical services with sophisticated equipment
Type of patient	Only outpatient	Inpatient and outpatient	Primarily inpatient
No of beds	0 beds	50-200 beds	>200 beds
Dependent on	Secondary and tertiary care hospitals for further diagnosis and support	Tertiary care hospital for diagnostic and therapeutic support on referral and for patient transfer	Tertiary care/secondary hospital for referrals for its workload
Investment	Low investment required	Medium	High

Classification based on complexity of ailment

Healthcare delivery may also be classified as primary, secondary and tertiary, on the basis of the complexity of ailment being treated. For instance, a hospital treating heart diseases may be classified as a primary facility if it addresses conditions such as high cholesterol; as a secondary facility if it treats patients suffering strokes; or as a tertiary facility if its deals with cardiac arrest or heart transplants.

Few diseases and kind of treatment one can expect from various types of hospitals:

Ailment/ condition	Primary	Secondary	Tertiary
Acute infections	Fever	Typhoid/ jaundice	Hepatitis B,C
Accidents/ injuries	Dressing	Fracture	Knee/ joint replacements / brain haemorrhage
Heart diseases	High cholesterol	Strokes	Cardiac arrest/ heart attacks/ heart transplantation/ heart defects like hole in heart
Maternity	Diagnosis/ check-ups	Normal delivery/ caesarean	Normal delivery/ caesarean/ post-delivery complications such as brain fever
Cancer	Lump diagnosis/ check-ups	Tumour – medical, surgical, and radiation therapy	Medical, surgical and radiation therapy

Source: CRISIL Research

Classification based on ownership

Hospitals can also be classified based on their ownership and management:

Type	Examples
Government	• Brihanmumbai Municipal Corporation hospitals, KEM Hospital, Cooper Hospital (Mumbai), Baba Saheb Ambedkar Hospital (Delhi)Ty
Private	• Asian Heart Institute, Apollo Hospitals, Fortis, Max Healthcare,Yatharth Hospitals, Park Hospitals
Trust	• Lilavati (Mumbai), Hinduja (Mumbai), Kolkata Port Trust Hospital (Kolkata), Tata Medical Center (Kolkata), Human Care Medical Charitable Trust (Delhi), MGS Hospital (Delhi)
Trust owned, but managed by a private party	• Two operational models are followed by trusts and private parties: • **Medical service agreement** - Max Super Speciality Hospital, Patparganj • **Operation and management contract** - Balabhai Nanavati Hospital in Mumbai; Apollo Hospital in Ahmedabad is owned by a trust but managed by the Apollo Group
Owned by one private player, managed by another	• East Coast Hospital in Puducherry was earlier managed by Fortis Healthcare

2.3 Review of business models for healthcare delivery

Doctor engagement models

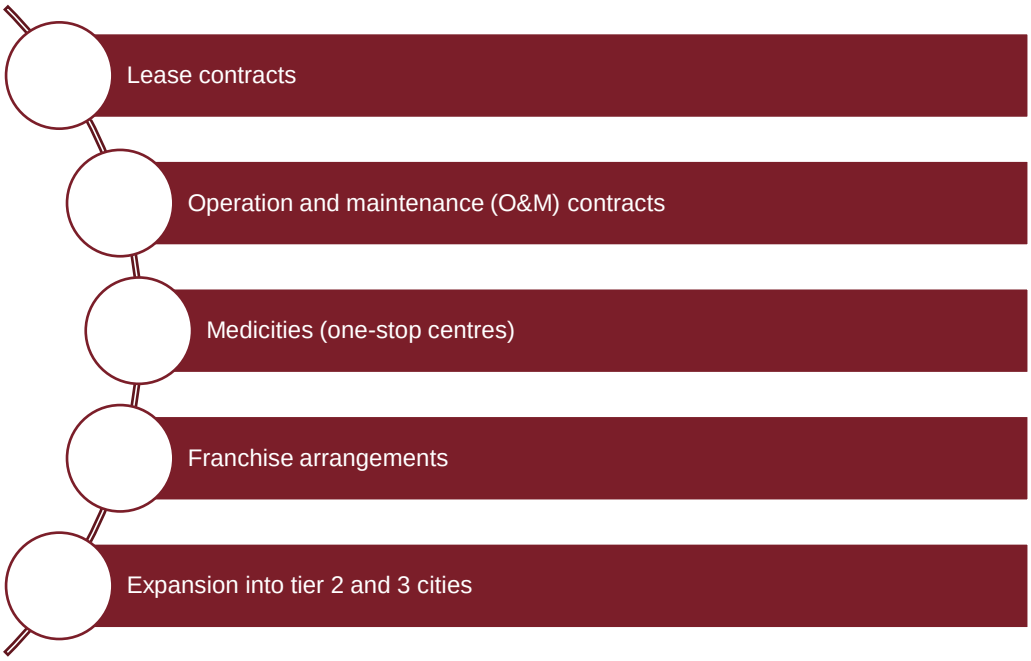
Hospitals generally operate in three models (doctor engagement models):

Model I	• Hospitals have 100% doctors on its payrolls • Revenue earned by the hospital under this model is not shared with doctors
Model II	• Hospitals generally follow a mix of resident and visiting/consultant doctors • Visiting/consultant doctors share the revenue earned by the hospital for consultancy or may charge a fixed fee for their services
Model III	• Partnership model with doctors

Large Indian hospitals typically follow the second model. The visiting/ consultant doctor shares a percentage of the consulting fee and the in-patient department (IPD) income (for surgeries done on the hospital premises) with the hospital. Even mid-sized hospitals (defined as 100-400 beds at pan India level) have visiting doctors and consultants. This helps hospitals decrease dependence on few/star doctors. Alternatives to this, such as the referral model, also exist. Under the referral model, doctors refer patients to other specific doctors and get a compensation.

However, there are some hospitals that have to give equity stakes to reputed doctors to attract and retain them in their hospitals.

Emerging business models



Lease contracts

In the hospitals sector, the ownership model has become costly because of the sharp increase in land prices, especially in metros and tier 1 cities, over the past few years. This has compelled private players to look for alternative models such as lease contract. In a lease contract, the landowner develops the hospital building as per specifications given by the private player, who, in turn, enters into a long-term lease agreement with the land owner. For example, Apollo Hospitals has acquired land and building on lease from Orient Hospital, Madurai, for 60 years. However, lease renewals pose a major risk for private players. This sharp rise in land prices is benefiting legacy/established hospitals wherever they own land or have very long-term lease. This is also a primary factor that many new hospitals are not coming in prime areas of metro cities.

O&M contracts

Under this model, a large private player (or a hospital chain) undertakes a contract for managing a standalone hospital and overseeing functions such as marketing, operations, finance, and administration. In return, the private player receives a fixed annual management fee and share in revenue or profits from the standalone hospital's owners. Apollo and Fortis (with Cauvery Hospital in Mysuru) have entered into such contracts to expand their base in India.

Medicity (one-stop centres)

Medicity is an integrated township of super-speciality hospitals, diagnostic centres, medical colleges, research and development (R&D), ancillary, and supporting facilities. The concept of medicity is based on models already operating in countries such as Scotland, the US, France, and Algeria. In India we have Medanta (Gurgaon), Narayana Hrudayalaya (Bengaluru), and Chettinad Health City (Chennai). However, the success of a medicity depends on its location and the ability to attract patients. Due to large land requirements, health cities are often located on the outskirts of a city and, hence, attracting patients could be a challenge unless transportation is available.

Franchise arrangements

In this model, franchisees obtain the premises (owned or leased) and infuse capital (both fixed and working), while the franchisor lends the brand name to the healthcare facility for a fee. The franchisor has to ensure that the service quality is maintained across all healthcare centres that use its brand. It may also help the franchisee in training and recruiting staff, procuring equipment, designing the facility, etc. In India, Apollo Hospitals has expanded its network of primary clinics through this model.

Expansion into tier 2/ 3 cities

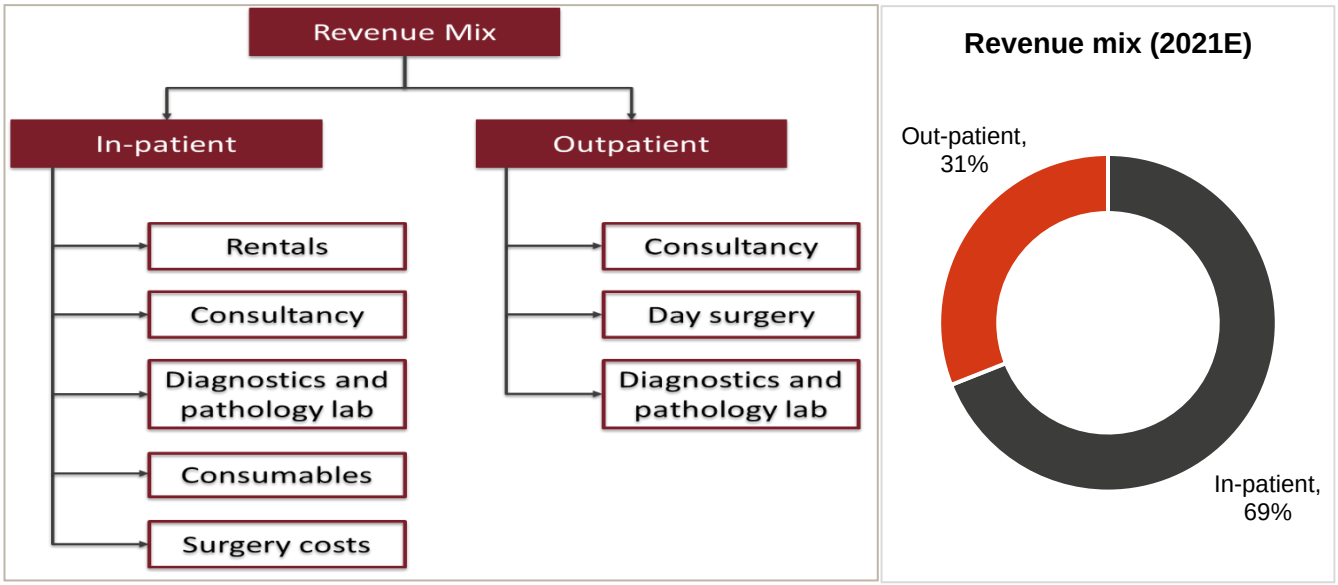
Private players are now foraying into tier 2 and 3 cities as income levels in these cities are fast catching up with those in metros and tier I cities, and these regions hold a big share of unmet healthcare demand. Some of the major hospital chains are also expanding into these regions at different price formats, thereby creating a continuum of care, with provision of higher super specialty services in metros/ tier 1 locations. Apollo Hospitals expanded into Karaikudi and Karimnagar with its Apollo Reach brand (rates of which are lower than in the cities). ILS hospitals have also expanded to tier-II cities such as Agartala, Howrah and is expanding to Ranchi.

However, there are some chains that predominantly operate only in tier 2 and 3 cities, such as Paras Healthcare and Shalby Hospitals.

2.4 Revenue and cost structure review of hospitals

Hospitals derive bulk of their revenue from IPD

The primary revenue streams of hospitals are the IPD and out-patient department (OPD) segments. Typically in most hospitals, the OPD contributes to three-fourths of total volumes; whereas, the IPD accounts for as much as 69% of the overall revenue based on 2021 industry estimates. This ratio could vary with hospitals, depending on the type of services rendered and the ailment mix. Yatharth Hospital & Trauma Care Services Ltd had IPD revenue of ~90%, while OPD revenue stood at ~10% for FY21. The same was 21% for OPD and 79% for IPD in FY20.



Notes: 1) The IPD in a hospital generally consists of beds, operation theatre(s), intensive care unit, supportive services (such as nursing services, pharmaceutical services, laboratory and diagnostics centres) and central sterile and supply department (CSSD)

2) In the OPD, examination, diagnostics and day surgeries are included

Source: CRISIL Research

Surgeries and diagnostics fetch bulk of the IPD revenue

Surgeries and diagnostics account for the bulk of IPD revenue for most hospitals; however, the share of these verticals vary across hospitals, based on the pricing strategies deployed and specialities offered. However, surgical patients generate more revenue as opposed to medical patients. Hospitals used to enjoy high margins on the consumables used. However, after the government has capped the prices of stents and knee implants, they have rationalised their treatment costs by charging for the services rendered. Some hospitals have in-house facilities such as diagnostic centres and pharmacies, while others outsource these services.

Other monitorables that may boost revenue include:

Occupancy levels: Given the high fixed costs (equipment, beds and other infrastructure), occupancy levels need to be commensurate for a hospital to break-even. Most large hospitals operate at over 65-70% occupancy ratio (OR). The following factors aid in ensuring high occupancy levels:

- Good brand recognition
- Reputed doctors
- A strong referral network

Average length of stay (ALOS): Large hospitals usually operate at high occupancy levels but try to keep the ALOS short, which enables them to record higher utilisation levels and ensure that more patients are treated at the same time.

Average revenue per operating bed (ARPOB): It is defined as Average In-Patient Revenue per Occupied Bed. It gives the daily revenue that can be generated by an occupied bed for a hospital

Ailment-wise length of stay

Ailment	ALOS	Remarks
Cardiac	5 days	In complex, surgical cases, ALOS is 7-8 days Angiography – day care; and angioplasty – 2 days
Orthopaedics	3-4 days	
Oncology	5-6 days	Hospitalisation is for surgical cases only. For chemotherapy, there are day-care beds and for radiotherapy, no stay is required
Neurosurgery	8-10 days	Would vary on case-to-case basis depending on the complexity of the case
Ophthalmology	1 day	Day care

Source: CRISIL Research

Medical patients versus surgical patients: Having a higher number of surgical patients versus medical patients helps hospitals boost revenue. This is because average revenue per surgical patient is higher, given the extensive use of operation theatre and diagnostic facilities.

According to our industry interactions, the OPD contributes almost one-third of in-patient revenues in most hospitals. This is especially evident during the initial years of operations of a hospital. The OPD, typically, also acts as a feeder for a hospital's in-house diagnostic/ pathology centres.

Ailment-wise realisation

Ailment	Average realisation per patient (Rs)
Cardiac	2,00,000 – 3,00,000
Orthopaedics	1,00,000 – 2,00,000
Ophthalmology	15,000 – 20,000
Oncology	70,000 – 1,00,000
Neurosurgery	1,00,000 – 1,50,000

Source: CRISIL Research

Procedure-wise realisation

Procedure	Average realisation per procedure (Rs)
Angioplasty (one stent)	1,90,500 – 4,12,750
Chemotherapy (per cycle)	63,500 – 1,90,500
Gastric bypass	2,85,750 – 5,71,500
Gastric banding	3,68,300 – 5,39,750
Lap hysterectomy	95,250 – 3,81,000
Myomectomy-hysteroscopic	63,500-4,57,200

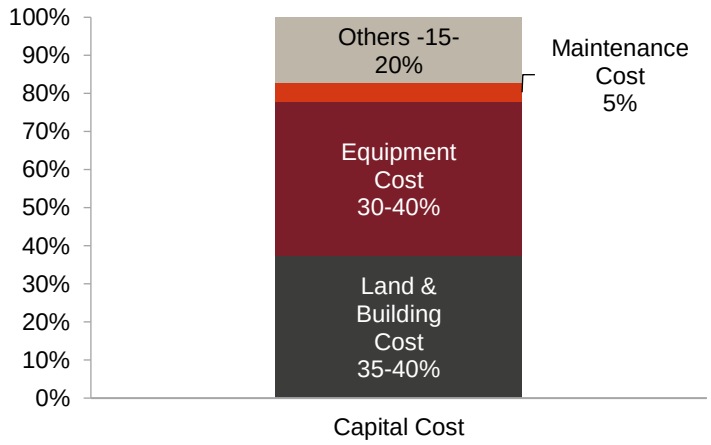
Source: Indian Healthcare, CRISIL Research

Capital costs

For secondary care hospitals in tier-I cities, the capital costs would hover around Rs 5-8 million per bed and the costs for super-specialty tertiary care hospitals would be higher as high-end technology and equipment costs are involved. Use of imported equipment can further drive-up equipment costs. Capital costs to build tertiary care

hospitals in tier-I cities are in the range of Rs 10-12 million per bed, excluding land cost. For a secondary care hospital in tier II cities, the capital cost would hover around Rs 2.5-5 million per bed followed by Rs 1-2.5 million per bed in the remaining Indian cities and towns (other than tier I & tier II). The table below depicts the capital cost per bed across tier-I, II & III cities for secondary and tertiary care hospitals.

Typical cost structure of hospitals



Capital cost / bed (excluding land cost)	Secondary care hospital	Tertiary/Quaternary care hospital
Tier - I	Rs 5-8 million	Rs 10 million+
Tier – II	Rs 2.5–5 million	Rs 5-8 million
Tier - III	Rs 1-2.5 million	Rs 2.5-5 million

Source: CRISIL Research

The two key capital cost components are land and building development costs and equipment costs.

- *Land and building costs:* These costs usually form 35-40% of the total project cost. Land cost usually constitutes 20-30% of the total project cost as land cost varies with location. In some cases, land is offered at a concessional rate by the government. However, after obtaining land at cheaper rates, hospitals may have contractual obligations to treat a certain percentage of patients (belonging to the lower income category) free of charge and/ or at a subsidised rate every year.

- *Equipment costs*: These costs form 30-40% of the total project cost (subject to variations depending on the sophistication of the equipment purchased). MRI, linear accelerators and CT scan machines are some of the expensive equipment, each costing Rs 50-100 million. As these equipment rapidly become obsolete, hospitals need to set aside resources periodically for technology upgradation (as it directly impacts patient outcomes). Moreover, the maintenance cost for high-end equipment is typically around 5% of the capital costs. In the case of tertiary care hospitals, most of the high-end diagnostic and surgical equipment are imported. Equipment costs vary across hospitals, depending on the ailment type the hospital specialises in.

Players with available land bank in top metro cities have an inherent advantage

The biggest capital costs incurred by hospitals while expanding/entering top cities are in procuring lands in these cities. Players with available land bank in top cities create a barrier for other players to enter a particular market. Apart from cost of land, availability of land in top cities is also a huge factor. For example, availability of land in NCR for a large multi-speciality hospital is scarce and would cost huge capital. Hence, players with available land bank in NCR would have an inherent advantage to expand into the market.

Doctor engagement model is crucial in managing the hospital's brand perception and profitability

Raw material and employee costs account for the largest proportion of cost for a hospital, together comprising more than 50% of the hospital's overall operating cost. Major hospital players also incur considerable capital expenditure in maintaining and upgrading existing facilities. Some hospital players enter into vendor agreements, particularly with imported equipment for specialty-based services, to mitigate price fluctuation risk.

- *Raw material costs/ consumables:* Typically, raw material costs (including drugs, medical consumables, diagnostic consumables and other items, such as linen, etc.) account for 25-30% of overall operating costs for a hospital. Raw material costs can be managed through effective inventory management and effective sourcing of raw materials that are lower priced. Tier-I hospitals generally spend about 20-22% on raw material/consumables versus 23-25% by that of a tier-II hospital on account of greater footfalls, higher IPD admissions and heavy discounts on consumables through distributers.

As a % of operating income	Tier – I	Tier – II
Raw material cost/consumables	20-22%	23-25%

Source: CRISIL Research

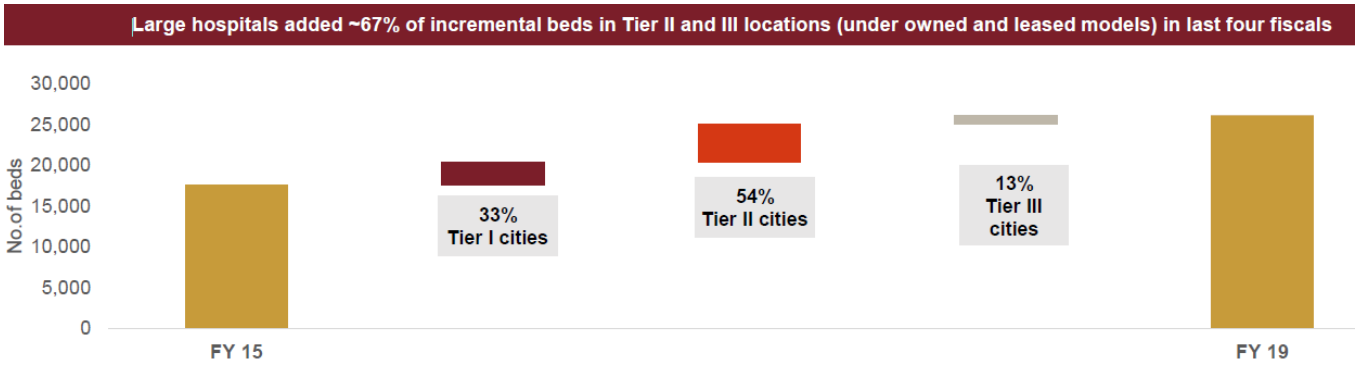
- *Employee costs:* These costs account for 25-30% of the overall operating costs. While salaries are fixed costs, consultants' fees can be linked to operations, making it a variable expense. The bed-to-staff ratio also varies from 1:3 to 1:5, with multi-specialty and super-specialty hospitals having a higher ratio. The employee cost of a hospital is also dependent on its doctor-engagement model. Tier-II hospitals generally spend higher percentage of their costs on wages and salaries versus tier-I hospital. Employing reputed doctors on the payroll (especially for new facilities) also increases employee costs. At times, to reduce doctor costs, hospitals keep a percentage of doctors on their payroll while others are engaged for consultations or on a case-by-case basis.

As a % of operating income	Tier – I	Tier – II
Wages & salaries	~19%	~20%

Source: CRISIL Research

2.5 Expansion trend of hospital chains

Increasing penetration of hospital chains in tier 2 and 3 locations



Note: Based on city category classification followed by 7th Pay Commission, tier I – X cities (top 8 cities), tier II – Y cities (next 88 cities)
Source: Company reports, CRISIL Research

The Indian healthcare delivery system has seen consolidation in recent years. A highly competitive industry, coupled with tightening of healthcare regulations, has made it difficult for smaller players in the industry to stay profitable. Larger hospital brands typically have stronger financial discipline and negotiating power with suppliers, better ability to attract medical talent, and greater capital and administrative resources to meet these needs over standalone hospitals. Many of the established players in the healthcare delivery industry follow inorganic growth to expand into the geographies where they have limited presence. In terms of supply creation, major hospital chains have expanded into the next level of creamy tier 2 and 3 locations (with ~67 % aggregate bed additions by 10 large hospitals players in the past four years being in these areas).

Rise in demand for health infrastructure, modern technologies and multi-disciplinary healthcare have been some of the key driving factors for consolidation in the industry. Investments by private equity (PE) players is also gaining traction. Majority of the PE deals in the industry in the past 2-3 years have been towards hospital portfolio consolidation, also enabling formation of regional clusters that provide base for further expansion and consolidation. Recently, Manipal Health acquired 100% stake in Columbia Asia hospitals, strengthening its presence in southern India. IHH health also has gained stake in Fortis Healthcare in 2018. In the past two years, deals worth ~Rs 126 billion and ~Rs 22 billion have taken place in multi-specialty and single-specialty hospitals, respectively.

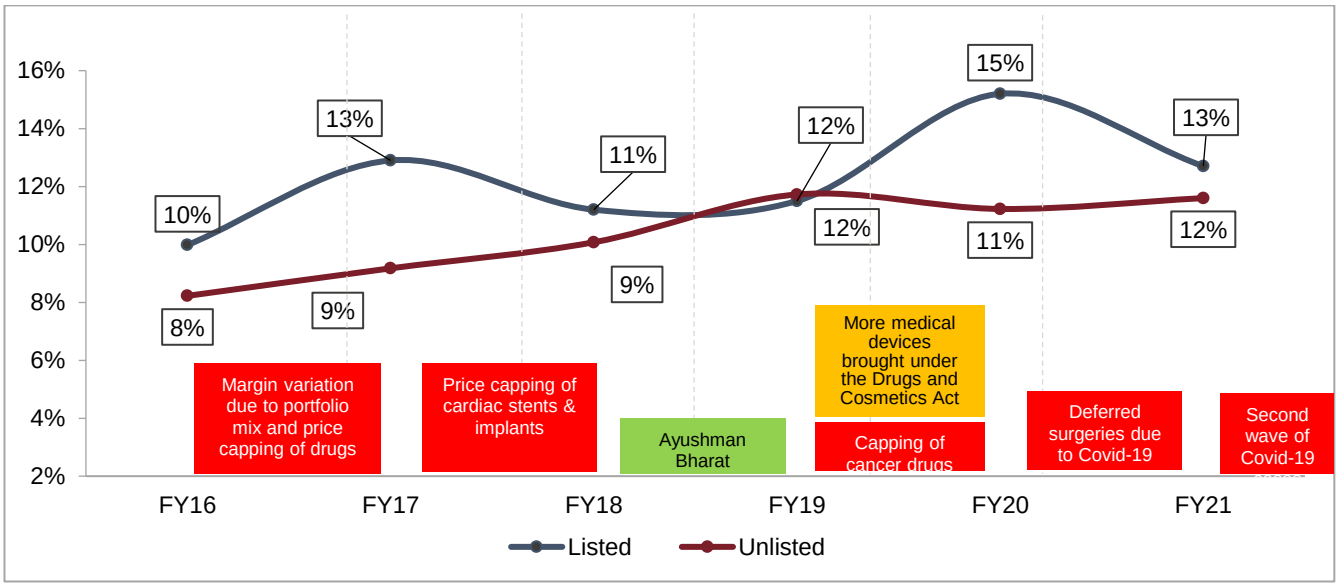
2.6 Review of industry profitability

Covid-19 strained financials of private hospitals in fiscal 2021

While lockdown restricted people movement and adversely impacted revenues and operating margins, deferred elective surgeries provided some respite to private players in the second half of fiscal 2021.

Operating margins to weaken in fiscal 2022 due to higher fixed proportion of operating costs

Operating margins of healthcare delivery (hospital) industry



E - Estimated; P - Projected

**Listed companies included are AHEL, Narayana Hrudayalaya Limited, Healthcare Global Enterprises, Fortis Healthcare Limited, Shalby Ltd and MHIL*

Unlisted companies included are Kailash Healthcare, Jaypee Healthcare, Yatharth Hospital and Trauma Care Services Ltd, and Blue Sapphire Healthcares Pvt Ltd

Source: CRISIL Research

Earlier, with the addition of new hospitals and expansion of operational beds, operating margins of key listed players had seen a muted improvement and remained range-bound due to a rise in consumable costs and employee costs associated with new supply additions and certain regulatory hiccups.

It usually takes 24-30 months for a newly opened hospital to stabilise its operations. However, this period may be longer for standalone hospitals than chains due to the latter's operational efficiency. But it could vary depending on the location and specialties offered.

The operations of private entities were adversely impacted in fiscal 2021. Despite not earning requisite revenue, hospitals still had to bear personnel costs, which account for 50-55% of total operating costs for hospitals. The margins fell by 200-400 basis points with margins likely to witness further pressure in fiscal 2022. Though the entire sector was under fiscal stress (especially in the first two quarters of the fiscal 2022 owing to cash flow concerns), major listed hospital chains which have had better financials than their unlisted regional chain peers are expected to face relatively lesser difficulty in tiding over this stress. A renewed surge in Covid cases countrywide during end of fiscal 2021 and second wave of fiscal 2022 hampered revenue prospects of hospitals. Hospitals with a tighter operating structure and higher realisations, resulting in higher EBITDA per operational bed, are expected to witness relatively low revenue erosion at the end of the fiscal.

The sector remains sensitive to regulations. In fiscal 2017, the government had capped prices of drug-eluting stents and knee implants, which hurt operating margins (the effect being more pronounced for single-specialty hospitals). But the effect of price capping was neutralised in the later part of fiscal 2018 via price rationalisations in bundle pricing.

Even during the Covid-19 pandemic, states such as Maharashtra capped treatment costs at private hospitals following reports of profiteering and as the state government took control of 80% of the private bed infrastructure in cities such as Mumbai in its fight against Covid-19.

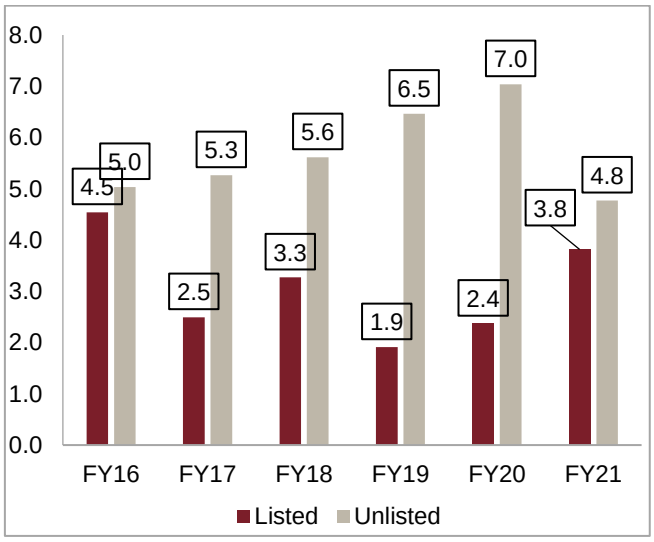
The rationale behind price capping was to make healthcare affordable, and the government is likely to introduce a policy regarding trade margin rationalisation for medical devices and consumables. In the long run, however, this move could aid in expansion of hospitals, providing affordable healthcare in smaller towns.

Financial metrics of listed players better than those of unlisted counterparts

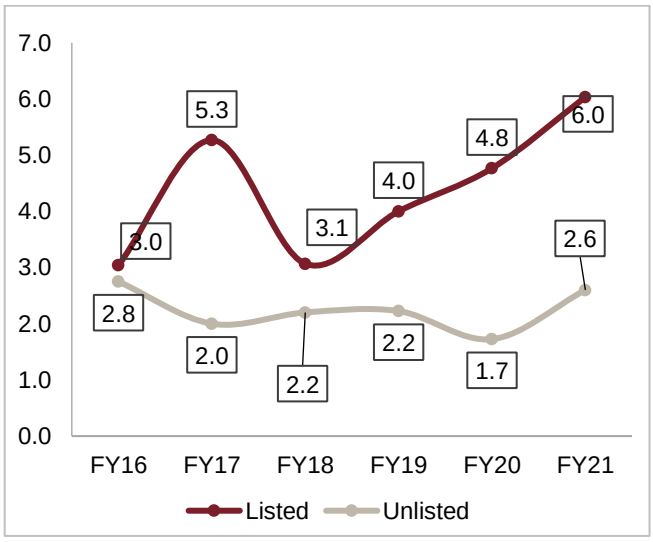
According to CRISIL Research, Debt/Profit before depreciation, interest and taxes (PBDIT) were more stable for listed entities than unlisted entities in the space. Also, for listed companies, the gearing ratio remained range-bound, with regional players being more dependent on debt for expansion. Coverage ratios of listed players were better than those of their unlisted peers, with debt/EBITDA remaining a key monitorable for unlisted hospitals in the near term.

Financial performance metrics of hospitals

Debt/PBDIT (Profit before depreciation, interest and taxes)



Interest coverage ratio



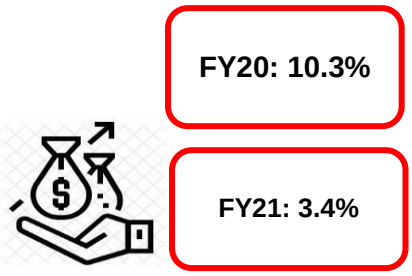
Note: Listed hospitals – AHEL, Fortis Healthcare, Healthcare Global, Max Healthcare, Narayana Hrudalaya, Shalby Ltd

Unlisted hospitals – Kailash Healthcare, Jaypee Healthcare, Yatharth Hospital and Trauma Care Services Ltd, and Blue Sapphire Healthcares Pvt Ltd in case of Interest coverage ratio. Jaypee Healthcare has not been considered for Debt/EBITDA calculation

DEBT/PBDIT calculated as Total Debt divided by PBDIT

Source: CRISIL Research

Despite higher ARPOB, large hospital chains earn lower ROCE due to high operating costs & capacity expansions

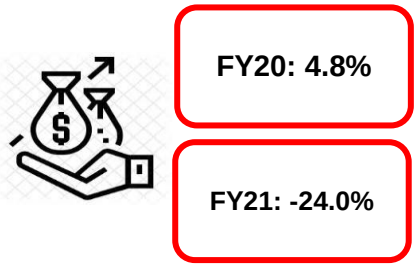
Aggregate ROCE of top hospital chains in India – FY20 and FY21	
	• Top hospital chains earn an ROCE of ~10% on an aggregate level. Fiscal 21 was an outlier due to the pandemic • Despite achieving higher ARPOB, top hospital chains do not earn high returns, primarily due to high costs (capital and operating) incurred • Bed capacity expansions undertaken by large hospital chain operators during the past 5-6 financial years lead to optically lower ROCE due to upfront high capital expenditure • Top hospital chains have to incur high initial capital expenditure for setting up a hospital. They are also required to invest in medical equipment, leading to high capital commitment initially. Over and above that, top hospital chains also have high operational costs in the nature of wages & salaries, raw material costs for medical consumables, and other operational overheads in terms of power and fuel • Hence, high capital expenditure and operating costs for top hospital chains do not allow ARPOBs to be translated into higher return on capital

Note: Industry aggregate includes ROCE calculation for MHIL, AHEL (healthcare services segment), Fortis Healthcare Ltd, Narayana Hrudayalaya Ltd, HCGEL. For 2020, MHIL ROCE not available

ROCE: PBIT/(Tangible Net Worth + Total Debt)

Source: Company annual reports, investor presentations, CRISIL Research

Top hospital chains earn an ROE of ~5%

Aggregate ROE of top hospital chains in India – Fiscal 2020 and 2021	
	• Top hospital chains earn an ROE of ~5% on an aggregate level. Fiscal 21 was an outlier due to the pandemic • Rising costs, regulatory price controls and increasing competition are the possible key reasons behind lower ROE of hospital chains

Note: Industry aggregate includes ROE calculation for MHIL, AHEL (healthcare services segment), Fortis Healthcare Ltd, Narayana Hrudayalaya Ltd, HCGEL. For 2020, MHIL ROE not available

ROE: PAT/(Tangible Net Worth)

Source: Company annual reports, investor presentations, CRISIL Research

Hospital chains with relatively smaller operations compared to large chains earn ROCE of ~10%

Aggregate ROCE of select hospital chains in India – Fiscal 2020 and

FY20: 5.3%

FY21: 10.4%

- Hospital chains with relatively smaller operations earn an ROCE of ~10% on an aggregate level.
- Rising costs, regulatory price controls and increasing competition are the possible key reasons behind lower ROCE of hospital chains
- Running smaller and mid-size hospitals can be more capital efficient due to high capex required to set up large hospitals (Rs 3-10 million per bed based on data of listed players)

Note: aggregate includes ROE calculation for Kailash Healthcare Limited, Yatharth Hospital and Trauma Care Ltd, Blue Sapphire Healthcares Pvt Ltd and Global Health Private Limited

ROCE: PBIT/(Tangible Net Worth + Total Debt)

Source: Company annual reports, investor presentations, CRISIL Research

2.7 Regulatory framework for hospitals and healthcare in India

Government framework for healthcare delivery

Central	• Department of Health and Family Welfare • Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homeopathy (AYUSH, formerly ISM&H)	**Implementing agencies** • Key agency: Ministry of Health and Family Welfare (MoHFW) • Ministry of AYUSH • Repository of technical knowledge: Directorate General of Health Services (DGHS)
State	• State health ministries	**Policy makers** • Primary advisory and policy-making body: Central Council of Health and Family Welfare • NITI Aayog
District	• Chief medical officer • District medical superintendent • District controller	**Key policies** • National Health Mission • Pradhan Mantri Swasthya Suraksha Yojana • National Health Policy, 2017 • Rashtirya Swasthya Bima Yojana

Source: Industry, CRISIL Research

The Union Ministry of Health and Family Welfare (MoHFW) is the key agency implementing healthcare programmes in India

The Indian healthcare ecosystem lacks a common regulator, with different entities in the healthcare value chain coming under the purview of different ministries and regulatory bodies.

The MoHFW is the central body responsible for implementing various healthcare and family planning programmes in India. These programmes aim at the prevention and control of major communicable diseases such as AIDS, leprosy, etc. Further, awareness programmes on maternal health, paediatrics, and promotion of traditional and indigenous systems of medicines (such as ayurveda, unani, etc.) are also carried out.

Besides these, the ministry also assists states in preventing and controlling the spread of seasonal disease outbreaks (such as malaria, dengue, etc.), and epidemics through technical assistance (such as recommending measures to contain sudden epidemics). The MoHFW sponsors central schemes and provides grants-in-aids to various autonomous/statutory bodies and NGOs. In addition to the centrally sponsored schemes, the ministry formulates and implements various World Bank-assisted projects for controlling diseases such as AIDS, malaria, tuberculosis, etc.

Health, in general, is a state subject – as all healthcare schemes devised by the central government have to be implemented via the state machineries. States have the leeway to devise and implement their own schemes as well. State health projects are implemented through respective state health ministries that form policies under the Central Council of Health and Family. Though the Department of Health assists states in availing external assistance, district-level authorities are given responsibilities to implement national health policies.

The implementing agencies of the new healthcare assurance scheme, PMJAY, are the National Health Agency (NHA) at the central level and State Health Agency (SHA) at the state level for the states that have signed the MoU for participation into the scheme.

Regulatory environment for healthcare delivery in India

1. Regulations pertaining to the healthcare delivery infrastructure

The regulations for setting up a hospital in India are stringent with several approvals required to be taken. Moreover, hospitals are also covered under the purview of the policies such as the Clinical Establishment Act, 2010, and the Bio-Medical Waste Management & Handling Rules, 1998, which provide guidelines for registering hospitals and clinics and regulate their day-to-day operations as far as their environmental impact is considered.

Indicative list of approvals required for setting up a hospital

Approval list of items	Agency	Time taken for obtaining approval* (days)
Certificate of incorporation at the time of company formation	Registrar of Companies (ROC)	14
Approval from the specified member secretary at the pre-construction phase	Urban Development Authority/ Corporation / other local bodies	60
Non-agricultural permission for conversion of agricultural land for industrial purpose	District Collectors	180
NOC for industrial development	Director of Industries	14
NOC from special planning authority	City development authorities (e.g., MMRDA/CDMA)	60 days after getting authority approval
NOC regarding sub station	Concerned electricity supply company	30
NOC if access is derived from highway	Highway authority of the state government	90
NOC for storing Class B petroleum, diesel for generators and boiler fuels, and for the construction of storage tanks	District Magistrate & Chief Controller of Explosives	90

Approval list of items	Agency	Time taken for obtaining approval* (days)
Approval for temporary and permanent connection	Relevant electricity board	30
Approval for water connection	Water Supply and Sewage Board	30 (temporary, during construction) 30 (permanent, post construction)
First safety clearance	Chief Fire Officer	30 days post construction
Approval for lift operation	Municipal authority	14
Approval for chimney for incinerator	Pollution Board	30
Approval from Health Department	Ministry of Health	30
Approval for radiology, nuclear medicine and radiotherapy department	Atomic Energy Regulatory Board	180
Pharmacy Licence	Commissioner, Drugs Control Administration	30
Licence for blood bank	Drugs Controller General of India	30

*Note: 1. *Indicative timelines are for setting up a hospital in Kerala. According to industry interactions, the number of approvals required and timelines for obtaining them, differ from state to state and even vary within a state depending on whether the location falls under a panchayat, municipality or corporation. 2. Approvals indicated may not necessarily be required to be taken in the same order*

Source: Industry

Key regulations

Regulations	Purpose
Bio-Medical Waste (Management & Handling) Rules, 1998	This act regulates the mode of treatment and disposal of bio-medical waste
Clinical Establishment Act, 2010	It is mandatory for all clinical establishments

Source: Industry

Accreditation of hospitals

Accreditation of hospitals is a voluntary process, wherein an authorised agency evaluates and recognises health services according to a set of standards that are revised periodically. In developing countries such as India, where healthcare services are delivered mainly through private health providers, regulation is a vital instrument and function of the government policy.

In India, hospitals are accredited by National Accreditation Board for Hospitals and Healthcare Providers (NABH). The NABH is a constituent board of Quality Control of India and a member of International Society for Quality in Health Care (ISQua). NABH accreditation is compulsory for hospitals to get empanelled under the Central Government Health Scheme (CGHS), which provides healthcare facilities to all central government employees. P.D. Hinduja Hospital (Mumbai), Max Super Speciality Hospital (New Delhi), Apollo Speciality Hospital (Chennai), Narayana Hrudayalaya (Bengaluru), ILS Hospital (Dum Dum), ILS Hospital (Agartala), Medwin Hospital (Hyderabad) are some of the hospitals accredited by the NABH.

International accreditation agencies include the International Organization for Standardization (ISO), Joint Commission International (JCI), and Trent Accreditation Scheme (TAS).

Diagnostic centres are accredited by the National Accreditation Board for Testing and Calibration Laboratories (NABL) in India and international agencies such as the Asia Pacific Laboratory Accreditation Cooperation and the

International Laboratory Accreditation Cooperation. ILS (Dum Dum) is also accredited by NABL for complying with ISO 15189:2012 standards in the field of medical testing.

2. Regulations pertaining to financing of healthcare infrastructure

Owing to the capital-intensive nature of hospitals and also considering the existing infrastructure gap, which calls for a rapid growth in bed counts across the country, the financing needs for setting up/expanding hospitals are fulfilled through various routes such as foreign direct investment (FDI), external commercial borrowing (ECBs), private equity funds, etc. apart from conventional bank loans.

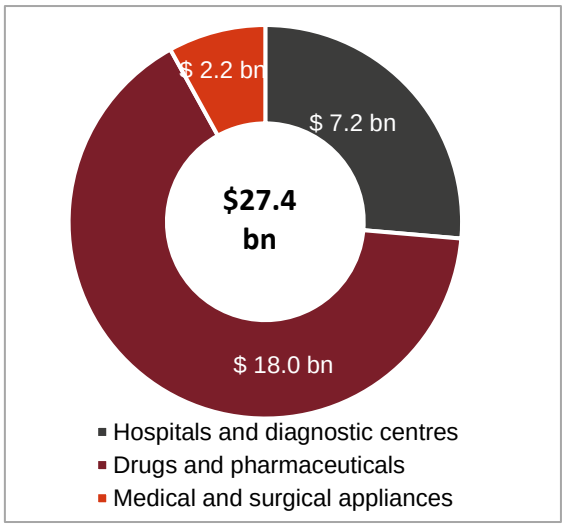
Apart from these, the government provides tax relief to hospitals with 100 beds or more in the form of investment-linked deduction (on capital expenditure other than for land acquisition, goodwill and financial instruments incurred prior to the commencement of business) under Section 35AD of the Income Tax Act 1961.

The central government has also come out with broad guidelines of provision of up to 40% viability gap funding for construction of new hospitals in Tier-II and -III cities/ towns, which are empanelled under the PMJAY.

FDI

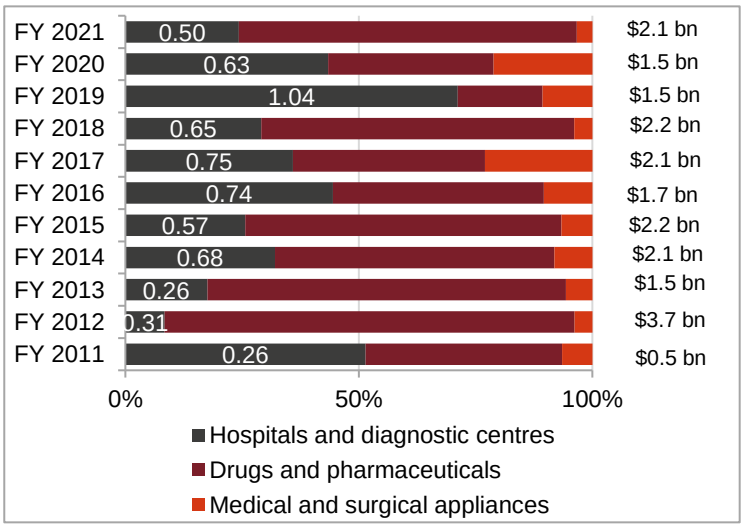
FDI of up to 100% is permitted under the automatic route in Indian hospitals from 2000. This means foreign investment in hospitals does not require prior approval either from the government or the Reserve Bank of India. Investors are only required to notify the concerned regional RBI office within 30 days of receipt of inward remittances and file the required documents with that office within 30 days of issue of shares to foreign investors. As of fiscal 2021, cumulative FDI equity inflows in: (1) hospitals & diagnostic centres amounted to $7.2 billion, (2) drugs & pharmaceuticals amounted to $18.0 billion and (3) medical & surgical appliances totalled $2.2 billion.

Annual cumulative FDI inflow for fiscal 2021 from fiscal 2001



Source: DIPP, CRISIL Research

Year-wise FDI inflow from FY11 to FY21 ($ bn)



Source: DIPP, CRISIL Research

ECB

Currently, services sector entities (including hotels, hospitals and software sectors), are allowed to avail ECB facility of: (1) up to $100 million per financial year, under the approval route, for imports of capital goods and (2) another $100 million per financial year, under the automatic route, for capital expenditure in foreign currency and/or rupee for permissible end use.

3. Regulations pertaining to price controls

The National Pharmaceutical Pricing Authority (NPPA) regulates prices of drugs/ medicines by bringing them under the ambit of the National List of Essential Medicines (NLEM). The medical devices sector is largely unregulated, except for those who have been notified as drugs under the Drugs and Cosmetics Act. In February 2017, the NPPA introduced price controls for cardiac stents – price of bare metal stents (BMS) was slashed to Rs 8,000 and that of drug-eluting stents (DES) was reduced by ~85% to Rs 29,600. In February 2019, however, the NPPA revised their prices upwards in line with the WPI numbers of 4.2% (with effect from April 1, 2019). The revised price of BMS stands at Rs 8,261 and that of DES stands at Rs 30,800 at present.

The prices of knee and hip implants were also capped (up to 69%) in August 2017. Cobalt chromium knee implant, which was priced at Rs 158,324 was capped at Rs 54,720 (excluding GST). Implants with special metals, such as titanium and oxidised zirconium, earlier priced at Rs 249,251 was capped at Rs 76,600 (excluding GST).

The NPPA's initial intention was to bring eight new medical device segments – all implantable devices, CT scanning equipment, X-ray equipment, MRI equipment, dialysis machine, bone marrow cell separators, defibrillators, and PET equipment – under the Drugs and Cosmetics Act. This would have subjected them to registration and import licensing under the Medical Device Rules 2017. This was to be done with effect from April 1, 2020. However, all medical devices are expected to be brought under the scope of regulation subsequently. NPPA may also consider capping the trade margins instead of capping the prices of medical devices.

The Bureau of Indian Standards (BIS) is in the process of finalising quality control orders (QCO) for medical devices, which will require all medical devices to be registered with the Central Drugs Standard Control Organisation (CDSO) in the first phase (of 12-18 months). After this period, they will have to conform to the quality standards of the Bureau.

Further, some state governments (such as Karnataka, West Bengal and Delhi) have been contemplating capping costs of medical procedures too in addition to medical devices.

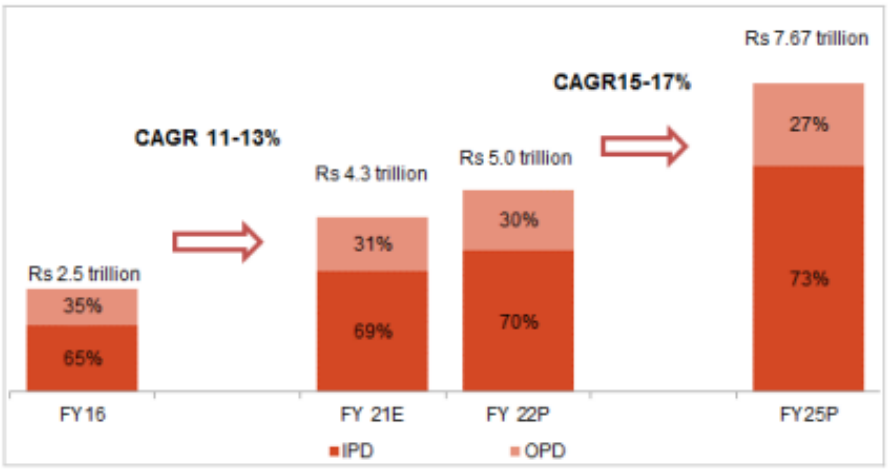
3 Assessment of India's hospital market

3.1 Review and outlook

Momentary blip for private hospitals this fiscal; but poised for robust growth in the medium term

Barring the momentary setbacks in fiscal 2021, CRISIL Research estimates the Indian healthcare delivery industry to post a healthy 15-17% CAGR between fiscals 2022 and 2025, driven by pent up demand coming back onto the system, strong fundamentals, increasing affordability and Ayushman Bharat Yojana.

Overall healthcare delivery market in India



Note: IPD stands for in-patient department and OPD stands for out-patient department. According to CRISIL Research out-patients are those who are not required to stay at the hospital overnight. It includes consultancy, day surgeries at eye care centres, and diagnostics, and excludes pharmaceuticals purchased from standalone outlets.

Source: CRISIL Research

The Indian Healthcare delivery market is estimated to grow to ~Rs 5 trillion in fiscal 2022

CRISIL Research estimates the Indian healthcare delivery market to reach ~ Rs 5 trillion in value terms by end of fiscal 2022, with growth being contributed by low base and the pent-up demand from deferred treatments in fiscal 2021. A potential upside is also expected from covid treatments, especially for hospitals where occupancies were typically on the lower side. Within the overall healthcare delivery market, the in-patient department (IPD) is expected to account for nearly 70% (in value terms), while the balance is to be catered by the out-patient department (OPD). Though in terms of volumes, OPD volumes outweigh IPD volumes, with the latter contributes the bulk of the revenues to healthcare facilities.

As opposed to fiscal 2021, whilst government investments in the sector to combat covid pandemic via temporary establishments had gained prominence, and private hospitals saw revenue erosion owing to travel restrictions, the private sector is expected to complement the role of the government in fiscal 2022 early on.

Healthcare delivery industry to grow 15-17% over next four years

With renewed impetus from PMJAY and government focus shifting onto healthcare sector, the healthcare delivery market is expected to grow at 15-17% compounded annual growth rate (CAGR) and reach Rs 7.67 trillion in fiscal 2025.

Over the last four years, major hospital chains have added supply (~70% of their incremental supply during the period) in tier II and III locations, to create a referral network into their main centre by tapping into the underserved creamy tier II areas. The government is also expected to augment this via a scheme in the pipeline (PM AtmaNirbhar Swasth Bharat) for strengthening primary, secondary & tertiary healthcare infrastructure in the country.

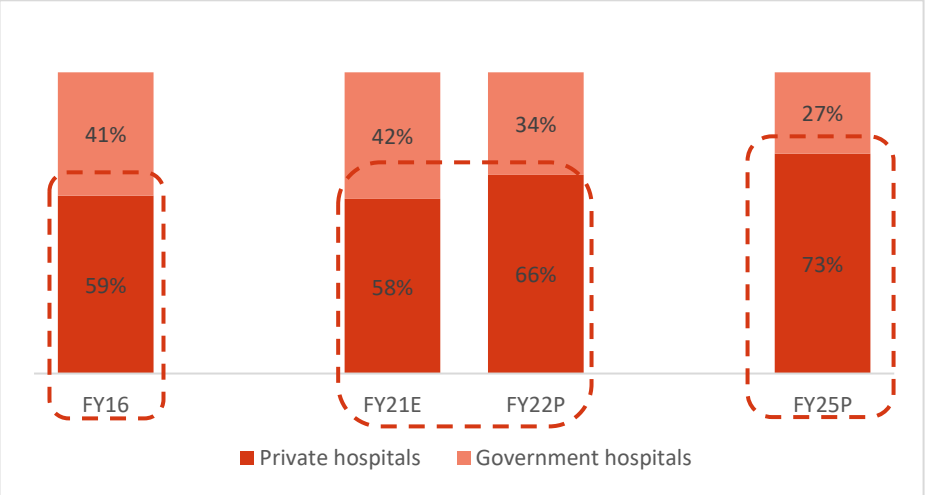
The other contributors to the demand are more structural in nature, like, increase in lifestyle-related ailments, increasing medical tourism, rising incomes and changing demography.

In India, healthcare services are provided by the government and private players, and these entities provide both IPD and OPD services. However, the provision of healthcare services in India is skewed towards the private players (both for IPD and OPD). This is mainly due to the lack of healthcare spending by the government and high burden on the existing state health infrastructure. The share of treatments (in value terms) by the private players is expected to increase from 58% in fiscal 2021 to nearly 73% in fiscal 2025, the share witnessing a slight dip in fiscal. 2021

As of fiscal 2021, around 58% of the treatments in value terms were carried out by private hospitals/clinics in the country. The skew is more towards the private players owing to the expansion plans of private players being centered on it, further supported by coverage of hospitalisations under the PMJAY scheme. Furthermore, going forward, the share of private hospitals/clinics in treatments (in value terms) is expected to increase to nearly 73% by fiscal 2025. The additional demand to be unleashed by the recently launched PMJAY can be met only by private participation as government facilities are already over-burdened. Hence, going forward, a major share of treatments would be inclined more towards the private sector.

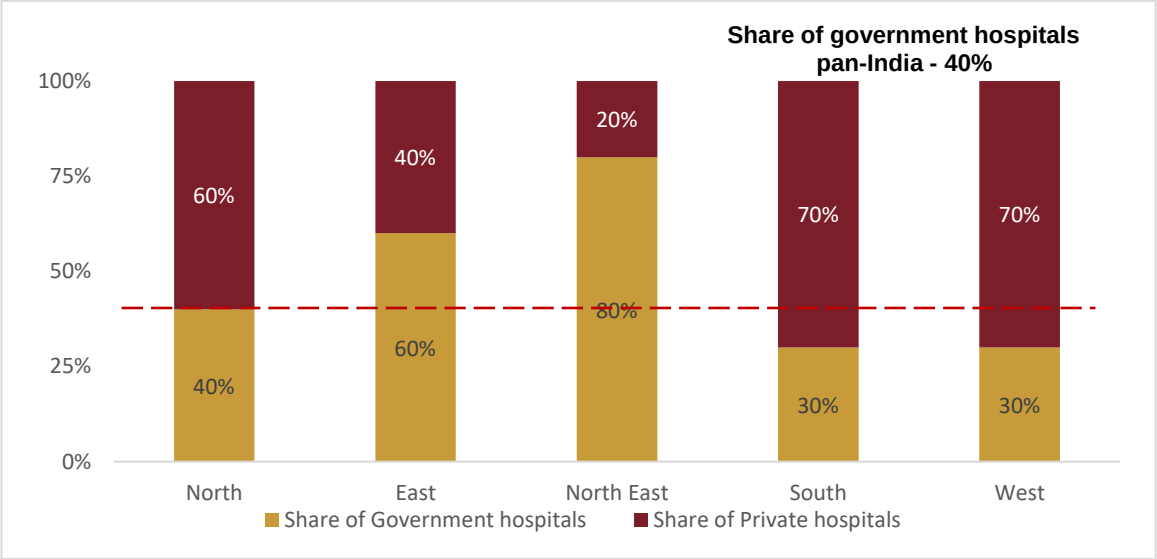
Further, in fiscal 2021, CRISIL Research estimates revenues of private hospitals to have declined by 10-15% due to reduction in both outpatient and inpatient footfalls (with OR falling to 25-30% in April). The extent of revenue loss is wholly dependent on recovery in footfalls and resolution of deferred surgeries, as the spread of Covid-19 cases is varied across the country. Between the two halves of the fiscal, the second half was expected to see much of the unmet demand coming onto the system.

Share of treatments in value terms (government hospitals versus private hospitals/clinics)



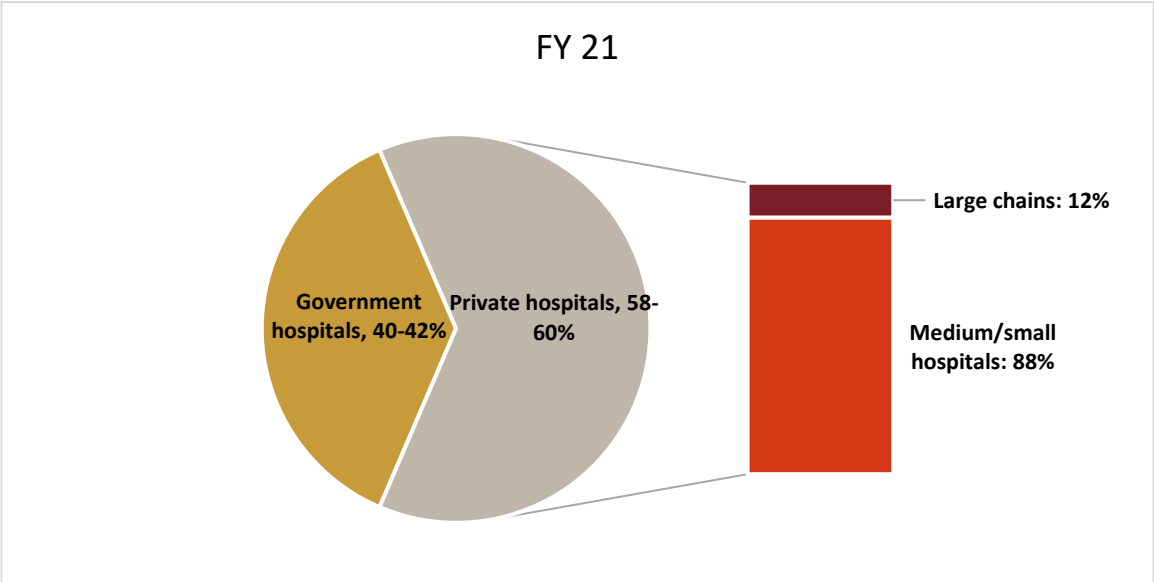
Source: CRISIL Research

Share of public hospitals in India (by value)



Source: CRISIL Research

Private hospitals make up 58-60% of the market by value, out of which large chains make up ~12%



Fiscal 2022 to bring some relief to the stressed financials of private hospitals

Even as the second covid wave impacted revenues and margins, deferred elective surgeries are expected to provide some respite to private players majorly in H2 of fiscal 2022.

Pent up demand for regular treatments will lead to strong recovery in fiscal 2022

The second wave which started from late Q4 FY21, saw covid cases increase rapidly and put an enormous strain on the health infra of the country. The first to feel the heat of inadequate infrastructure was the healthcare delivery market, as hospitals which were witnessing sequential recovery had to divert their beds towards Covid care and unlike the first wave the private hospitals were roped in early onto the second wave to tackle the healthcare emergency. This time around the requirement was more for severe/ critical beds - with oxygen supply, ICU beds and

ventilators. But as compared to the situation in the first wave where non-covid regular treatments were hit hard due to the lockdown in the first wave, the second wave saw relatively lesser disruptions with non-covid treatments seeing a recovery from second half of Q1 FY22 as covid cases abated.

CRISIL Research estimates the recovery in fiscal 2022 to be much stronger on the back of pent-up demand for regular treatments & OPDs coming onto the system, with covid treatment revenues also to be topline accretive in the interim. As the second wave abated, increased demand has been witnessed from regular demand channels in Q2 Fiscal 2022, indicating pent up demand. On the margin front, though some of the cost rationalisations of the previous year may continue for a while, high realisation and specialised treatments are expected to provide a boost to the margins.

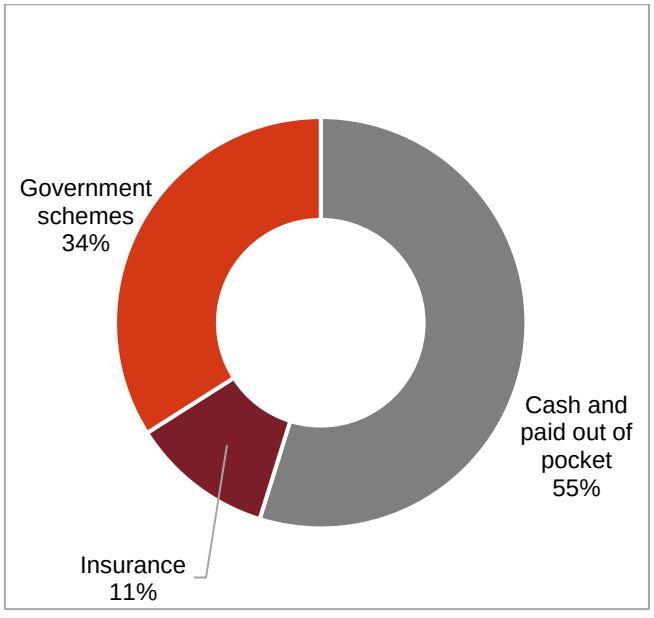
Robust growth is expected in fiscal 2023 as underlying fundamental growth factors remain strong. Regular demand drivers such as OPD, elective surgeries & regular treatments stabilize & demand drivers such as high realization medical tourism business picks up as international travel restarts gradually. Margins are expected to remain rangebound as compared to the previous fiscal.

We have not assumed a major/severe covid wave in the country going further in our base case scenario. However, Covid curve trajectory in the country remains monitorable, as newer virus variants/mutations emerge.
CRISIL Research estimates the healthcare delivery industry size at ~Rs 5 trillion in fiscal 2022 & at ~Rs 5.5 - 5.7 trillion in fiscal 2023. This includes both inpatient treatments forming almost 70% in value share and outpatient consultations contributing the rest 30%. While government's share is estimated at 32-36%, private sector contributes lion's share at 64-68%. Within private sector, large hospitals form only 10-15% of the industry with rest of the market dominated by small and medium hospitals, clearly indicating the fragmented nature of the industry.

3.2 Payment modes in Indian healthcare

Government schemes accounted for 34% of the Indian healthcare expenditure in 2019, with PMJAY's contribution being less than 5%. Insurance accounted for 11%, while the major chunk came from cash/out of pocket expenses

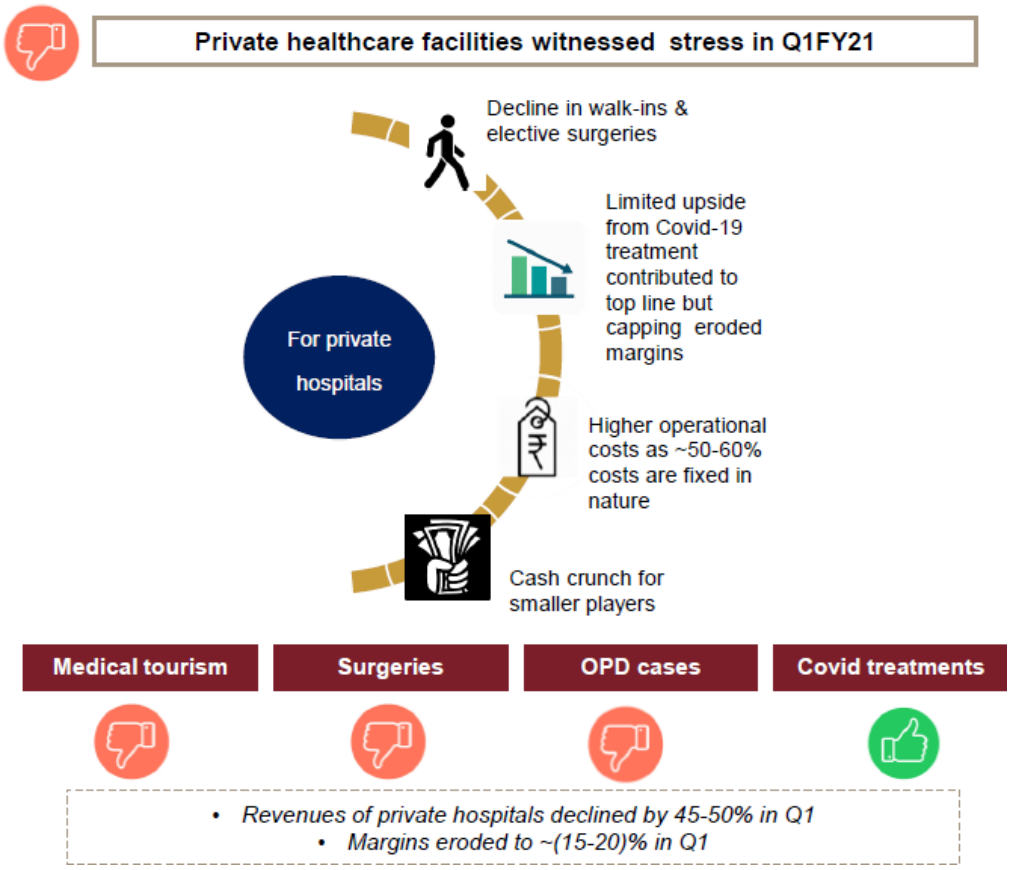
Payor mix (India) 2018



Source: Global Health Expenditure Database - WHO, IRDAI, CRISIL Research

Government schemes accounted for 34% health expenditure in the country in 2019. PMJAY's contribution was low and accounted for less than 5% of the total healthcare expenditure. 66% was privately funded. Out of this 66%, ~54.8% was out-of-pocket expense and the remaining 11% was funded by insurance. For Yatharth Hospital and Trauma Care Services Ltd, ~32% came from government and government schemes, ~29% came from insurance and other third-party administrators, while the remaining ~39% came from self-paying patients in fiscal 2021.

3.3 Impact of Covid-19 on healthcare delivery market



The healthcare delivery market saw reduced footfalls during the pandemic-induced lockdown. Surgeries were deferred, too. This impacted cash flow of players. However, the market is driven by strong fundamentals, conducive government policies, improving affordability and geographical diversification of hospital players. The pace of the sector's growth in the medium term remains robust. Amidst second wave of Covid-19 cases in Q1FY22 hospitals would again face the same set of challenges as in same corresponding quarter last fiscal

Source: CRISIL Research

Trade-off between Covid-19 and non-Covid-19 care sullies industry outlook in near term

As the nation continues to grapple with Covid-19, like other sectors, the healthcare delivery market also witnessed a loss of revenue, despite this being a healthcare-related emergency. Till date, the major burden of combating this contagious virus has been handled by the government, with some private facilities being roped in to meet the shortfall in bed infrastructure. The nationwide lockdown in response to the pandemic restricted movements of people, impacting OPD footfalls at hospitals as well as in-patient conversion from OPD. This also ensured that conveyance of people to urban hospitals was restricted. Many private hospitals chose to delay elective surgeries (some had shut operations for some time) in order to minimise the risk to patients, especially those, whose immunity was already compromised due to varied illnesses, thereby leading to a drop in occupancy levels. Some hospitals started teleconsultations and adopted telemedicine for OPD treatments (at similar costs) but have been unable to shift their entire OPD patient load onto this mode due to factors such as patients being unaware of this facility and some still preferring the traditional face-to-face consultation.

To sum it up, COVID-19 had a derailing effect on the global economy. Effects of a weaker economy, increased exposure to the risks of COVID-19 at hospitals, the imposition of restrictions and other precautionary measures taken by the Government of India, authorities and hospitals to manage the spread of COVID-19 and other unexpected difficulties arising out COVID-19 pandemic have resulted in, among other things; lower patient volumes; deferred surgeries; and decline in elective surgeries.

As per our primary interactions, occupancy in private hospitals had fallen up to 25-30% in April FY21, but witnessed a gradual pick-up in the following months. Most of the pent-up demand was met in the second half of the fiscal 2021. Major listed hospitals have seen an improvement in occupancy, both from deferred treatments as well as Covid treatments.

A renewed surge in Covid cases countrywide during end of fiscal 2021 and first half of fiscal 2022 hampered revenue prospects of hospitals as they diverted critical beds towards Covid care which hampered revenue prospects from regular channels that were a higher revenue contributor and the path towards return to normalcy for hospital players has gotten delayed.

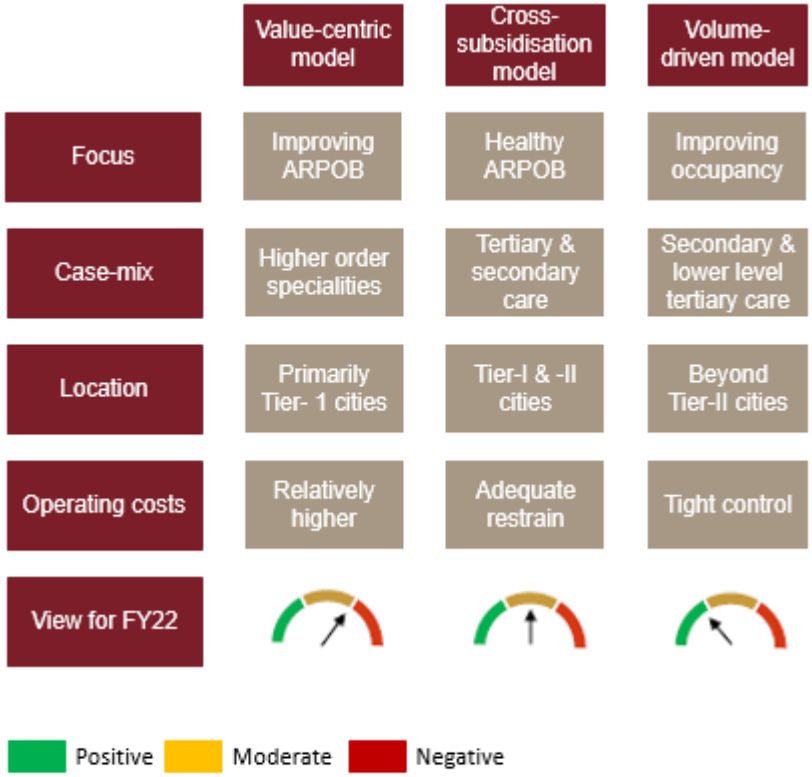
Visa curbs and grounding of inbound airlines is expected to wipe out revenues (to the tune of 8-10%) from the high-margin medical tourism business for major hospitals in metros. Prospects for this vertical remain bleak during the fiscal 2022 as well, as people would continue to exercise caution while travelling to India as cases of new variant increase risks.

Hospital industry margins to further erode in fiscal 2022

Loss of revenue will translate into margin erosion for hospitals as the sector has higher share of fixed operating costs. CRISIL Research has estimated an erosion of 400-500 basis points in margins in fiscal 2021 with margins seeing further compression in fiscal 2022. Though the entire sector would be under fiscal stress (especially in the first two quarters of the fiscal 2022 owing to cash flow concerns), major listed hospital chains which have had better financials than their unlisted regional chain peers are expected to face relatively lesser difficulty in tiding over this stress.

While the government has released an emergency fund of ~Rs 150 bn for a three-year period to procure personnel protective equipment (PPE), N-95 masks and fund Covid treatment costs, an observation has been that states which traditionally had relatively inferior government bed density have not been able to combat or control the pandemic to the extent of states that have a better public healthcare infrastructure in place. And with some of those former states witnessing a faster increase in the number of cases and subsequent increase in fatalities (the national case fatality rate is 3-5%), the reliance of these states on the private sector will be greater for testing as well as treatment facilities.

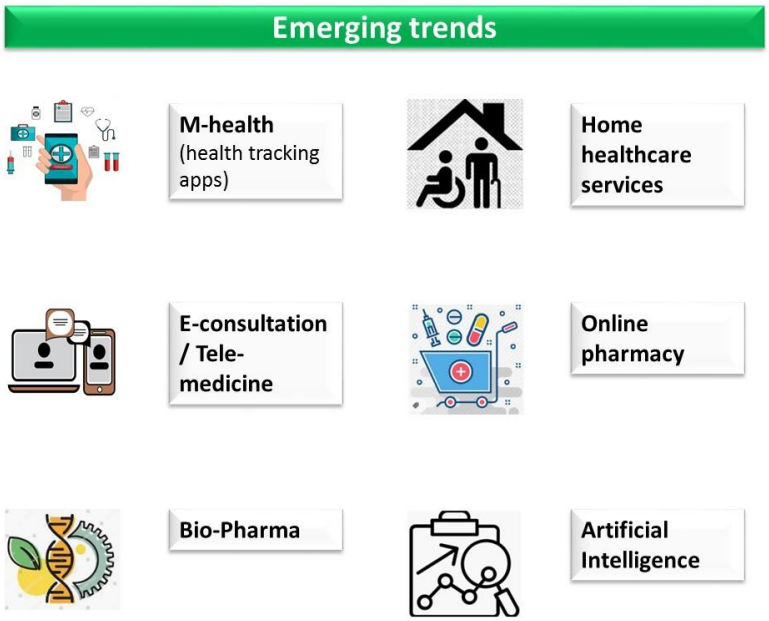
Impact of the pandemic on different business models



Source: CRISIL Research

- Hospitals focussed on specific specialities such as oncology, orthopaedics, etc, will see faster recovery (catering to deferred essential surgeries)
- Dependence on medical tourists in Tier-1 cities to shave off revenues for hospitals in fiscal 2022
- Volume-driven dependence on government schemes to aid volumes in the second half for empanelled hospitals
- Compliance and additional sanitary measures (such as PPE) along with testing of employees with lead to an increase of 3-5% in treatment costs

Consumers prefer convenient, affordable and personalised treatments



The need for social distancing and contactless services in the post-Covid world is changing consumer preferences.

Already this has resulted in the growth of mobile health (M-health) with increased use of health-tracking apps apart from the growth in e-consultation and tele-medicine. Besides, home and healthcare services such as those provided by Bengaluru-based start-up Portea, online pharmacies are also gaining traction, along with growing acceptance of bio-pharmaceuticals.

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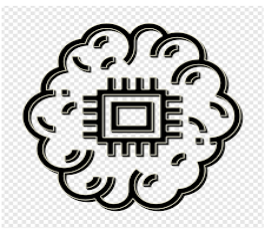
3.4 Emerging technologies in healthcare delivery

Electronic Health Records



Artificial Intelligence, Blockchain

Radiology information system

Clinical decision support system

Mobile-based applications

Telemedicine

Robotic surgery

Wearables and sensors

The healthcare industry, like other industries, is constantly evolving in terms of technology. Developments in information technology have helped create systems that ensure faster and reliable services. While, on the one hand, these systems help increase reach and quality of healthcare delivery systems across the country, on the other, they enable healthcare delivery providers to improve efficiency by helping them in resource planning, maintaining patient records, etc. CRISIL Research expects the advent of 5G, smartphone penetration, and increasing health-conscious population to deepen digital healthcare penetration.

Electronic health records

EHRs are designed to manage detailed medical profile and history of patients such as medication and allergies, immunisation status, laboratory test results, and radiology images. Information stored in EHRs can be in a combination of various formats including picture, voice, images, graphs, and videos. Besides storing information, EHRs have the capability of analysing data with respect to a specific ailment, generating customised reports, setting alarms and remainders, providing diagnostic decision support, etc.

EHRs can be shared between multiple systems allowing doctors from various specialties and hospitals to share the same set of patient data. This feature helps improve coordination between doctors, saves time, and prevents redundancy of recreating medical records. EHRs allow medical histories to be transferred quickly and accurately, thereby ensuring effective and timely treatment. They can be secured with various privacy settings.

Artificial Intelligence (AI) and blockchain

Healthcare establishments like hospitals are looking at opportunities to deploy AI or/and blockchain in improving their operating efficiency – scheduling appointments depending on the gravity of the issue, healthcare monitoring, etc, thereby minimising human error through technological intervention. For instance, NITI Aayog has extended its support to an AI-based project - Radiomics, which is also supported by Tata Memorial Centre Imaging Biobank.

Apollo has partnered with Microsoft to create a cardiovascular disease risk score application programme interface (API) for assigning risk scores to cardiac patients in India. Max Healthcare is also in the process of piloting AI and machine learning (ML) algorithms for prediction of readmission of myocardial infractions, along with being involved in a project concerning speech to text technology for accurately capturing clinical and radiology information in the systems.

The partnership is beneficial not just for the hospitals, but also for the tech companies that test these technologies on hospital patient data, like Google trying to use AI for detecting diabetic retinopathy at Aravind Eye Care hospitals.

Radiology information system

RIS is a tool that allows managing digital copies of medical imagery such as X-ray, MRI, ultrasound, and associated data on a network. RIS is used by doctors to access medical imagery data from multiple locations. It is connected to medical equipment such as X-ray, MRI and ultrasound machines, which generate diagnosis results in the form of images and graphs.

The RIS directly captures results and feeds them to EHRs, central databases or remote databases. RIS systems are integrated with a dedicated picture archiving and communication modules which ensures that the pictures are stored in a systematic manner and transferred accurately to the intended database or recipient.

Implementation of RIS allows hospitals eliminate the need of generating and maintaining medical imagery on expensive films. RIS enable hospitals to store complete radiology history of patients together. This feature allows generating detailed analytical reports on patient's medical history.

Clinical decision support system

CDSS is a software designed to assist doctors in taking decisions pertaining to the diagnosis and treatment of patients. A CDSS is supported by a large database that has detailed information on ailments with data aspects ranging from symptoms to diagnosis. The database is supported by a set of rules that help generate accurate results for the query made by the user. It also contains patient specific information such as medical history, allergies, etc, which helps doctors to make effective decisions on the treatment. CDSS databases are open-ended to allow addition of information on newly discovered diseases, procedure and medications, rectification of erroneous procedures, and updating of patient information.

Mobile-based application

Healthcare delivery is also seeing an influx of mobile-based applications (mobile apps) to assist doctors as well as patients. These apps provide features such as self-diagnosis, drug references, hospital/doctor search, appointment assistance, electronic prescriptions, etc. While certain apps allow doctors to obtain information on drugs, dosage, contradictions, disease/ condition references and procedures; others allow patients to locate doctors, fix appointments, and opt for video consultations. Furthermore, there are apps that help patients save their medical records and keep them updated regularly.

Even the government is looking at adopting these measures with the launch of UMANG (Unified Mobile Application), which offers 242 services across 57 departments in 12 states. It has a feature to book hospital appointments, check blood availability, and view medical reports online on registration.

Wearables and sensors

With awareness on healthcare increasing, people have started adopting wearables and sensors that keep a track of the vitals of the user. Wearables and sensors also have data about the user’s historical health records and sends out alerts in case of any irregularities. Some sensors are used solely from a curative healthcare perspective, to lead a healthy life with a proper fitness routine.

3.5 Key growth drivers of healthcare delivery industry

A combination of economic and demographic factors is expected to drive healthcare demand in India. CRISIL Research believes the PMJAY scheme launched by the government would also support these drivers.

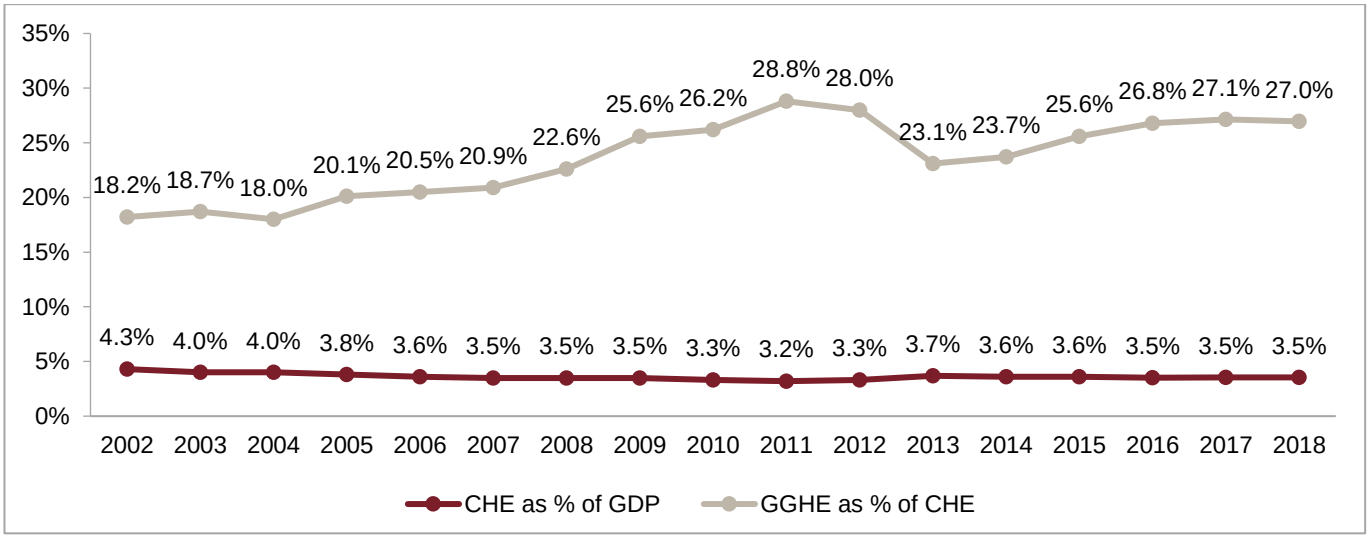
Source: CRISIL Research

India lags global benchmarks in healthcare infrastructure, both in terms of physical infrastructure as well as personnel. However, the picture is bleak even on the healthcare indicators front. In case of life expectancy at birth, which reflects the overall mortality of the population, India stands at a distant 68.8 years in comparison with the global average of 71.4 years. This is despite life expectancy at birth growing at 0.6% CAGR between 2000 and 2017.

Government policies to improve healthcare coverage

The government has raised its healthcare budget for fiscal 2022 to Rs 1,221.2 bn, keeping in line with its goal to raise its healthcare spending to 2.5% of GDP by 2025 under the National Health Policy, 2017.

Government expenditure as a proportion of current healthcare expenditure



Note: CHE: Current healthcare expenditure; DGGHE: Domestic general government healthcare expenditure
Source: WHO Global Healthcare Expenditure Database

According to the government, inpatient hospitalisation costs have risen by 300% over the past 10 years and nearly six million families had to sell assets or borrow money to undertake treatment, thereby driving them to poverty.

The PMJAY was launched on September 23, 2018, with the objective of providing affordable healthcare. The scheme primarily has three objectives:

1. Strengthening of physical health infrastructure: Sub-centres

Upgradation of 1.5 lakh 'Health and Wellness' centres to provide comprehensive healthcare, including coverage of non-communicable diseases and maternal and child health services. These centres would also provide essential medicines and diagnostic services free of cost. Inclusion of new ailments under the ambit of the scheme would go a long way in ensuring focus on preventive care as opposed to only curative care. A strong referral network is vital in providing a continuum of care.

2. Strengthening of physical health infrastructure: Government hospitals

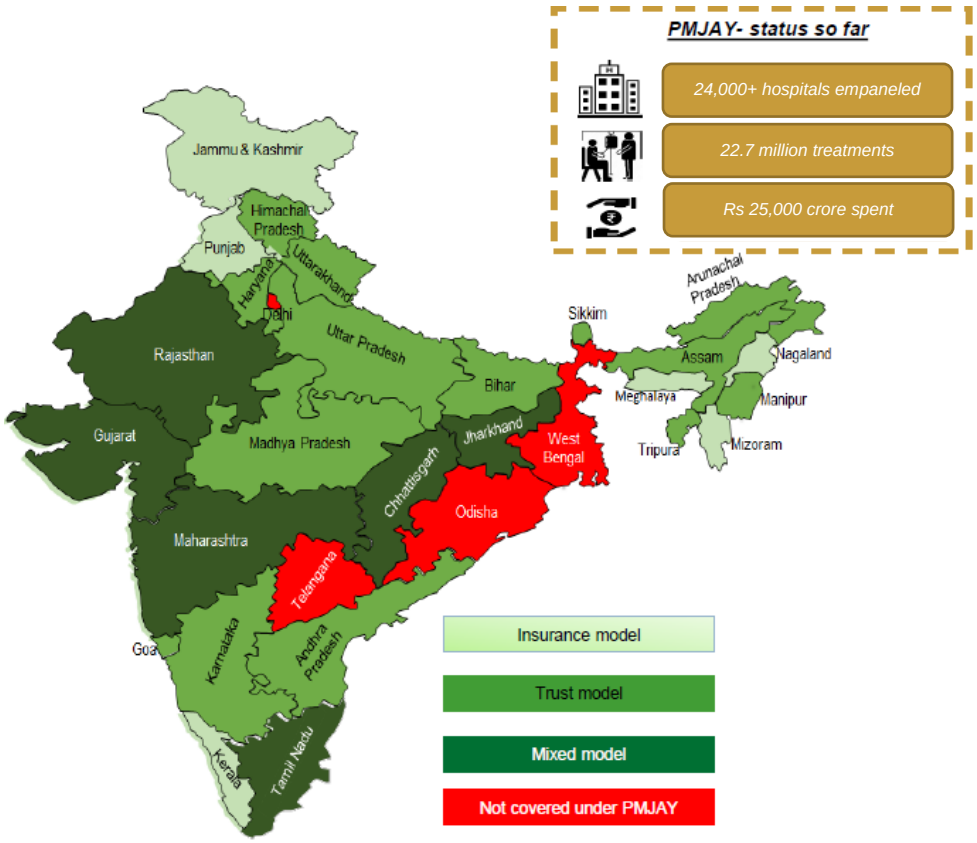
Setting up of 24 new government hospitals and medical colleges and upgradation of existing district hospitals. The intention is to have at least one medical college for three parliamentary constituencies. The government already has a scheme in place, Pradhan Mantri Swasthya Suraksha Yojana (PMSSY), to correct the geographical imbalance in the availability of tertiary healthcare. Six All India Institute of Medical Sciences (AIIMS), one each at Patna (Bihar), Raipur (Chhattisgarh), Bhopal (Madhya Pradesh), Bhubaneshwar (Odisha), Jodhpur (Rajasthan), and Rishikesh (Uttarakhand), have been set up. An AIIMS is under construction at Rae Bareli (OPD services have started) and 13 new ones have been announced by the government. The aim is to tackle issues of inadequate healthcare infrastructure and personnel.

3. Expansion of health insurance coverage: Ayushman Bharat

This involves a provision of Rs 0.5 million assured healthcare coverage to each family that is eligible, selected on the basis of inclusion under the Socio Economic Caste Census (SECC) list. Nearly 107.4 million families will be covered under the scheme. All existing central and state health insurance schemes will be subsumed under Ayushman Bharat. The model of implementation of the scheme (via insurance company, trust or mixed model) is the state's prerogative.

However, healthcare delivery at affordable prices would require a shift in focus towards capitalising on volumes (with nearly 165 million new people coming under a healthcare scheme) rather than on value (via margins). The government has started an initiative of National Health Stack (NHS), a shared digital framework for both private and public hospitals. It is expected to digitise all health records and keep track of all details concerning healthcare enterprises in the country. The scheme is well-intentioned and holds huge potential for the healthcare delivery and allied industries, but the mechanism for quality control and monitoring along with raising resources for implementation will be a key monitorable.

Pradhan Mantri Jan Arogya Yojana adds a demand impetus



Note: PMJAY stands for Pradhan Mantri Jan Arogya Yojana
Source: PMJAY-AB updates, CRISIL Research

Under the trust-based model, the scheme is directly implemented by the State Health Authority (SHA) without the intermediation of the insurance company. The financial risk of implementing the scheme is borne by the government in this model. Even though no insurance company is involved, the SHA employs the services of an Implementation Support Agency (ISA) for claim management and related activities.

In the insurance model, the SHA competitively selects an insurance company through a tendering process to manage PMJAY in the state. Based on a market-determined premium, the SHA pays premium to the insurance company per eligible family for the policy period and the insurance company, in turn, completes the claims settlement and makes payments to the service provider. The financial risk for implementing the scheme is also borne by the insurance company in this model.

Under the hybrid/mixed model, the SHA engages both the assurance/ trust and insurance models mentioned above in various capacities with the aim of being more economic, efficient, flexible and allowing convergence with the state scheme. This model is usually employed by brownfield states which had existing schemes covering a larger group of beneficiaries.

Ayushman Bharat will further provide volume momentum to the sector, with the scheme on its full scale implementation providing healthcare assurance of Rs 5 lakh per family (on floater basis) to nearly 10.74 crore families (the actual coverage would be greater on account states extending the scheme to even some sections of the uncovered populace). As on November, 2021, nearly 22.7 million treatments had taken place under Ayushman Bharat since the inception of the scheme in September, 2018. More recently, nearly 725,000 patients have received treatment worth ~Rs 2800 crore for Covid under the scheme (as of July, 2021).

In terms of implementation till date, most states have signed a MoU with the National Health Agency (NHA) under varied implementation models- Trust based, Insurance based or Mixed model, however, some states are yet to kick start full scale adoption. However, states like Madhya Pradesh, Uttar Pradesh and Bihar which were devoid of any health insurance scheme have extended coverage under PMJAY to more than 25% of its population.

CRISIL Research believes that with increased coverage and increased awareness, the claim ratio under the scheme is expected to improve, unlike in the past when claim ratio under government schemes has remained in the range of 1-2% vis`-a-vis` 7-8% under individual health insurance schemes. With the NHA undertaking measures to improve awareness about the scheme, an incremental demand of nearly 100-200bps for the private hospital players on account of PMJAY is expected.

But the scheme's progression and adoption by private players, will be primarily dependent on a) timely payment of dues to hospitals and b) attractive package rates.

For assessing the probable fiscal requirements of the scheme, (considering the Rs 25000 crore spend on nearly 20 million+ treatments), the assumption of per case spend of ~Rs 12,000 and a claim ratio of 2% translates into annual expenditure of ~Rs 13,000 crores. The claim ratio may rise in the initial years of implementation with most beneficiaries coming under the higher coverage for the first time, the claim ratio may rise in the initial years of implementation, leading to an increase in overall expenditure. Ergo, making payment days to hospitals crucial and monitorable as it can affect prolonged participation of players under the scheme and also their fiscal profile. (During erstwhile insurance schemes, there were cases of hospitals facing cash flow issues on account of delayed payments by state authorities or insurance companies).

Players will also remain cautious in major states like Bihar, Uttar Pradesh and Madhya Pradesh which are implementing health insurance scheme for the first time and have fiscal deficit between 1.7% and 3.2%.

Package rates has been another area of concern for most corporate hospitals, reflecting in the low participation of the private sector. Out of 33,000 private hospitals (as per ROHINI database), only 28% have participated in the scheme. However, it should be noted that though the share of private sector is 40% in facilities enrolled for the scheme, but ~54% of the beneficiaries have been treated in private hospitals . This clearly indicates the preference of beneficiaries for private hospitals, given that the government infrastructure is already over- burdened. Amongst the treatments sought, 57% of the total spend has been on tertiary treatments, with orthopaedics, cardiology, cardio-thoracic, oncology and urology being the most preferred, indicating the unmet demand in this category.

Another point to note is the increase in average treatment cost increases as healthcare coverage increases. In case of RSBY which had a coverage of Rs 30,000 witnessed an average treatment cost of Rs 4,825, while state schemes which had health cover ranging from Rs 1 -2 lakh witnessed an average treatment cost of Rs 8,900. In case of PMJAY, the average amount per treatment till date is around ~Rs 12,500.

According to analysis by CRISIL Research, average treatment cost in large hospitals is upwards of Rs 70,000. And analysis of key treatment costs with GIPSA rates indicate that PMJAY package rates are almost 30-35% of GIPSA rates. Owing to which the government evaluated changes in existing packages and increased rates of ~ 270 packages under the scheme.

Given that 65% of the population is living in rural areas, government is incentivizing private investments in these regions. Currently, private players find it difficult to replicate the model that worked for them in tier I and creamy tier II locations, due to the relatively lower revenue per bed in these regions (due to the low paying capacity in these areas and occupancy of existing facilities. CRISIL Research believes that a volume centric model focusing on secondary and lower level tertiary care segments with tight control on costs will allow private players to enter and be profitable in rural areas too.

To encourage creation of medical infrastructure in tier II and III cities, government has announced viability gap funding up to 40% of the total project cost, applicable to hospitals willing to empanel under Ayushman Bharat. However, CRISIL Research believes that the proposed incentive may not be adequate to compel private players to invest heavily in these regions.

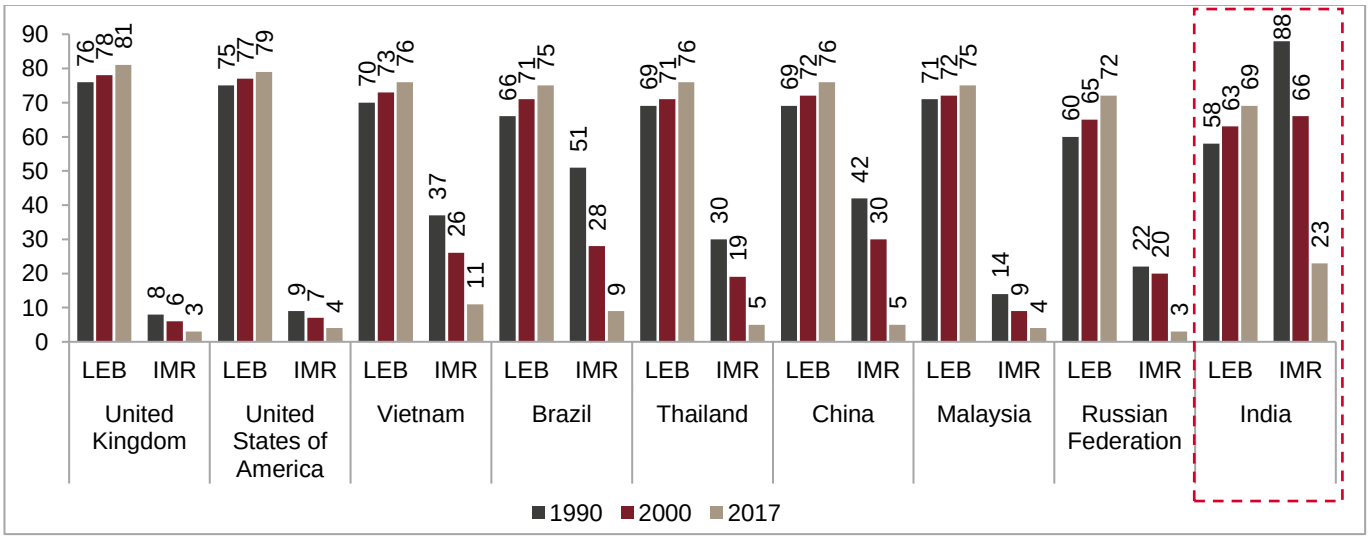
According to a CRISIL Research analysis, for a 100 bed hospital located in a rural area with a capital outlay of ~Rs 200 million (funded by a debt to equity of 1 time) for an EBITDA margin of 10-12%, we believe a VGF of at least 50% of the total project cost would be required to make investments in rural areas viable. [On an assumption of interest rate of 11% and IRR calculation over a 10 year period].

Major corporate chains have decided to take unit level decision to participate in the scheme so far. Also, from private sector's perspective, participation will be assessed from the view of utilization and not profitability. Hence, over the medium term, significant supply addition just on account of Ayushman Bharat is unlikely, unless government makes the VGF model more lucrative. However, players operating at low occupancy are more likely to participate in order to improve utilization.

With life expectancy improving and changing demographic profile, healthcare services are a must

With improving life expectancy, the demographic profile of the country is also witnessing a change. As of 2011, nearly 8% of the Indian population was of 60 years or more, and this is expected to surge to 12.5% by 2026. However, the availability of a documented knowledge base concerning the healthcare needs of the elderly (aged 60 years or more) remains a challenge. Nevertheless, the higher vulnerability of this age group to health-related issues is an accepted fact.

Life expectancy (at birth) and infant mortality rate: India vs others

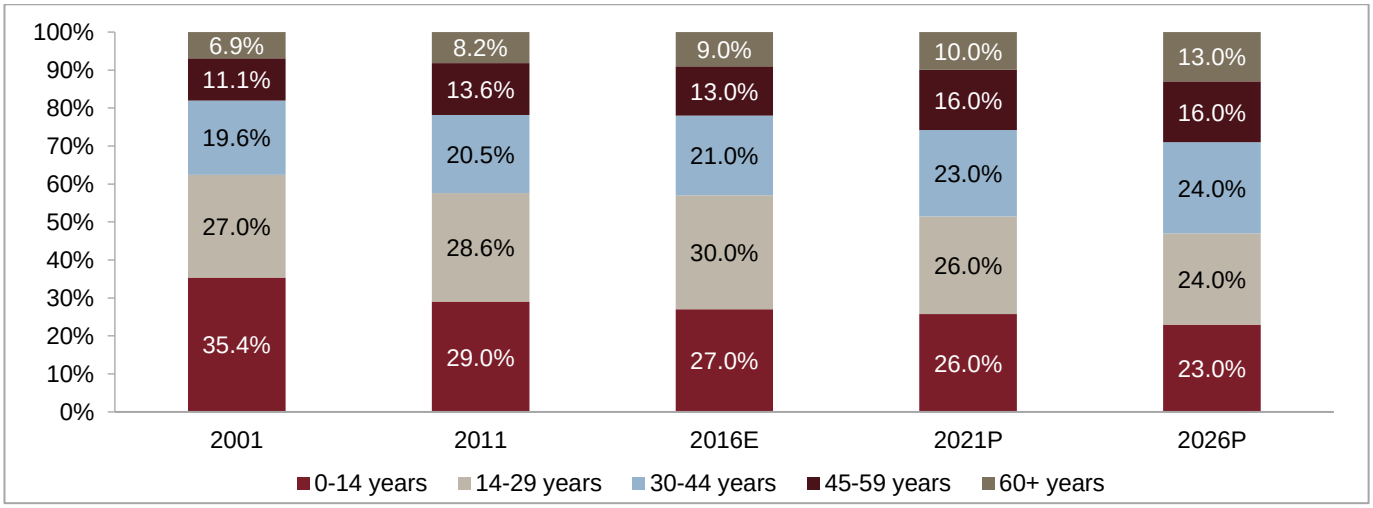


Note: LEB – life expectancy at birth; IMR – infant mortality rate (probability of dying by age one year per 1000 live births)

Source: WHO World Health Statistics 2020

According to the Report on Status of Elderly in Select States of India, 2011, published by the United Nations Population Fund (UNFPA) in November 2012, chronic ailments, such as arthritis, hypertension, diabetes, asthma, and heart diseases, were commonplace among the elderly, with ~66% of the respective population reporting at least one of these. In terms of gender-based tendencies, while men are more likely to suffer from heart, renal and skin diseases, women showed higher tendencies of contracting arthritis, hypertension, and osteoporosis.

Population in 60+ age group to grow faster



Source: Census, CRISIL Research

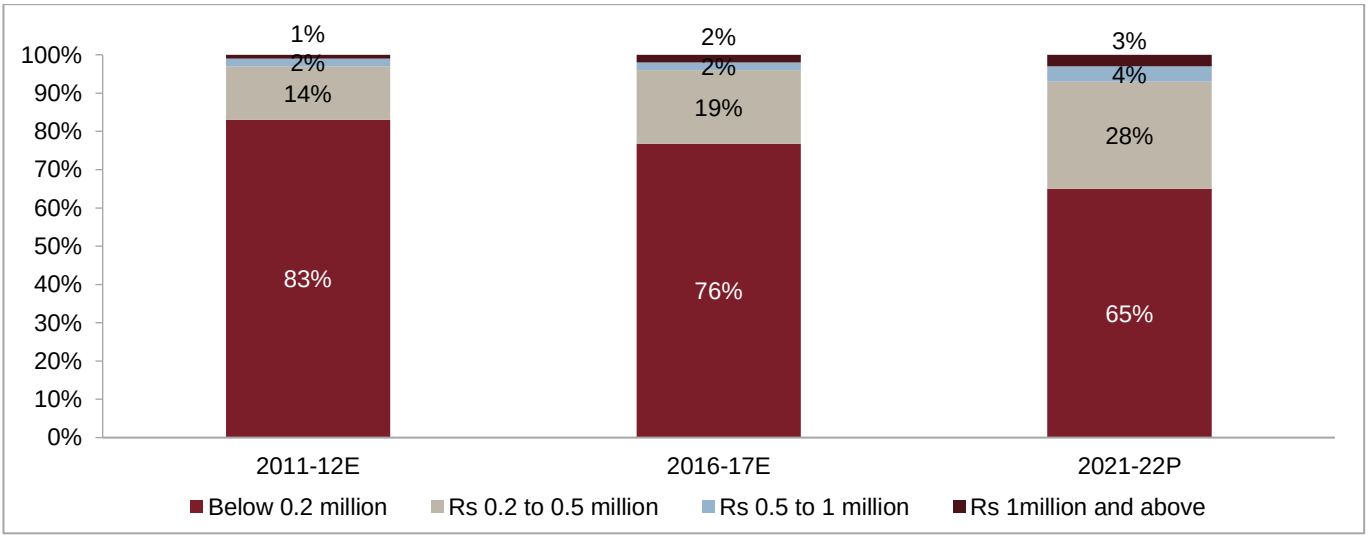
With the Indian population expected to grow to ~1.4 billion by 2026 and considering the above mentioned factors, the need to ensure healthcare services to this vast populace is imperative. This also provides a huge opportunity to expand into a space that bears enormous potential.

Rising income levels to make quality healthcare services more affordable along with increase in healthcare budgets by states

Though healthcare is considered a non-discretionary expense, considering that ~83% of households in India had an annual income of less than Rs 0.2 million in fiscal 2012, affordability of quality healthcare facilities remains a major constraint.

Growth in household incomes and, consequently, disposable incomes, are critical to the overall growth in demand for healthcare delivery services in India. The share of households falling in the income bracket above Rs 0.2 million is expected to go up to 35% in fiscal 2022 from 23% in fiscal 2017. They provide a potential target segment (with more paying capacity) for hospitals.

Income demographics



Source: CRISIL Research

Uttarakhand and Delhi have shown the highest jumps in healthcare budget for FY22 compared to previous year among the key states under study

State	FY22 Health and Family Welfare Budget (Rs. Million)	Ratio of health and family welfare budget to total expenditure (FY22)	Increase over FY21 budgeted (%)	Key provisions
Uttar Pradesh	3,20,090	6%	22%	- Rs 53,950 million has been allocated towards National Rural Health Mission - Rs 13,000 million has been allocated to Ayushman Bharat Yojana
Delhi	99,340	14%	33%	- Rs 12,930 million has been allocated for capital projects for development of health-related infrastructure, including upgradation of existing infrastructure in hospitals. Rs 14,800 million has been allocated for the Delhi State Health Mission. - Rs 500 million has been allocated for providing free COVID-19 vaccines to Delhi citizens
Uttarakhand	34,390	6%	45%	- Rs 7,920 million has been allocated towards allopathic rural health services, and Rs 7,750 million has been allocated towards urban health services. - Rs 2,290 million has been allocated for the construction of three new medical colleges
Haryana	73,170	5%	17%	- Rs 8,830 million has been allocated towards the strengthening of urban hospitals and dispensaries - Rs 8,370 million has been allocated as grants for National Rural Health Mission
Madhya Pradesh	1,16,190	5%	23%	- Rs 30,350 million has been allocated to the National Health Mission - Rs 12,080 million has been allocated for hospitals and dispensaries at district level

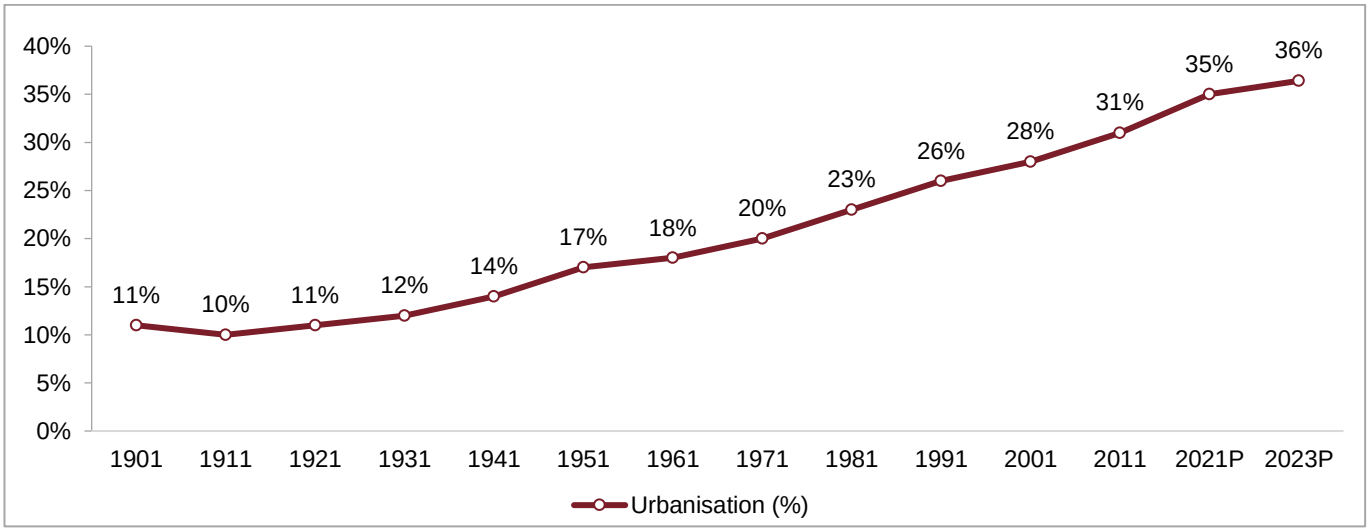
Source: State Budgets, CRISIL Research

Increasing health awareness to boost hospitalisation rate

Majority of healthcare enterprises in India are more concentrated in urban areas. With increasing urbanisation (migration of population from rural to urban areas), awareness among the general populace regarding presence and availability of healthcare services for both preventive and curative care is expected to increase.

CRISIL Research, therefore, believes that the hospitalisation rate for in-patient treatment as well as walk-in out-patients will improve with increased urbanisation and increasing literacy.

Urban population in India (% of total population)



Source: UN World Urbanisation Prospects: The 2018 revisions

Non-communicable diseases, a silent killer

As opposed to the decreasing rate in communicable diseases, lifestyle-related illnesses or non-communicable diseases (NCDs) have been increasing rapidly in India over the past few years. The contribution of NCDs to the disease profile has risen from 30% in 1990 to 55% in 2016. Statistics show that these illnesses accounted for nearly 62% of all deaths in India in 2016.

As per the World Economic Forum, the world will lose nearly $30 trillion by 2030 for NCD treatments and India's burden from this will be $5.4 trillion.

In 2016, of the total disease burden, the contribution of group of risks (unhealthy diet, high blood pressure, high blood sugar, high cholesterol and overweight), which mainly causes ischemic heart disease, stroke and diabetes, had risen to nearly a quarter. The combination of these risks was highest for states such as Punjab, Tamil Nadu, Kerala, Andhra Pradesh and Maharashtra, but has increased in all other states as well. There were 38 million cases of cardiovascular diseases (CVDs) in 2005, which rose to nearly 64 million cases in 2015.

CRISIL Research believes that NCDs exhibit a tendency to increase in tandem with rising income. WHO projects an increasing trend in NCDs by 2030, following which CRISIL forecasts demand for healthcare services associated with lifestyle-related diseases such as cardiac ailments, cancer and diabetes to rise.

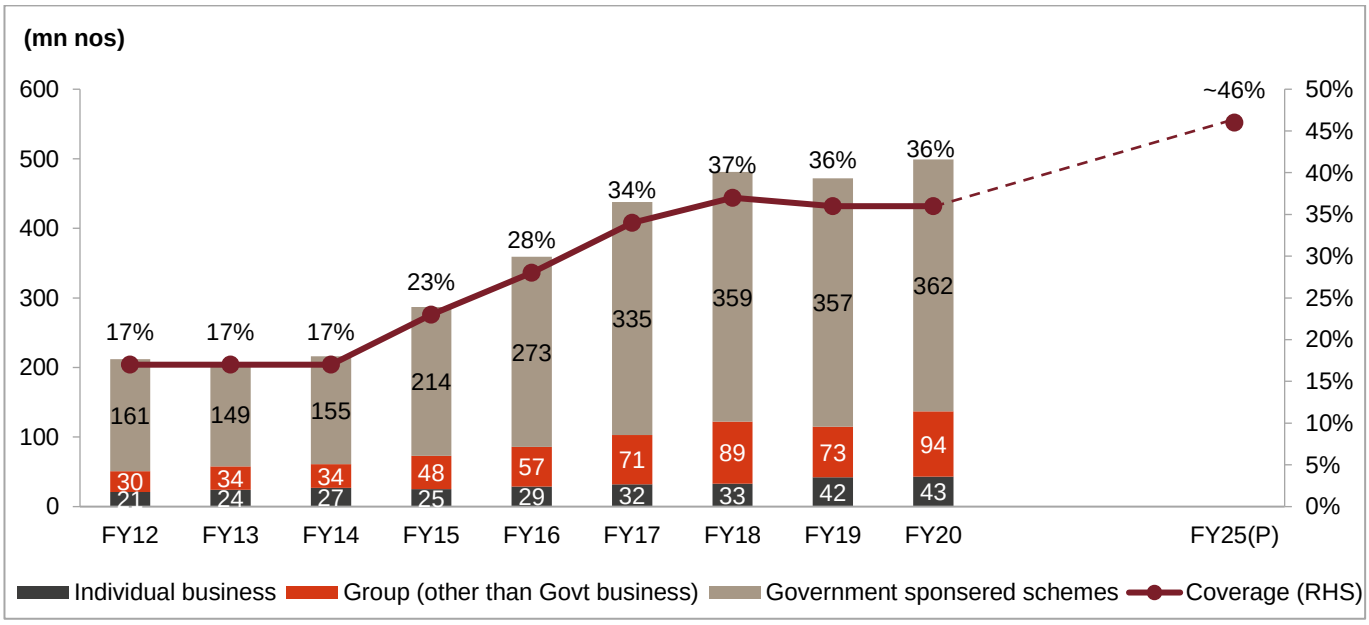
Another emerging market in the country is orthopaedics, which currently comprises a very small proportion compared with NCDs, but has a potential market in the country. The orthopaedics market can be classified into four different segments, viz., knee, hip, trauma, and spine, of which the knee-replacement market holds the biggest

share, followed by trauma and spine. Hip replacement in India is still a very small segment compared to knee replacement, whereas it is the opposite around the world.

Growing health insurance penetration to propel demand

Low health-insurance penetration is one of the major impediments to the growth of the healthcare delivery industry in India, as affordability of quality healthcare facilities by the lower-income groups remain an issue. Health insurance coverage has increased from 17% in fiscal 2012 to ~36% in fiscal 2020. As per the Insurance Regulatory and Development Authority (IRDA), nearly 499 million people have health insurance coverage in India (as of fiscal 2020), as against 288 million (in fiscal 2015), but despite this robust growth, the penetration in fiscal 2020 stood at only 36%.

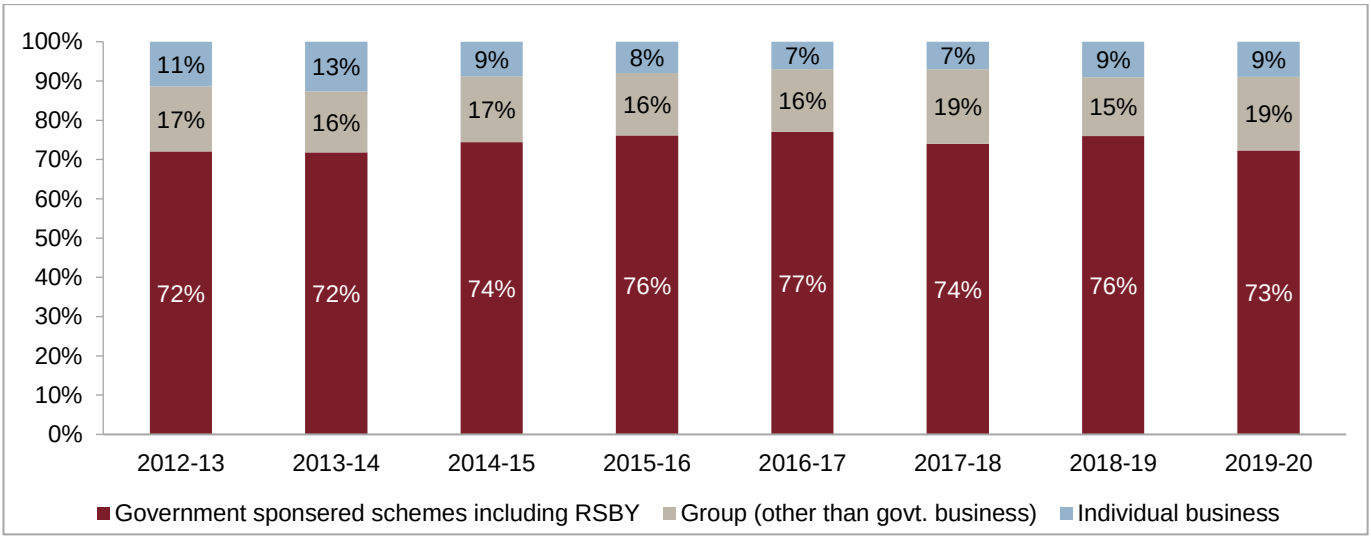
Population-wise distribution among various insurance businesses (million)



Source: IRDA annual report 2019-20

As is evident, the share of government-provided insurance is greater than that due to insurance policies availed of by individuals not covered under any schemes. Government or government-sponsored schemes, such as the Central Government Health Scheme (CGHS), Employee State Insurance Scheme (ESIS), Rashtriya Swasthya Bima Yojana (RSBY), Rajiv Arogyasri (Andhra Pradesh government), and Kalaignar (Tamil Nadu government) account for ~75% of health insurance coverage provided. The remaining is through commercial insurance providers, both government (Oriental Insurance and New India Assurance.) and private (ICICI Lombard and Bajaj Allianz) players.

Percentage split of number of persons covered under health insurance



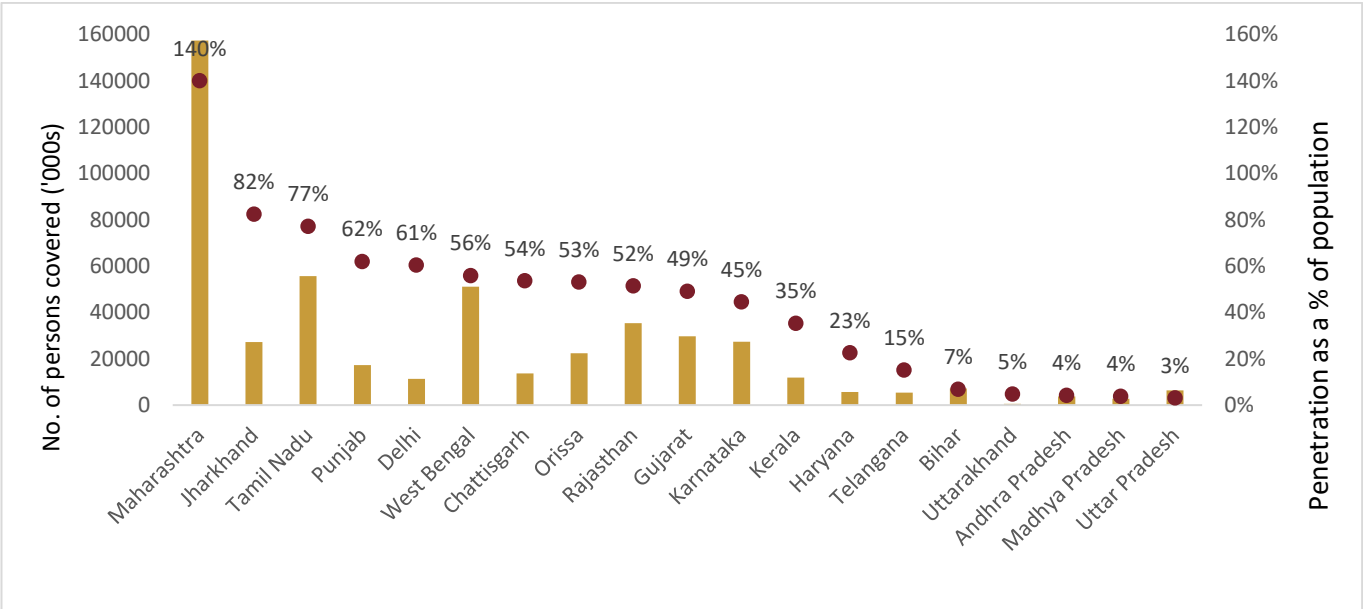
Source: IRDA annual report 2019-20

CRISIL Research sees that while low penetration is a key concern, it also presents a huge opportunity for the growth of healthcare delivery industry in India. With the PMJAY scheme and other growth drivers, the insurance coverage in the country is expected to increase to nearly 46% by FY25.

With health insurance coverage in India set to increase, hospitalisation rates are likely to go up. In addition, health check-ups, which form a mandatory part of health insurance coverage, are also expected to increase, boosting demand for a robust healthcare delivery platform.

Uttar Pradesh, Madhya Pradesh and Andhra Pradesh underpenetrated in terms of health insurance

State-wise penetration and number of persons covered under health insurance



Note: 17 states under the non-special category given by Reserve Bank of India (except Goa) have been considered for the analysis viz Andhra Pradesh, Bihar, Chhattisgarh, Gujarat, Haryana, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Telangana, Uttar Pradesh and West Bengal; Population of all states have been considered as per Census 2011

Source: Handbook on Indian insurance statistics F.Y. 2019-20; IRDA, CRISIL Research

Uttar Pradesh, Madhya Pradesh and Andhra Pradesh are underpenetrated states in terms of health insurance, with penetration of ~3% and 7% respectively. Uttar Pradesh has the lowest penetration amongst the states compared above. In terms of people covered under health insurance in the state of Uttar Pradesh, the metric has de-grown during the period FY16 to FY20. However, with schemes such as the PMJAY, health insurance penetration in these states is expected to grow further in the coming years, thus providing a boost to private hospitals.

Medical tourism in India

Medical tourism has gained momentum over the years and India is fast emerging as a major medical tourist destination, given the relatively low cost of surgery and critical care in India. The healthcare costs in developed countries is relatively higher than in India. India is also an attractive destination due to the presence of technologically advanced hospitals with specialised doctors and facilities, such as e-medical visa.

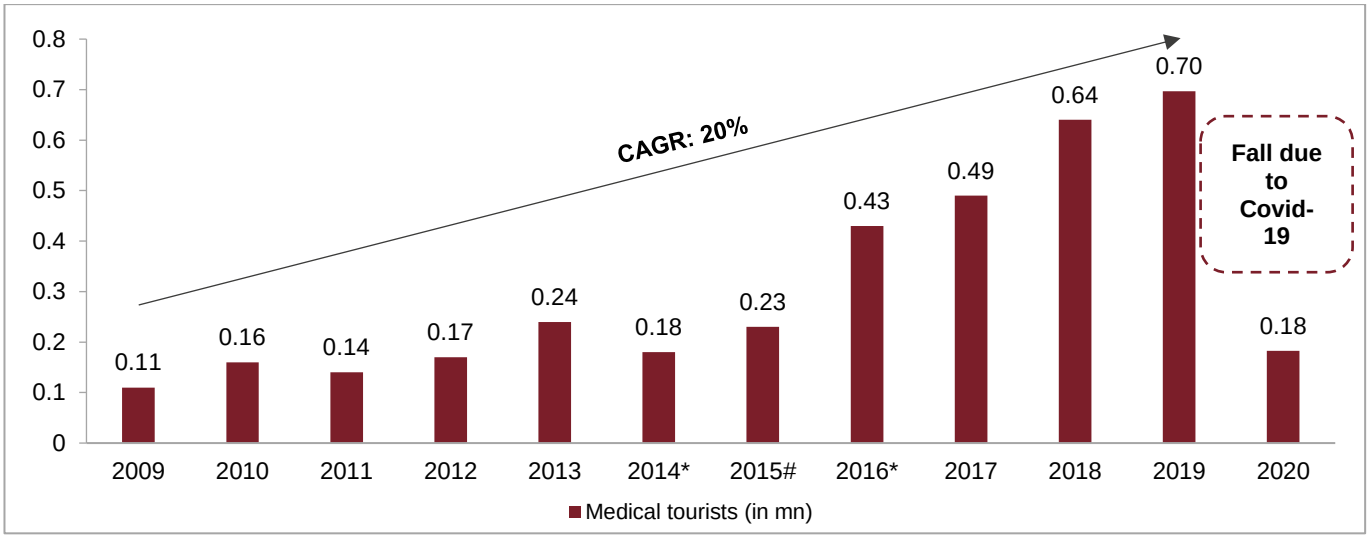
Treatments mostly sought after in India are for heart surgery, knee implant, cosmetic surgery and dental care, due to their relatively low costs. Medical tourism in India is driven by the private sector. A large proportion of medical tourist arrivals are in key metro cities of the country. Despite improving connectivity, the distribution of healthcare facilities is still skewed towards urban areas in comparison with the hinterland. Apart from the lacunae associated with geographical distribution of healthcare delivery, the quality and type of services provided is also varied across locations. Usually, tier 1 cities have more tertiary and quaternary care centres, which is near-absent in smaller towns and rural areas. Delhi-NCR is one of the major hubs for medical tourism in India due to its connectivity by air with all major international destinations and the presence of all modern medical facilities and technologies.

As per the Ministry of Tourism, countries such as Singapore, Malaysia and Thailand also offer medical-care facilities to foreigners, but what differentiates India, apart from state-of-the-art infrastructure and reputed healthcare professionals, is traditional healthcare therapies, such as ayurveda and yoga, combined with allopathic treatments to provide holistic wellness.

According to latest available official data, of the total foreign tourist arrivals in India, the proportion of medical tourists grew from 2.2% (0.11 million tourists) in 2009 to 6.4% (0.6 million tourists) in 2019. The government has constituted a National Medical and Wellness Tourism Board along with providing financial assistance of Rs 6 lakh to medical tourism service providers under market development assistance (MDA) to develop medical tourism in India.

The industry is facing temporary slowdown in medical tourism in recent times due to ongoing pandemic which has led to travel restrictions across the borders restricting travel of medical tourists in India.

Growth in medical tourists*

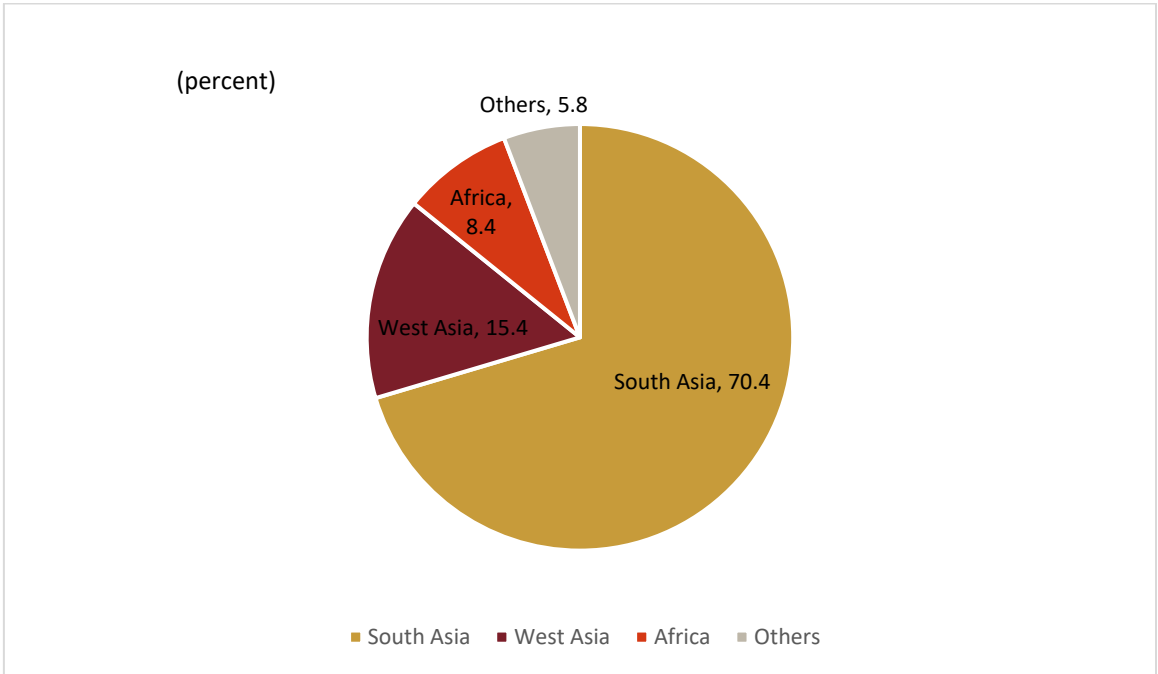


*Note: * includes all types of medical and medical attendant visa; #includes medical visa and medical attendant visa*
Source: Ministry of Tourism

About two-thirds of medical tourism demand from South Asia (2019)

More than 94% of medical tourists are from countries in Africa, west and south Asia. Medical tourists from countries like United Kingdom and Canada are also seeing an increase, given long waiting periods for availing of treatments in these regions.

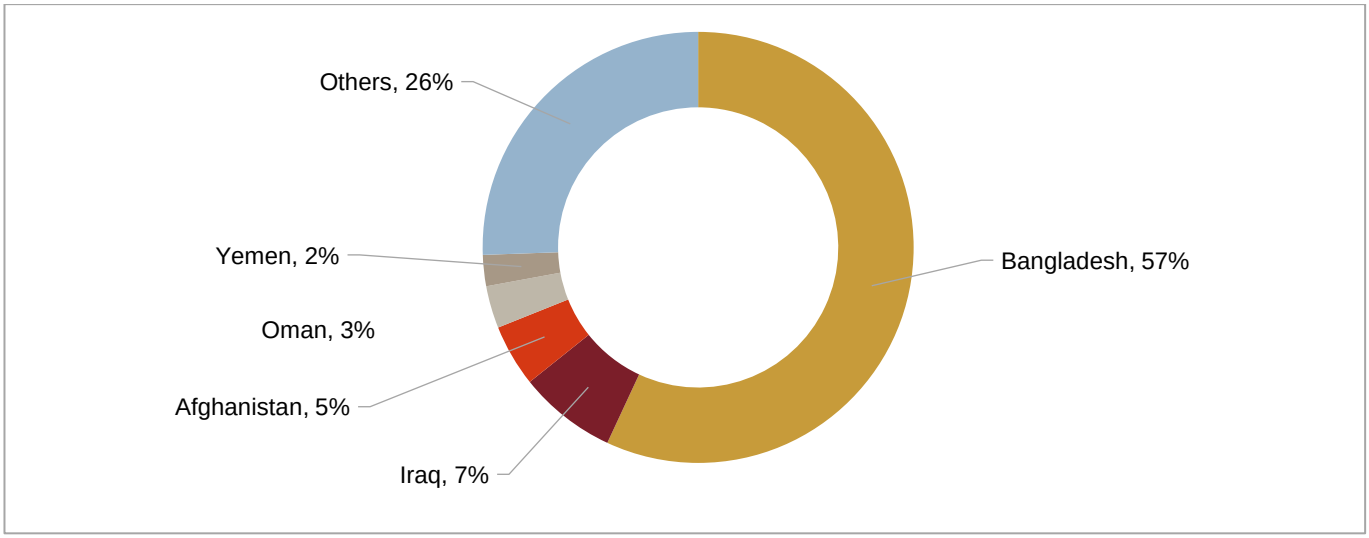
Break-up of medical tourists* by major region of origin (2019)



*Note: * Proportion of medical tourists of the overall foreign tourist arrivals, 2019*

Source: Ministry of Tourism, CRISIL Research

Break-up of medical tourists* by major country of origin (2019)



Note: Based on data as of CY19

Source: Ministry of Tourism

Bangladesh makes up absolute majority when it comes to medical tourists visiting India

57% of medical tourists who visited India in 2019, were from Bangladesh. This was followed by Iraq, who made up 7% of medical tourists, while Oman and Yemen accounted for 3% and 2% of medical tourists respectively. India did not see any medical tourists from Nepal and Bhutan, while Maldives accounted for almost 1% medical tourists in 2019. India did see some medical tourists coming from Sri Lanka which accounted for 0.6% of all medical tourists in the country. Apart from the above countries, India also receives medical tourists from Cambodia, Azerbaijan, Armenia, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Uzbekistan, Ukraine to name a few countries.

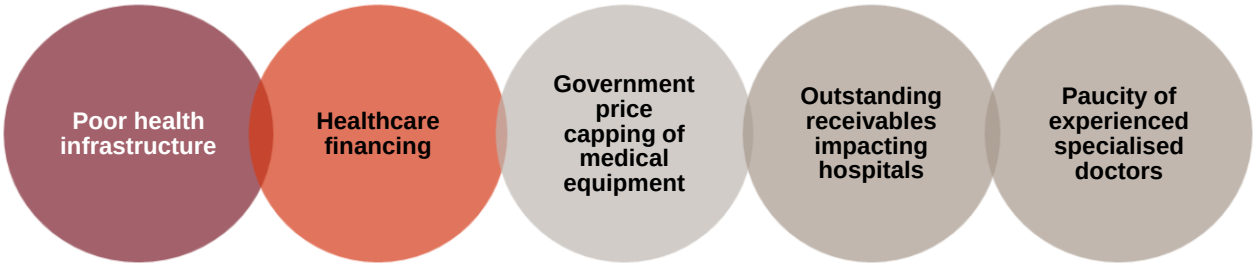
Country-wise cost of key treatment procedures (in $)

Ailments ($)	US	Korea	Singapore	Thailand	India
Hip replacement	50,000	14,120	12,000	7,879	7,000
Knee replacement	50,000	19,800	13,000	12,297	6,200
Heart bypass	144,000	28,900	18,500	15,121	5,200
Angioplasty	57,000	15,200	13,000	3,788	3,300
Heart valve replacement	170,000	43,500	12,500	21,212	5,500
Dental implant	2,800	4,200	1,500	3,636	1,000

Source: CRISIL Research

3.6 Key challenges for the healthcare delivery industry

The potential demand and opportunities in healthcare in India aside, many challenges exist, mainly: inadequate health infrastructure and unequal quality of services provided based on affordability and healthcare financing.

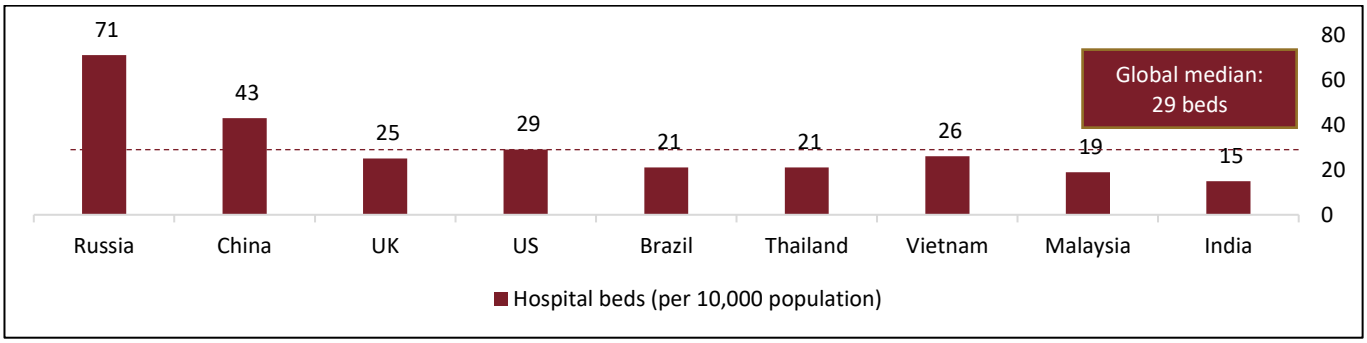


1. Health infrastructure in dire need of improvement

The adequacy of a country's healthcare infrastructure and personnel is a barometer of its quality of healthcare. This, in turn, can be assessed from bed density (bed count per 10,000 population) and availability of physicians and nurses (per 10,000 population).

For India, that's where the concern begins. The country comprises nearly a fifth of the world's population, but has an overall bed density of merely 13, with the situation being far worse in rural than urban areas. India's bed density not only falls far behind the global median of 29 beds, it also lags that of other developing nations, such as Brazil (21 beds), Malaysia (19 beds), and Vietnam (26 beds).

Hospital bed density: India vs. other countries (2018)

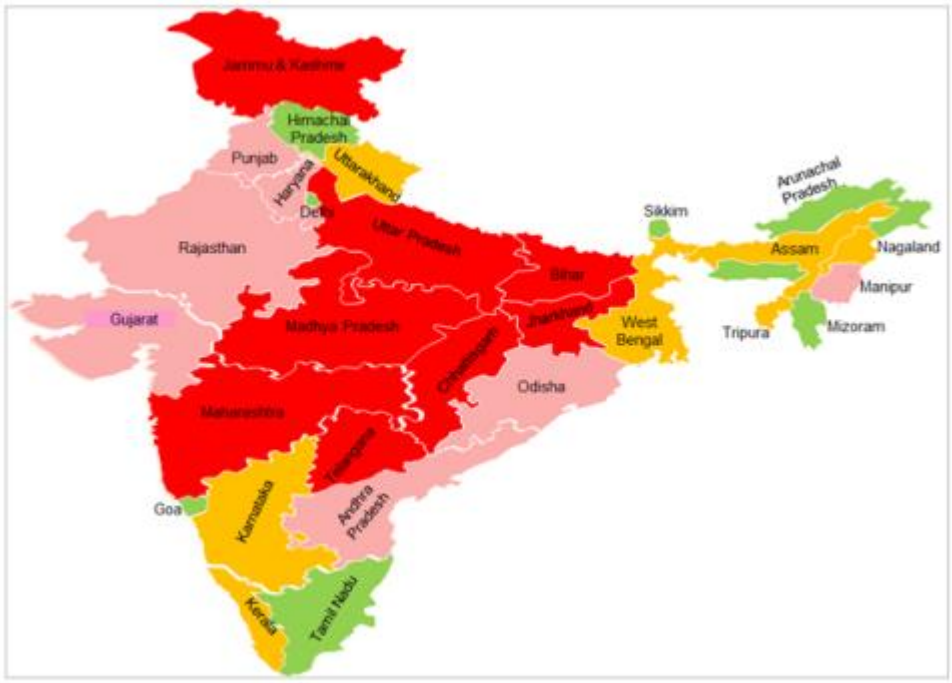


Note: India bed density is estimated by CRISIL Research for 2020

Source: World Health Organization Database, CRISIL Research

The total number of government beds in India are estimated at ~0.8 million. An estimated population of ~1.34 billion implies that 1,632 people on average are served per government bed in the country. Sikkim (34), Mizoram (17), Arunachal Pradesh (16) and Himachal Pradesh (20) have the highest government bed density per 10,000 population. Telangana (1), Bihar (2), Maharashtra, Chhattisgarh and UP (3 each), and MP and Jharkhand, (4 each) have the lowest.

Availability of government beds (per 10,000 population) in India



Note: <4 beds indicates very low density (red)

>4 and <7 beds indicates low density (pink)

<13 beds indicates medium density (yellow)

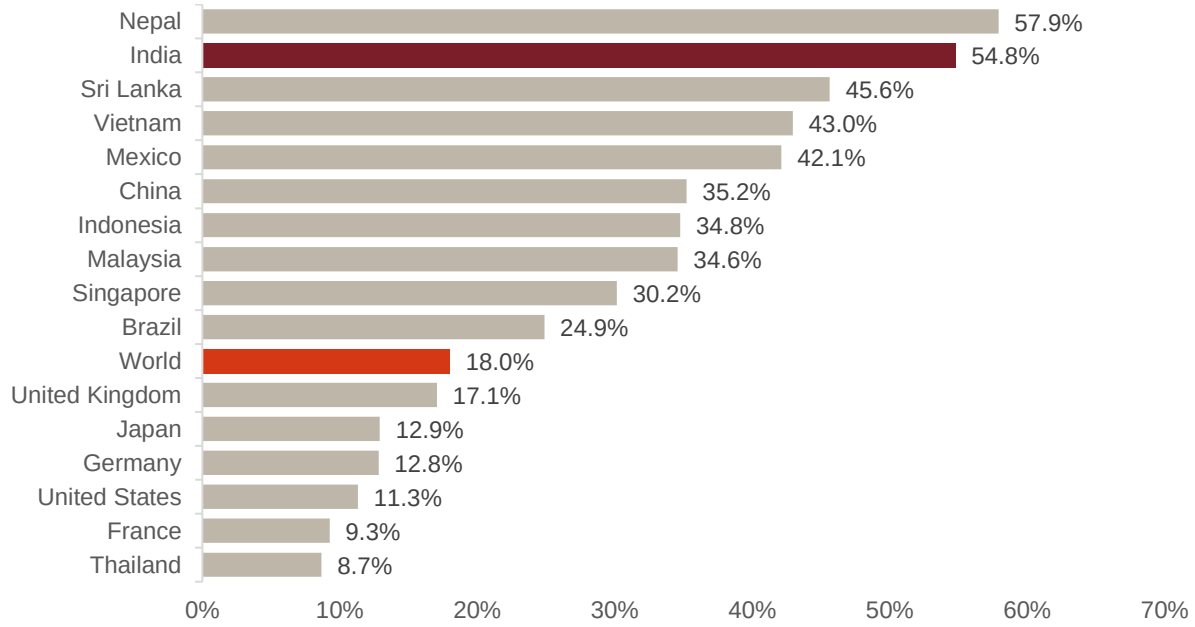
>13 beds indicate high density (green)
Source: National Health Profile 2020

2. Healthcare financing has been a pain point

In India, out-of-pocket (OOP) expenditure on health accounted for nearly 55% of total health expenditure as of 2019 (the second highest among all the other countries compared below in the chart). Insurance earlier did not cover out-patient treatments (Insurance companies started covering OPD treatments under health insurance only recently). Hence, OOP expenditure on out-patient treatments greater than in-patient treatments.

Nearly 17% of the rural population and 13% of the urban population are dependent on borrowings for funding their healthcare expenditure. And nearly 80% of the rural population and 84% of the urban population use their household savings on healthcare-related expenditure as per “Health in India – 2018, NSS 75th Round. Health expenditure contributes to nearly 3.6% and 2.9% of rural and urban poverty, respectively. And annually, an estimated 60 to 80 million people fall into poverty due to healthcare-related expenditure. However, with Pradhan Mantri Jan Arogya Yojana (PMJAY), the affordability aspect of healthcare expenditure is expected to be taken care of to some degree, especially for the deprived population.

Out-of-pocket expenditure (% of current health expenditure)



Source: World Health Organization Database, CRISIL Research

3. Government price capping of medical equipment

The government has restricted price capping to four devices – cardiac stents, drug-eluting stents, knee implants and intra-uterine devices. However, the National Pharmaceutical Pricing Authority (NPPA) is proposing to bring in capping of trade margins instead of extending the list of devices under the National List of Essential Medicines.

Even state governments have been resorting to measures to curb profiteering by hospitals. The Delhi government had, earlier this year, proposed norms for restricting hospitals and nursing homes from marking up prices of consumables and medicines from their procurement prices, to limit their profits.

Price capping on cardiac stents introduced in February 2017, and on knee-implants, in August 2017 was a deterrent for the industry, which is majorly run by the private sector. However, players have since been able to come back to normalcy after taking a hit on operating margins initially, through price rationalisation via bundle pricing. The National Pharmaceutical Pricing Authority (NPPA) has further extended the capping of prices of knee implants, ranging from Rs 54,000 to Rs 1.14 lakh, for one more year.

Post implementation of price caps on stents and implants, the government has identified 23 medical devices to put price controls on.

4. Outstanding receivables affecting fiscal profile of hospitals

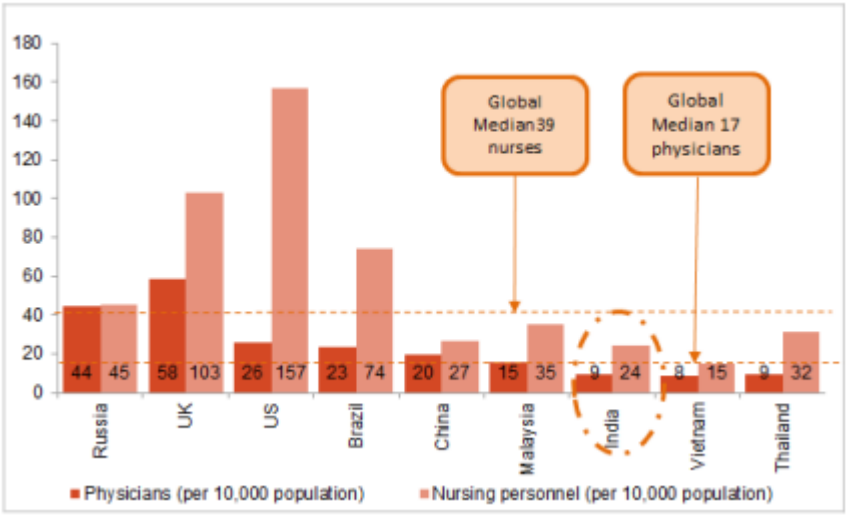
The financial profile of many hospitals empanelled under state schemes became weak due to rising outstanding receivables from the government (state and Centre) for providing treatments to beneficiaries under health insurance schemes. However, this challenge is expected to be dealt with on priority under the PMJAY, by fixing a particular timeline for reimbursements of claims.

5. Paucity of experienced specialised doctors

Paucity of experienced specialised doctors is another challenge. Experienced specialised doctors also contribute to the reputation and brand of the hospitals. Paucity of such doctors, thus, impacts the growth of the hospital sector. At nine physicians and 24 nursing personnel per 10,000 population, India trails the global median of 17 physicians

and 39 nursing personnel. Even on this parameter, India lags behind Brazil (23 physicians, 74 nurses), Malaysia (15 physicians, 35 nurses).

Healthcare personnel: India vs. other countries



Source: WHO World Health Statistics 2021

3.7 Key actionable areas

While the healthcare delivery sector in India faces several teething issues currently, it also presents immense opportunities for the players involved.

This potential is further augmented with information and communication technology (ICT)-enabled services gaining widespread popularity – CRISIL Research expects internet subscriber base to increase to ~1000 million by fiscal 2024; while the wireless subscriber base (mobile phone users) is expected to increase to 990 million by fiscal 2024. Not only do these technologies increase the reach of healthcare facilities to hitherto remote locations, they also help players achieve better efficiencies.

Data from the healthcare space is growing at a steady pace and this has driven hospitals to adopt artificial intelligence (AI)-based patient intelligence systems. These are expected to improve the operating metrics of the hospitals and drive timely detection of diseases.

In this section, we briefly look at how the healthcare delivery infrastructure scenario is expected to pan out over the medium term. The section also highlights how certain emerging business models and technologies will help extend reach and increase efficiency of this industry.

Shortfall in bed capacity: Major opportunity for healthcare delivery players

India needs to increase its bed capacity (about 0.9 million beds) to reach the global median (almost 2.5 million beds). With population growing at almost 1% annually, India is expected to have more than 1.37 billion people by 2020.

Further, top players such as Fortis Healthcare Limited, Max Healthcare Institute Limited, Manipal Health Enterprises Pvt Ltd, Apollo Hospitals Enterpise Limited, Narayana Hrudalaya Ltd have majority of their bed

capacities in Tier-I cities, indicating the lack of specialty hospitals in Tier-II cities and towns, which can be a major opportunity for healthcare delivery partners.

But compounding the beds shortfall, is an immense dearth of healthcare personnel (physicians and nursing personnel). India had ~0.9 million physicians in 2013. This needs to be almost doubled to meet the global median. According to the national health profile (NHP) 2019, the average population served by one allopathic doctor is 11,039 and there are nearly 10.4 lakh doctors registered with the Medical Council of India (MCI).

As of March 31, 2018, there are only 476 medical colleges (recognised by MCI), offering a total of about 52,646 MBBS seats, adding about five doctors (MBBS) per lakh of population annually.

The shortage of nursing personnel (nurses and midwives) is relatively less critical (17 nurses per 10,000 population in India versus 38 per 10,000 population globally) than in physicians (9 physicians per 10,000 population in India versus 16 per 10,000 population globally). As per the NHP 2019, there are 3,215 institutions from where 1.29 lakh general nurses / midwives graduate annually, and 1,936 institutions from where 0.96 lakh nurses qualify annually.

Diversification into different format/areas to increase reach and efficiency

Despite the challenges present in the healthcare delivery system in India, innovations and newer business models are being explored. The main objective of these innovations are to increase efficiencies through optimum resource utilisation and widen the reach of healthcare services. Though different business models might being applied depending on the location and services to be provided, the PMJAY is expected to lead to the adoption of new business models focusing on volume-driven, affordable healthcare.

Single speciality healthcare units

Single-specialty healthcare units are those that treat patients with specific medical conditions, with the need of specific medical/surgical procedures. A single-specialty healthcare unit can be a hospital, clinic, or care centre. The advantage of these units is that, by focusing on providing care in a single segment, they can increase efficiencies as well as create a niche in the target segments. Nowadays, birthing centres are among the fastest growing single specialty centre. Specific regulatory headwinds, however, can affect the margins of these business units.

Day-care centres

The objective of day-care centres is to reduce the need for overnight hospitalisation. In this type of setup, a patient is allowed to go home on the same day after being treated. These centres have also given rise to the concept of outpatient surgeries.

While this model is very popular in the eye care segment, other segments such as arthroscopic, general, cosmetic, and dental surgery have also been using this as a popular care delivery model. The advantage of the day-care centre model is that patients can save on bed/room rentals associated with overnight hospitalisation. The healthcare units, on the other hand, can have a streamlined setup with optimum equipment, staff and infrastructure, which helps bring down operational costs.

End-of-life/geriatric care centres

The objective of end-of-life care centres or hospices and palliative care centres is to provide care and support to patients, who are suffering from terminal illness with a life expectancy of six months or less. Hospice and palliative care focus more on pain management and symptom relief rather than continuing with curative treatment. These centres are designed to provide patients a comfortable life during their remaining days and cover physical, social, emotional, and spiritual aspects apart from the medical treatment. Such type of care can be delivered onsite, where special facilities are set up, in the hospital premises, or at the patient's home.

Palliative care is delivered with the help of an inter-disciplinary team which may consist of the patient's physician, hospice doctor, a case manager, registered nurses, counsellor, a dietician, therapist, pharmacologist, social workers, and various trained volunteers. Depending upon the patient's ailment and medical condition, the team prepares a customised care programme which comprises services such as nursing care, social services, physician services and trained volunteer support.

Home healthcare

The primary objective of home healthcare services is to provide quality health care at the patient's premises. In India, these services are still in the nascent stages. CRISIL Research believes that with increasing geriatric population, nuclearisation of families and increasing disease burden causing a strain on conventional health delivery systems, home healthcare will be a preferred alternative. A number of healthcare start-ups have started vying for growth in this space.

The revenue from ICU beds decreases as weeks pass by and, hence, reducing the strain (both on hospitals and patients) can be explored through home healthcare. Patients can avail of ICU care at home at nearly a fifth of the prices of hospital care. Hospitals can also benefit by this model not just through reduced overcrowding, but also prevention of associated hospital acquired infections.

The services currently offered are: post-intensive care, rehabilitative care and services of skilled/unskilled nurses. But areas such as home therapeutic care for infusion and respiratory therapy, dialysis and convenience centred teleconsultation, have more potential for growth. Apollo HomeCare (by AHEL) & Max@Home (by MHIL) are home care services provided by two largest hospital chain operators in the country.

Innovative business models to help penetration in tier 2 and 3 cities

Given that 65% of the population lives in rural areas, the government is incentivising private investments in these regions. But private players find it difficult to replicate the model that worked for them in tier 1 and creamy tier 2 locations, due to the relatively lower revenue per bed in these regions (due to the low paying capacity in these areas and occupancy of existing facilities). CRISIL Research believes that a volume-centric model focusing on secondary and lower level tertiary care segments with tight control on costs will allow private players to enter and be profitable in rural areas, too.

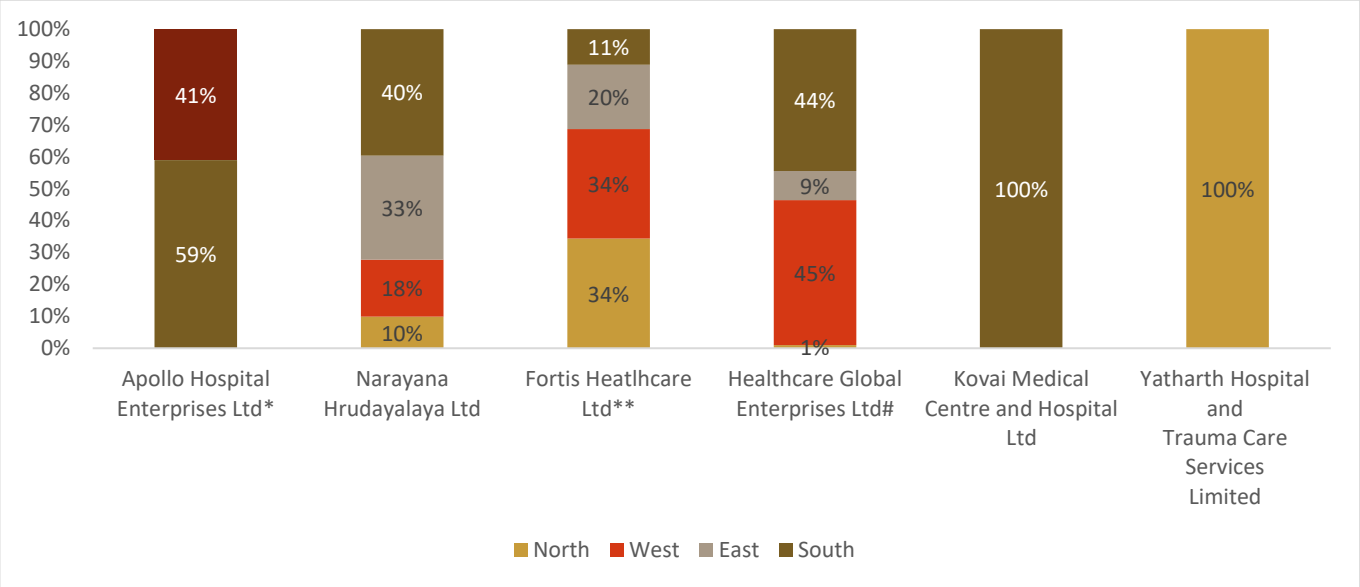
Healthcare providers generally operate under one of the three models – owned, leased and O&M. In an owned model, the company constructs and installs medical equipment and is wholly responsible for day-to-day operations. This model is highly capital intensive in nature. In case of a leased model, the landowner develops building as per specifications of the company, which takes it on a long-term lease. Capital intensity in a leased model is ~50% lower than that of an owned model. In an O&M model, the company signs a contract for managing a standalone hospital against a fixed management fee and share in revenue/profit. This is a low capital-intensive model.

The break-even for each model also differs on a case-to-case basis. However, a typical break-even at operating level under ownership model lies between 2-3 years in a tier 2 city. In case of a leased model, the break-even gets delayed because of payment of lease rentals. In an O&M model, a company is not generally impacted by the duration of break-even for fixed fees (variable fees will, however, be dependent on break-even).

Established regional presence gives players an upper hand

Key listed healthcare delivery players in India have established themselves in regions across the country. Those with regional presence have an added advantage over those that don't.

Regional revenue mix of key players as of fiscal 2021



**For Apollo Hospitals Enterprise Ltd (AHEL), revenue from Tamil Nadu, Andhra Pradesh, Telangana, and Karnataka has been considered under the 'south' region. 'Others' includes revenue from 'significant subsidiaries/JVs/associates', as classified by AHEL in its earnings update PPT for FY21, which includes revenue from Bhubaneswar, Bilaspur, Nashik, Navi Mumbai, Ahmedabad, Kolkata, Delhi, Indore, Assam, and Lucknow.*

***For Fortis Healthcare Ltd, revenue contribution from only Indian hospitals has been considered (i.e. excluding revenue from international hospitals).Figures are for Q4FY21 for Fortis*

#Regional mix only for HCGEL centres, which consist of 22 comprehensive cancer centres, 3 multispecialty hospitals, 3 diagnostic centres and 1 multispecialty hospital managed by HCGEL, as of March 31, 2021.

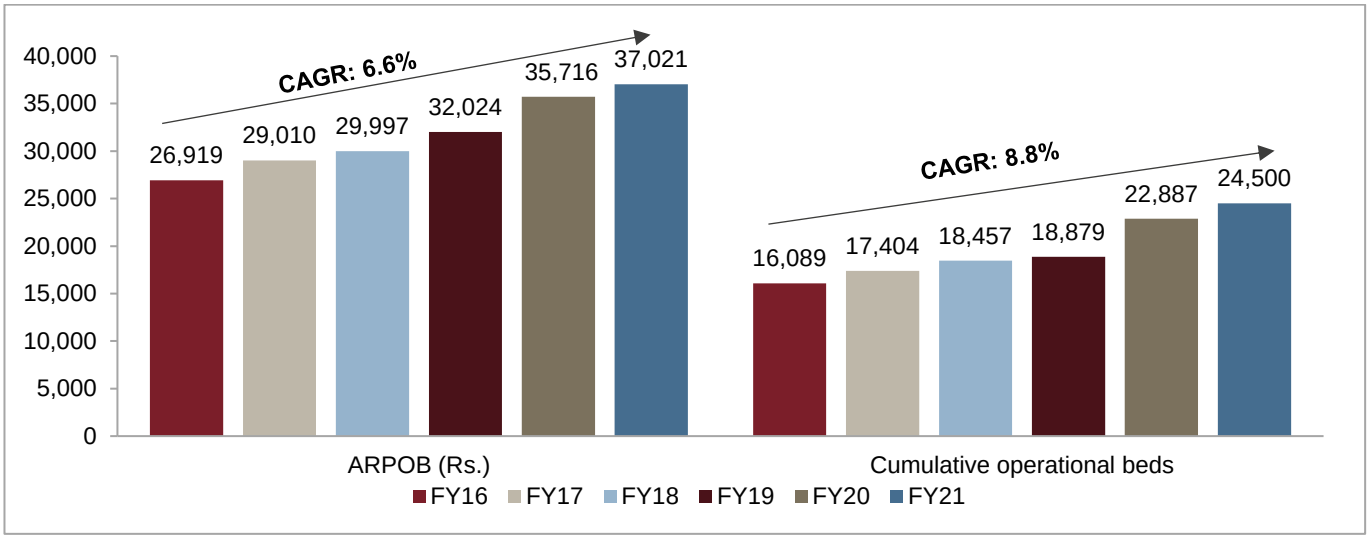
Source: Company annual reports/investor presentations, CRISIL Research

Some of the key advantages of having regional presence are as follows:

- **Stronger local connect with people** (patients) in a particular region forms a crucial part of connecting and establishing long-term relationships for any hospital. Players with regional presence often have a strong grasp of the regional languages, food preferences, culture, and affordability, which helps them connect and bond with their patients from a long-term perspective.
- **Understanding the mentality of doctors** is also an important aspect for a hospital. Having regional presence not only gives players access to the key doctors in the region, but it also helps doctors tie up with a brand to enhance their portfolios.
- **Integrating talent from well-established allied workforce** such as lab technicians and nurses also augers well for established players. There are additional benefits for employees associated with a regional chain, such as easy location transfers for any personal reasons. Hence, workforce in such hospitals sticks longer.
- **First mover advantage in building out network in across tier 2/3 cities** can help the hospitals build a brand in the regions. Being amongst the first to build a regional presence can attract the best doctor talent, and a brand recall among people which can help hospitals in the long run.

3.8 Operating metrics of key listed players

Average revenue per occupied bed (ARPOB) of key listed players clocked ~6.6% CAGR over fiscals 2016-21



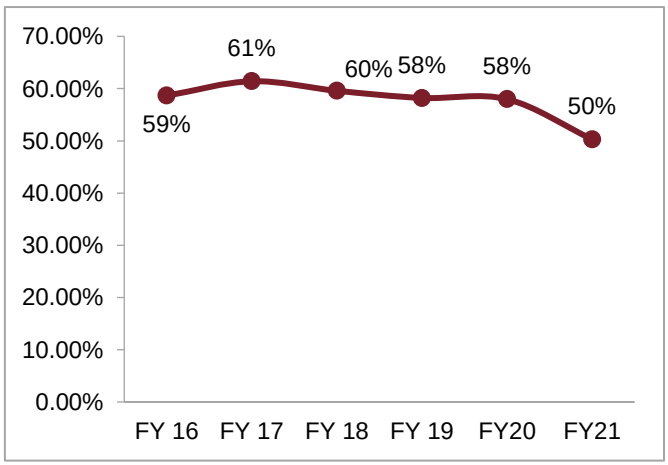
Note: Companies considered for analysis are AHEL, Fortis Healthcare Ltd, Narayana Hrudayalaya Ltd, MHIL, Shalby Ltd, and Healthcare Global Enterprises Ltd (HCGEL)

Source: Company annual reports, investor presentations, CRISIL Research

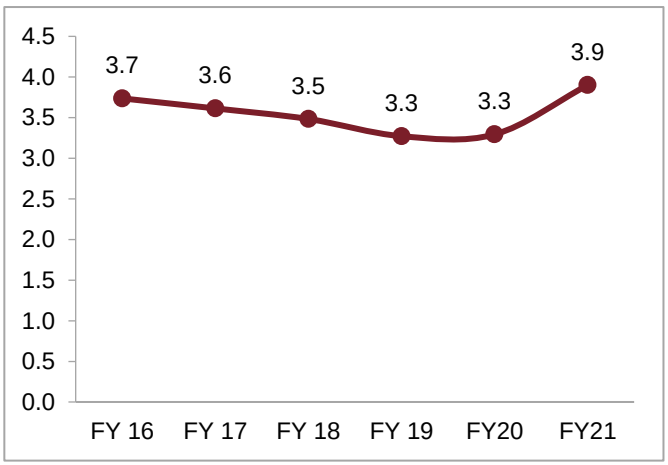
ARPOB of key listed players increased at a CAGR of ~6.6% over fiscals 2016-21, and operational beds logged a 8.8% CAGR. Operational beds for key listed players grew at the highest rate of 21% in fiscal 2020 in the past five fiscals.

Aggregate occupancy rates and ALOS of key listed players

Occupancy rate (%)



ALOS (days)



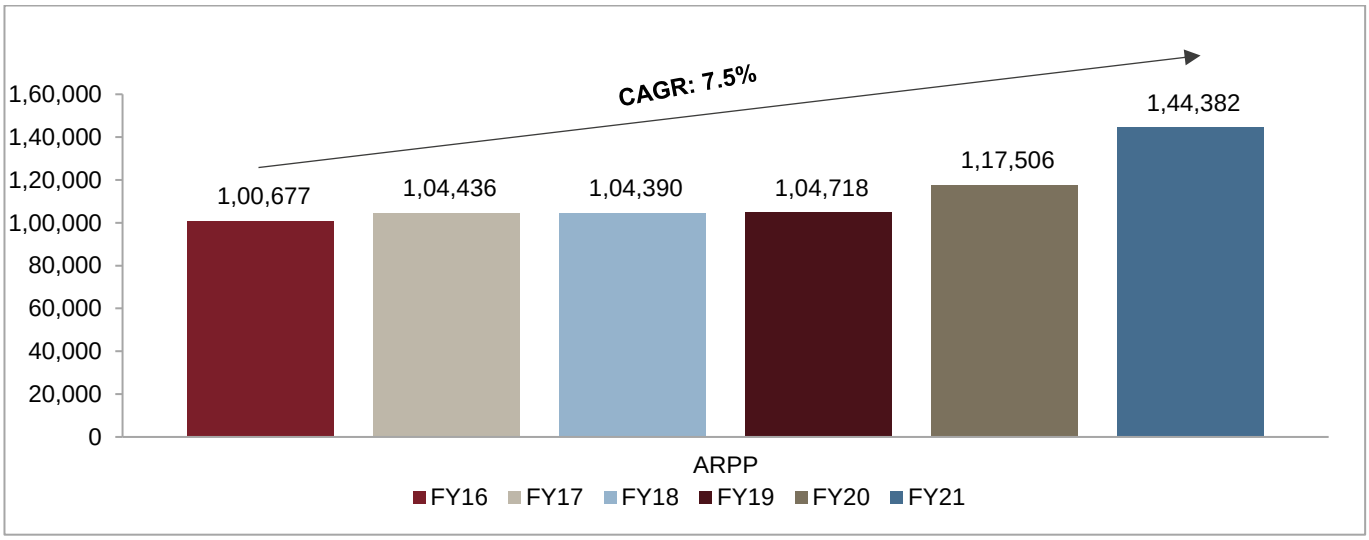
Note: Companies considered for analysis are AHEL, Fortis Healthcare Ltd, Narayana Hrudayalaya Ltd, MHIL, Shalby Ltd, and HCGEL

Source: Company annual reports, investor presentations, CRISIL Research

Occupancy rates of key listed players have remained steady (58-61%) between FY16 and FY20. Occupancy rate fell to 50% in FY21 on account of COVID pandemic. Although aggregate occupancy rates are in the range of 58-61%, the metric is skewed at the individual company level – e.g. MHIL had an occupancy rate of 73% in FY20 and

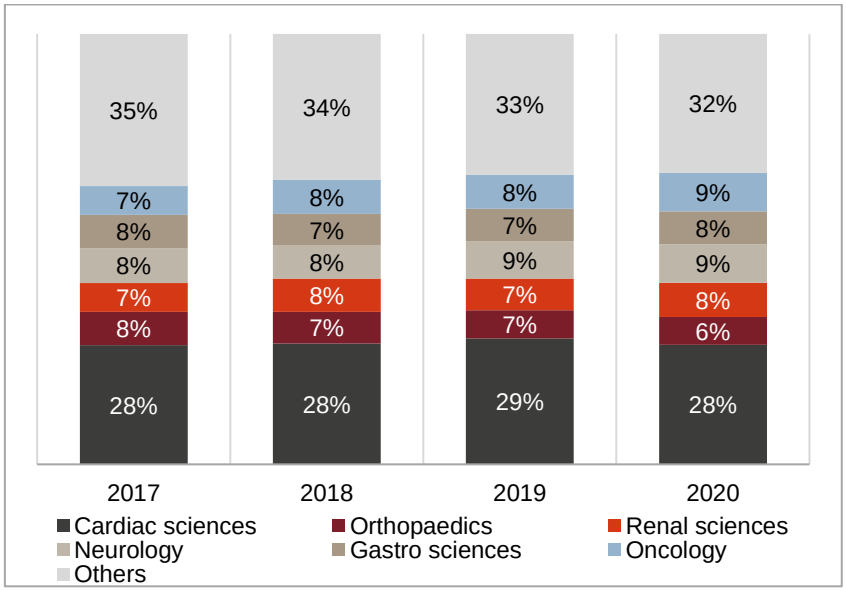
65% in FY21 and Shalby, 38% in FY20 and 35.7% in FY21. A steady aggregate occupancy rate and a declining ALOS are a positive for these players. ALOS, on an aggregate basis, of key listed players decreased to 3.3 days in fiscal 2020 from 3.7 days in fiscal 2016. ALOS rose in FY21 to 3,9 days. Hospitals typically focus on reducing their ALOS, as it increases their ARPOB and ensures more patients are treated at the same time.

Average revenue per patient (ARPP) of key listed players clocked ~7.5% CAGR over fiscals 2016-21



Note: Companies considered for analysis are AHEL, Fortis Healthcare Ltd, Narayana Hrudayalaya Ltd, MHIL, Shalby Ltd, and Healthcare Global Enterprises Ltd (HCGEL). ARPP not taken directly from annual reports, they are calculated by multiplying ARPOB and ALOS
Source: Company annual reports, investor presentations, CRISIL Research

Cardiac sciences dominates in terms of share, but oncology drives the highest growth across treatment mix for key listed players



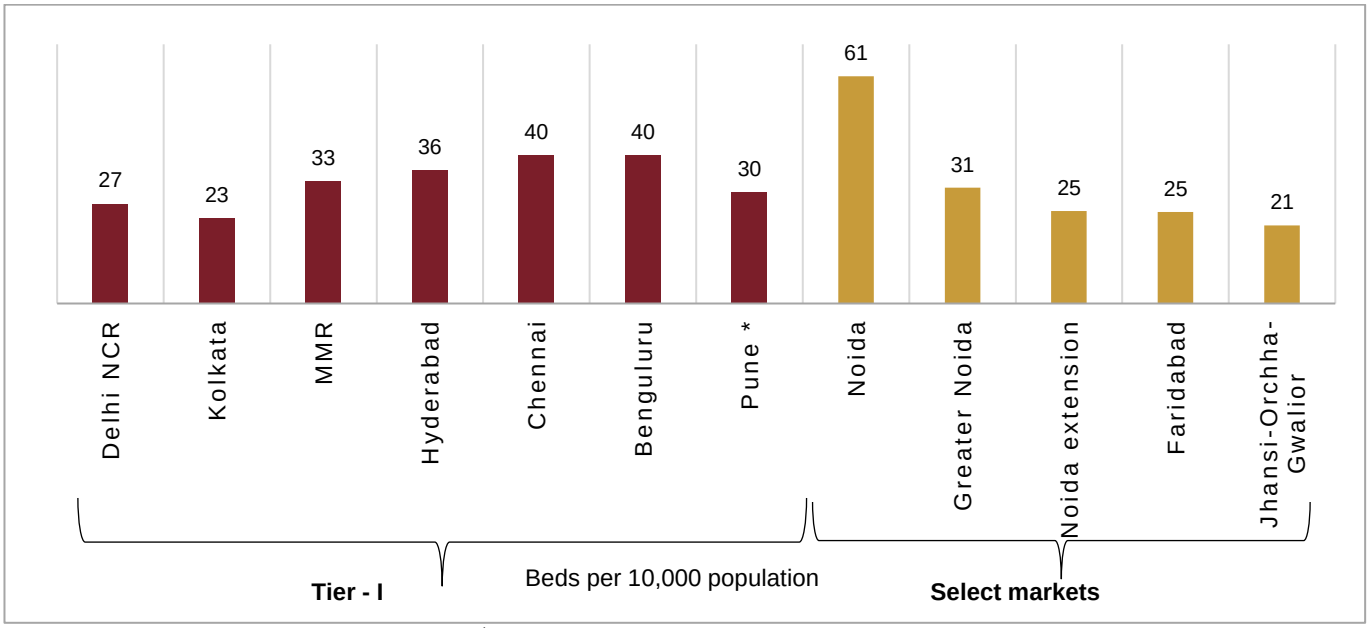
Note: Companies considered for analysis are Fortis Healthcare Ltd, Narayana Hrudayalaya Ltd, and Shalby Ltd; Others is a consolidation of services such as nephrology, pulmonology, gynaecology & obstetrics, and arthroplasty

Source: CRISIL Research

Cardiac sciences accounted for the largest share of revenue in the specialty mix over fiscals 2017-20, logging a 7% CAGR. Cardiac sciences comprises various types of surgeries, such as valve replacement, open heart, and coronary artery bypass grafting. Cardiac sciences is followed by neurology, which is closely followed by oncology, renal sciences, and gastro sciences. However, in terms of growth, oncology logged the highest CAGR of 17%, followed by renal sciences (13%), over fiscals 2017-20.

3.9 Market-wise hospital statistics

Estimated bed density across key markets in India



Based on city category classification followed by 7th Pay Commission, Tier I – X cities (top 8 cities)

** Pune metropolitan region*

Source: CRISIL Research

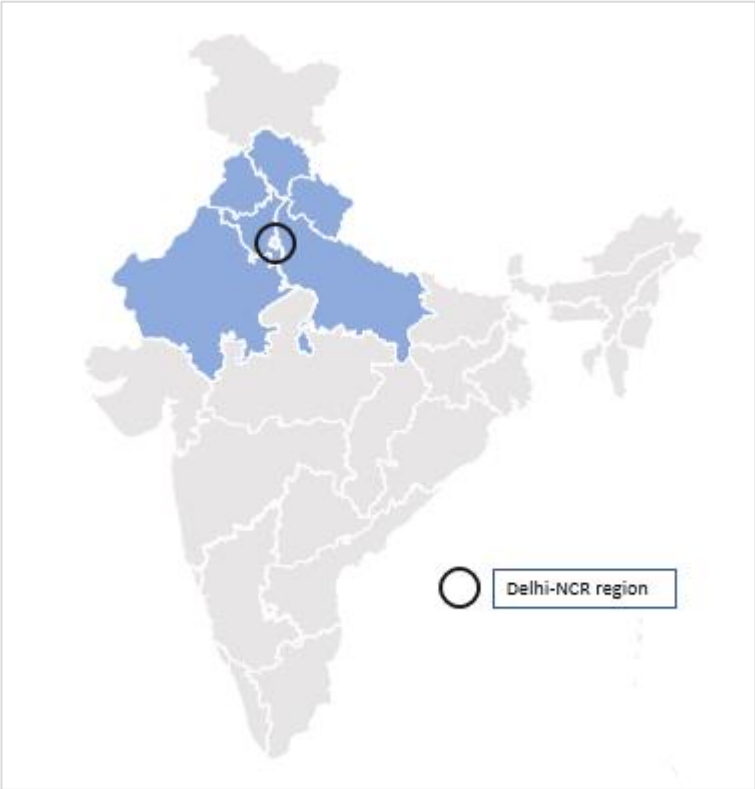
The Delhi NCR, Kolkata, Pune Metropolitan and Mumbai Metropolitan regions are highly populous and have a bed density of 27, 23, 33 and 36, respectively. An important facet to consider, while estimating the healthcare infrastructure adequacy in a selected city, is to take into account the availability of healthcare infrastructure in the neighbouring cities/states. Given that the selected cities are key cities with a well-developed hospital infrastructure, they tend to attract patients not only from other cities and towns within the state, but also from the neighbouring states. While this creates an additional burden on the healthcare infrastructure of these cities, it also clearly indicates the willingness of people from nearby tier 1 and 2 cities to travel in order to access quality healthcare facilities. In other tier 1 cities such as Hyderabad, Chennai and Bengaluru, the bed density is higher than Delhi NCR, Kolkata and Mumbai because of presence of big hospital chains with large bed capacities. Another indication of this trend is the expansion of large chain hospitals to tier II cities.

Delhi-NCR attracts a lot of patients from adjoining states with inadequate healthcare facilities

Large hospital chains located in the Delhi-NCR are major beneficiaries of patients visiting for various healthcare requirements. NCR region receives patients from adjacent states of Uttar Pradesh, Haryana, Punjab, Rajasthan and even northern belts of Madhya Pradesh. Patients visit top chains in NCR region as they have superior infrastructure facilities & medical equipment, senior medical talent supported by strong trusted brands. Further, NCR region is the hub of specialty hospitals in the whole of North India and which these above states and regions lack, indicating significant and growing need for quality and affordable healthcare services and also a major opportunity to expand and grow here. Facilities and talent at top chains in NCR region help patients visiting from various regions in battling critical ailments.

Delhi-NCR region receives high influx of domestic patients from northern states as highlighted below in the map

Noida, Greater Noida & Noida extension have high bed density due to their proximity to the capital, and due to the presence of large chain of hospitals which attract patients from the NCR region, other states and even internationally. Even with high bed densities, hospitals in the region have shown high occupancy rates indicating potential for further growth and expansion.



Source: CRISIL Research

Macro-economic performance of some key select districts

Noida, Ghaziabad, Agra, Hathras, Jhansi have been key to economic growth in the region

To assess the economic growth near Yatharth Hospitals, we have looked at the past performance of eight districts viz. Gautambuddh Nagar, Ghaziabad, Bulandshahr, Aligarh, Hathras, Mathura and Jhansi. Among these eight districts, Gautambuddh Nagar is the largest district in terms of GDP growth followed by Agra and Ghaziabad.

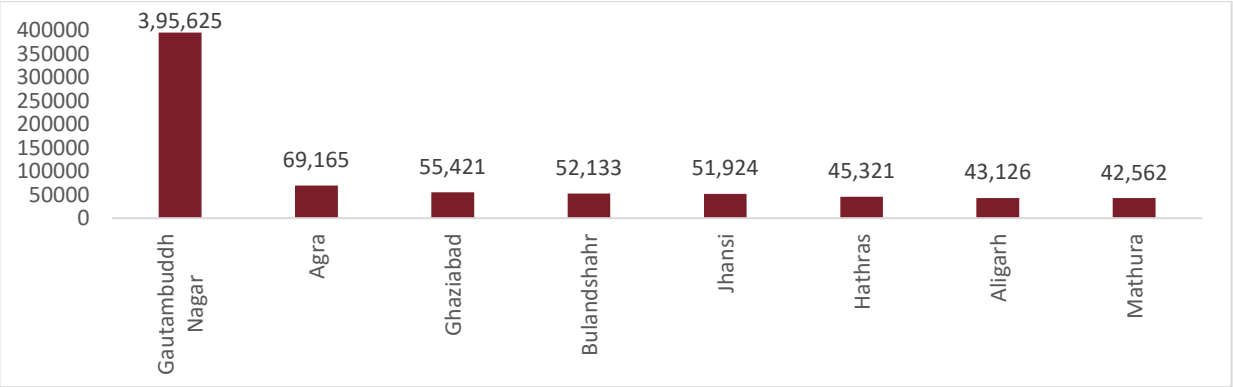
Annual trend in key district-wise GDP output (at basic prices)

(Rs billion)	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY12-20 CAGR
Gautambuddh Nagar	444	492	587	607	647	708	1,044	965	927	9.6%
Agra	223	231	256	263	296	311	369	384	387	7.1%
Ghaziabad	190	193	209	215	247	252	303	298	285	5.2%
Bulandshahr	151	157	170	179	187	197	214	223	223	5.0%
Aligarh	140	140	155	159	166	174	184	198	199	4.5%
Jhansi	83	89	86	102	109	126	NA	NA	126	5.4%
Hathras	56	65	66	70	71	75	78	85	86	5.5%

Mathura	97	106	115	109	122	130	131	147	137	4.4%

Source: Directorate of Economics & Statistics - Government of Uttar Pradesh, CRISIL Research

Snapshot of per capita income for key districts (FY20)



Source: Directorate of Economics & Statistics - Government of Uttar Pradesh, CRISIL Research

The districts of Gautambuddh Nagar (to which Noida, Greater Noida, Noida extension belong), Agra, Hathras and Jhansi witnessed strong economic growth in the last few years

Over the last eight years from fiscal 2012 to fiscal 2020, Gautambuddh Nagar, Agra, Hathras and Jhansi have recorded higher growth compared with the other districts considered. Most of the districts have seen their GDP grow at a pace which is either higher or at a comparable level with that of the state of Uttar Pradesh (6.0% growth between 2012-2020) during these eight years from fiscal 2012 to fiscal 2020.

Manufacturing, Transport, Trade & Tourism and Construction sectors have boosted economic growth in the region over the last few years

Across the eight districts over the last eight years from fiscal 2012 to fiscal 2020, manufacturing and transport (excluding railways) segments have seen a significantly strong growth when compared to other sectors. When considered individually, Gautambuddh Nagar saw a strong performance across all segments except agriculture during the corresponding period. Apart from manufacturing, it also received a boost from Real estate, trade, hotels & restaurants and mining & quarrying. A strong growth across segments like hotels & restaurants and transport across districts in the region is believed to be influenced mainly by tourism in the region. Even though the western Uttar Pradesh belt, where these districts are located, has a significant farming activity, the growth in output from agriculture and related segments has remained subdued across all districts over the last few years. Along with this, employment and capital invested in the industries has been growing at a good rate in the below districts, indicating potential for growth and economic activity.

Snapshot of key economic activity-wise growth in key districts (FY12-20)

(CAGR FY12-20)	Gautambuddh Nagar	Ghaziabad	Buland-shahr	Aligarh	Hathras	Mathura	Agra	Jhansi
Agriculture, Forestry and Fishing	1.8%	-5.6%	3.5%	2.6%	2.1%	1.9%	1.3%	1.3%
Mining and Quarrying	9.8%	-5.8%	0.0%	7.1%	-6.3%	-7.8%	1.4%	14.3%
Manufacturing	10.8%	4.2%	4.7%	6.8%	6.1%	3.8%	9.2%	-2.9%
Construction	9.1%	5.4%	5.5%	0.7%	11.3%	1.7%	7.4%	2.3%
Trade and Hotel & Restaurant	13.5%	4.4%	6.4%	6.8%	5.7%	4.9%	8.3%	5.1%
Transport by Means (excluding Railways)	13.9%	18.3%	6.0%	9.1%	12.8%	15.0%	5.9%	10.3%
Real Estate, Ownership of Dwellings and Professional Services	13.1%	7.5%	4.3%	3.6%	6.9%	3.6%	7.8%	4.6%
GDP (at Basic prices)	9.6%	5.2%	5.0%	4.5%	5.5%	4.4%	7.1%	5.4%

Source: Directorate of Economics & Statistics - Government of Uttar Pradesh, CRISIL Research

Delhi NCR has 27 beds per 10,000 people as of 2020

Delhi NCR Region is a highly populous region with a total population of ~57.8 million as of 2021. Delhi state's per capita GSDP (at constant prices) is estimated at Rs ~2,83,614 in fiscal 2021, 7% lower than fiscal 2020. Its GSDP, at current prices is projected to be Rs 7,98, 310 crores for fiscal 2021, 4% lower than fiscal 2020. The economy contracted due to Covid-19 in fiscal 2021, which had otherwise seen a growth till fiscal 2020. Due to the growing economy and population, there is significant and growing need for quality and affordable healthcare services. Total expenditure of Delhi state is estimated at Rs 69,000 crore for fiscal 2022. The region has a bed density of 27 per 10,000 which is low when compared to the global averages. Estimated number of hospital beds are ~1,56,060 with 2,150 hospitals. ~1% of all facilities are private super specialty and multispecialty hospitals. An important facet to consider while estimating the adequacy of healthcare infrastructure in the region is to also take into account the availability of the same in the neighbouring cities/states. Given that Delhi-NCR region has a well-developed hospital infrastructure, they tend to attract patients not only from other cities and towns within the state, but also from the neighbouring states. While this creates an additional burden on the healthcare infrastructure of this region, it also clearly indicates the willingness of people from nearby tier 1 and 2 cities to travel in order to access quality healthcare facilities. Another indication of this trend is the expansion of large chain hospitals to such cities. Major hospital chains in the country have their presence in the region with some players such as Max Healthcare, Medanta, Yatharth Hospitals and Apollo having large proportion of beds in Delhi NCR region.

Key hospitals	Key specialties provided
Apollo Hospital Enterprise Ltd	Cardiology, neurology, oncology
Max Healthcare	Oncology, cardiology, orthopaedics, laparoscopic surgeries, neurology
Medanta Hospital	Cardiology, neurology, gastroenterology, liver transplants and regenerative medicine, oncology
Yatharth Hospitals	Cardiology, orthopaedics, neurology, renal sciences, oncology

Note: Includes only the key specialties out of all the specialties mentioned on company website accessed on November 24, 2021
Source: Company data, Secondary research, CRISIL Research

Noida

Noida is a city with a total population of ~8,14,888 as of 2020. Gautam Buddh Nagar District, to which Noida belongs had a GDP of Rs 97,715 crore at constant prices in fiscal 2020, the highest in the state of Uttar Pradesh. Its GDP per capita at constant prices stood at an estimated Rs ~5,25,466 during the same year. The region has a bed density of 61 per 10,000, which indicates a well-developed healthcare infrastructure. It attracts patients from nearby districts and states, which do not have specialty hospitals. Even with high bed density in the region, the occupancy rates are good for major hospitals, indicating further scope of expansion and growth in the area. Estimated number of hospital beds are ~5,000 with 175 hospitals and nursing homes. Being a planned city, Noida has several multispecialty hospitals, private hospitals and additional medical infrastructure. An estimated 2-3% hospitals in Noida belong to a large chain, while the rest are standalone hospitals.

Key hospitals	Key specialties provided
Apollo Hospitals Noida	Gynaecology, paediatrics, orthopaedics, kidney transplants, oncology
Fortis Noida	Oncology, orthopaedics, neurosciences, liver transplant, kidney transplant, cardiology
Jaypee Hospital	Cardiology, oncology, organ transplant, orthopaedics
Kailash Hospital	Gastroenterology, cardiology, oncology, neurology
Metro Hospitals & Heart Institute	Cardiology, endocrinology & diabetology
Yatharth Super Specialty Hospital, Noida	Cardiac sciences, orthopaedics, nephrology, urology, oncology

Note: Includes only the key specialties out of all the specialties mentioned on company website accessed on November 24, 2021
Source: Company data, Secondary research, CRISIL Research

Greater Noida

Greater Noida has an estimated total population of 8,00,000 as of 2020. Gautam Buddh Nagar District, to which this area belongs, had a GDP of Rs 97,715 crore at constant prices in fiscal 2020, the highest in the state of Uttar Pradesh. Its GDP per capita at constant prices stood at an estimated Rs ~5,25,466 during the same year. The region has a bed density of 31 per 10,000, which indicates a well-developed healthcare infrastructure. Estimated number of hospital beds are ~2,500 with 30 hospitals and nursing homes. An estimated 10% hospitals in Greater Noida belong to a large chain, while the rest are standalone hospitals.

Key hospitals	Key specialties provided
Government Institute of Medical Sciences	ENT and head & neck surgery, Ophthalmology, paediatrics, general medicine, orthopaedics
Sharda Hospital	Ophthalmology, ENT and head & neck surgery, dermatology, venereology & leprosy, obstetrics & gynaecology
Yatharth Super Specialty Hospital, Greater Noida	Cardiology, neurology, urology, nephrology, gastroenterology

Note: Includes only the key specialties out of all the specialties mentioned on company website accessed on November 24, 2021
Source: Company data, Secondary research, CRISIL Research

Noida extension

Noida extension has an estimated total population of 4,00,000 as of 2021. Gautam Buddh Nagar District, to which these two areas belong, had a GDP of Rs 97,715 crore at constant prices in fiscal 2020, the highest in the state of Uttar Pradesh. Its GDP per capita at constant prices stood at an estimated Rs ~5,25,466 during the same year. The region has a bed density of 25 per 10,000, which indicates a well-developed healthcare infrastructure. The reason for such a high bed density is the fact that it attracts patients from Noida, Delhi, the whole NCR region, and even some nearby states and international medical tourists. Estimated number of hospital beds are ~1,000 with 15-20 hospitals and nursing homes. Yatharth Super Specialty Hospital with 450 beds is one of the largest hospital in the region. An estimated 5-10% hospitals in Noida extension belong to a large chain, while the rest are standalone hospitals.

Key hospitals	Key specialties provided
Government Institute of Medical Sciences	ENT and head & neck surgery, Ophthalmology, paediatrics, general medicine, orthopaedics
Yatharth Super Specialty Hospital, Noida Extension	Cardiology, neurology, urology, nephrology, gastroenterology

Note: Includes only the key specialties out of all the specialties mentioned on company website accessed on November 24, 2021
Source: Company data, Secondary research, CRISIL Research

Faridabad

Faridabad has a total population of 1,944,196 as of 2021. The region has a bed density of 25 per 10,000. Estimated number of hospital beds are ~4,800 with 300 hospitals and nursing homes. An estimated 1-2% hospitals in Faridabad belong to a large chain, while the rest are standalone hospitals.

Key hospitals	Key specialties provided
Asian Institute of Medical Sciences	Oncology, transplants, cardiology, neurology, urology
Fortis Escorts Hospital	Cardiology, neurosurgery, general surgery, orthopaedics, urology, critical care, pulmonology
Metro Hospital and Heart Institute	Cardiology, neurology, gastroenterology, minimally invasive surgeries, internal medicine, paediatrics, gynaecology, obstetrics & infertility
Sarvodaya Hospital	Cardiology, dialysis & kidney transplant, joint replacement, neurology, oncology
QRG Health City	Cardiology, orthopaedics, nephrology and kidney transplant, neurology, paediatrics, gastroenterology, minimally invasive surgery

Note: Includes only the key specialties out of all the specialties mentioned on company website accessed on November 24, 2021
Source: Company data, Secondary research, CRISIL Research

Jhansi-Orchha-Gwalior

The region has a total population of 3,723,771 as of 2021. The region has a bed density of 21 per 10,000. Estimated number of hospital beds in this market are ~7,900 with 215 hospitals and nursing homes. A few major

hospitals in the region are listed below. Ramraja Multispecialty Hospital, a 305 bedded hospital in Orccha town near Jhansi, is one of the largest hospitals in the region and has been acquired by Yatharth Hospital & Trauma Care Services Limited as of February 18, 2022.

Key hospitals	Key specialties provided
Maharani Laxmibai Medical College	Cardiology, neurology and other key specialties
St Jude's Hospital and College of Nursing	General surgery, gynaecology, paediatrics
Vinayak Hospital	Cardiology, neurology, orthopaedics, gynaecology, general surgery, endocrinology
Boston Hospital & Research Institute (Gwalior)	Obstetrics & gynaecology, neurology, orthopaedics, paediatrics
Birla Institute of Medical Research (Gwalior)	General surgery, cardiology, paediatrics, neonatology, neurology
Ramraja Multispecialty Hospital (Orchha)	General medicine, cardiology, critical care, paediatrics, orthopaedics

Note: Includes only the key specialties out of all the specialties mentioned on company website accessed on November 24, 2021
Source: Company data, Secondary research, CRISIL Research

3.10 Overview of Robotic surgery segment

Surgical methods can broadly be classified into two categories as open (more invasive, traditional) and minimally invasive. Robotic surgery or Robot assisted surgery (RAS) is one of the minimally invasive methods of surgical procedure, which has been in the practice for nearly three decades and is one of the fastest developing segments in the global healthcare space. In Robotic surgery, procedures are performed using very small tools attached to a robotic arm. The controls can be given through computer by pre-programmed systems or surgeon where the surgeon controls the robotic arm with a computer. General surgery, urology, gynecology, cardio-thoracic, orthopedic are some of the therapy areas where robotic surgical procedures are performed.

There are three main types of robotic systems which are mainly in use in the surgical arena. The three systems can be classified as Active, semi-active and master–slave systems.

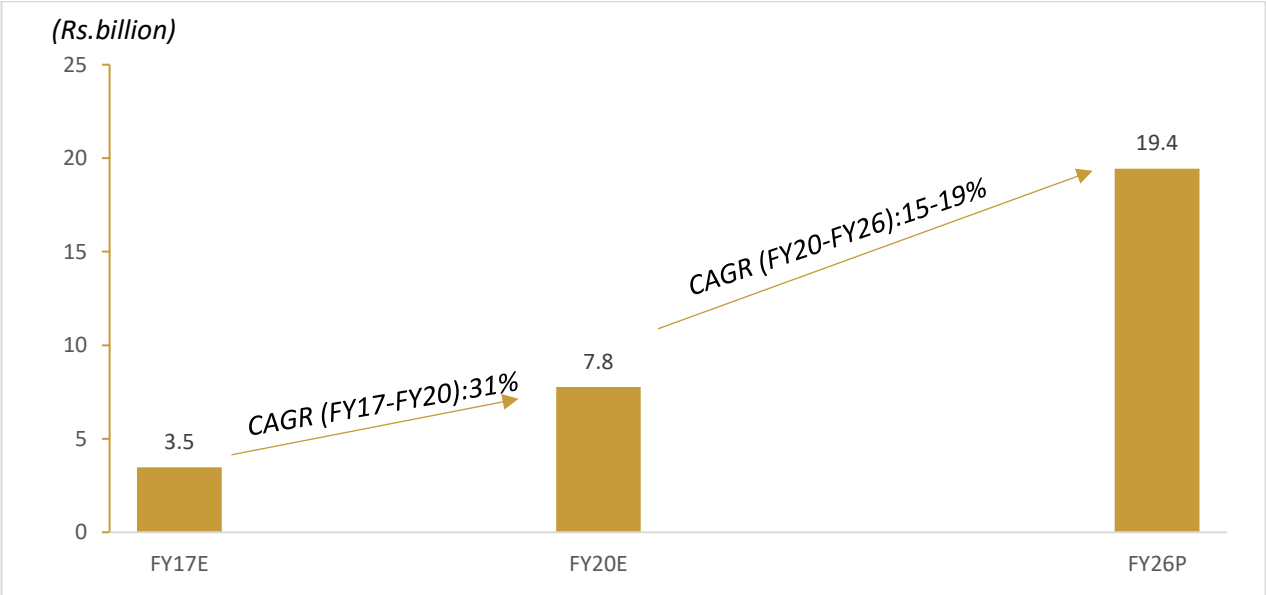
Active systems: Active systems essentially work autonomously (while remaining under the control of the operative surgeon) and undertake pre-programmed tasks. The PROBOT and ROBODOC platforms which were among the initially developed robotic surgical platforms are examples of active platforms.

Semi-active systems: Semi-active systems allow for a surgeon-driven element to complement the pre-programmed element of the robot systems.

Master-slave systems: The master–slave systems lack any of the pre-programmed or autonomous elements of other systems. They are entirely dependent on surgeon activity. Surgeon hand movements are transmitted to laparoscopic surgical instruments, which faithfully reproduce surgeon hand activity intracorporeally. Popular robotic surgery platform da Vinci is the example of the master-slave system.

There are approximately 66 centers and 70 robotic equipment installations as of Fiscal 2020. India has also developed talent pool of doctors who are specialized in performing robotic surgeries. The number of systems and volume of robotic surgeries are expected to increase as more robotic surgeons get trained and other surgical specialties increasingly utilizing this platform. The robotic surgeries in India are primarily performed in the urology, gynecology, gastro, head & neck and general therapy areas. In 2020, ~an estimated 1 million robotic surgeries were performed in India. The adoption rate of robotic surgeries is less than 5% (Out of the total surgeries) in India as of fiscal 2020. Average cost of robotic surgery was higher than normal surgery, approximately costing Rs 0.5 million

Review and outlook of Indian Robotic surgery market



Note: E-Estimated-Projected

Source: CRISIL Research

The robotic surgery market is expected to grow at 15-19% CAGR from FY2020 to FY2026

The Indian robotic surgery market have grown at healthy speed in the last few years. Increased adoption by hospital players, higher accuracy of the robotic surgical systems and trained surgeon base are some of the factors that have supported the growth of the Indian robotic surgery market. The Indian robotic surgery market has grown at the healthy rate of 31% CAGR between FY2017 and FY2020. Going ahead with increased adoption of robotic surgery procedures and with more options available to choose from in the robotic surgery equipment is expected to drive growth of robotic surgery market in India. The Indian robotic surgery market is expected to expand at 15-19% CAGR from FY2020 to FY2026 to reach approximately Rs 19.4 billion by FY2026.

Key growth drivers for robotic surgery market in India

IRDA inclusion of robotic surgeries in insurance claims expected to boost the volume of robotic surgeries

As the cost of robot assisted surgeries can be higher than the traditional surgeries, patient usually prefers the robotic surgeries if it is covered under the health insurance. Medical insurance in India did not cover robot surgeries until 2019. Hence, usually only patients with high income background could afford this healthcare service by means of robotic surgical practices. However, the insurance regulator, Insurance Regulatory and Development Authority (IRDA) has changed this by mandating inclusion of robotic treatments in the insurance policies across the country.

Key benefits like lesser blood loss, small incisions and accuracy drives the patient demand for robotic surgeries

In the recent years robotics surgeries in India has picked up owing to its operational benefits to patients. Among the benefits of the robotic surgery treatment over open surgery are a shorter hospitalization duration, lower post-surgery discomfort, faster recovery time and return to normalcy, smaller incisions resulting in reduced infection risks, reduced blood loss and minimal surgical scarring on the body. These benefits as well as suitability of robotic surgery for a particular patient is driving the demand from patients especially in the therapy areas like urology, gynecology, gastro, general surgery

Growing surgeon base in the country to support adoption of robotic surgeries in India

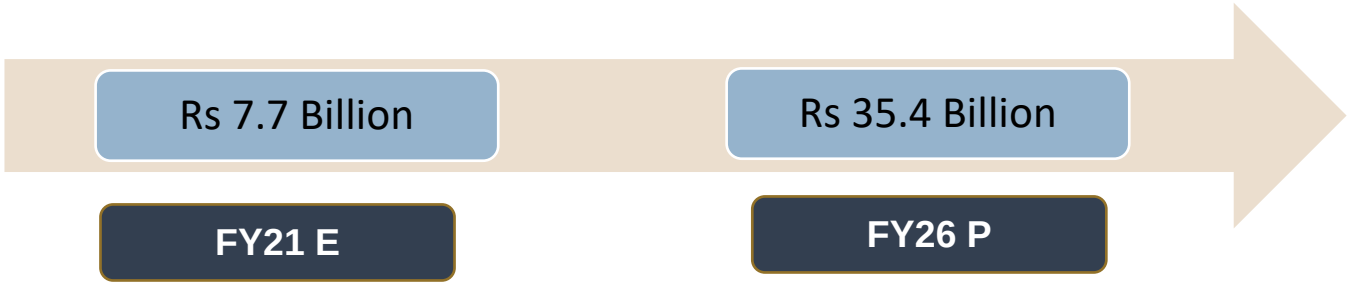
Laparoscopy which requires small incisions is well established practice in India. Robotic surgical systems offers minimal incisions and hence are one of the preferred mode for performing laparoscopic surgeries. India has established base of laparoscopic surgeries and hence, the transition from a laparoscopic surgeon to a robotic surgeon is smooth. As of 2020, there approximately 500 surgeons who are trained to perform robotic surgeries. This number is expected to grow with increased adoption and training programs for surgeons.

Several institutes in India are offering training programs in robotic surgery, mentored by senior consultants at various government institutions and private hospitals. With the Vattikuti 1-year fellowship in robotic surgery, the training process has been streamlined with increased opportunities for upcoming young surgeons. Moreover, the da Vinci Basic Surgical Skills Training Center has been started in India to provide additional training opportunities. This in turn is going to increase the robotic surgeon base in India and spur the growth of robotic surgery market in India.

3.11 Telemedicine Industry in India

Telemedicine Practice Guidelines - Amendment in the Indian Medical Council (Professional Conduct, Etiquette and Ethics) Regulations, 2002 defines Telemedicine as 'The delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities.' For the purpose of this analysis, CRISIL Research has included technology-based patient health consultations using audio, video and text-based modes of communications.

The Telemedicine market in India is estimated to grow from Rs 7.7 Billion in FY2021 to Rs 35.4 Billion in FY2026 registering a CAGR of 34-38%.



E: Estimated; P: Projected
Source: CRISIL Research

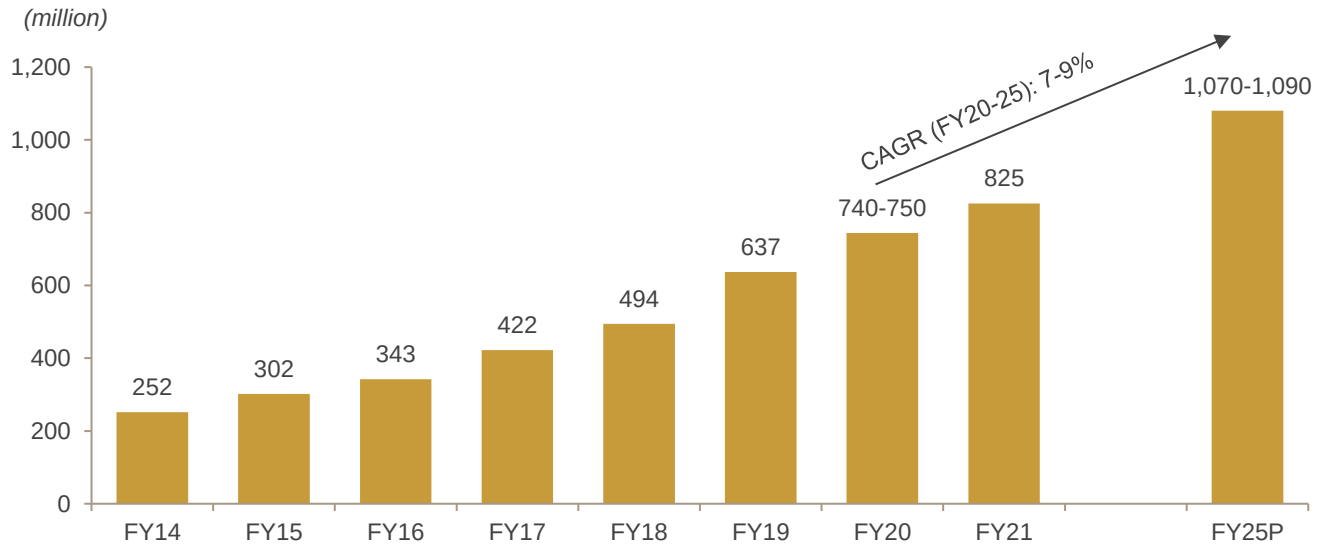
Telemedicine Applications

- Mode of Communication
  - Audio
  - Video
  - Text Based
- Timing of Information transmitted
  - Real time interaction
  - Asynchronous exchange of relevant information
- Purpose of consultation
  - First consult: Diagnosis, Treatment or emergency consult
  - Follow up consult
- According to individuals involved
  - Patient to Registered Medical Practitioner
  - Caregiver to Registered Medical Practitioner
  - Registered Medical Practitioner to Registered Medical Practitioner
  - Health worker to Registered Medical Practitioner

Key growth drivers:

- Internet subscriber growth: India has witnessed a drastic surge in internet users over the past few years. CRISIL Research expects the total number of internet subscribers in the country to cross 1,000 million by fiscal 2025 increasing at 7-9% CAGR from fiscals 2020-25.

Internet subscribers' growth over fiscals 2020-2025



Note: P: Projected

Source: TRAI, CRISIL Research

- Consumer Behaviour: Telemedicine industry saw significant growth in FY21 on account of travel restrictions amid the covid 19 pandemic. Patients and health care seekers opted for teleconsultation as it offered a convenient alternative especially for high-risk patients.

- Lack of experts in tier 2 and tier 3 cities: Many tier 2 and tier 3 cities lack expert doctors and registered medical practitioners; telemedicine is being opted for by patients in these regions as they get access to these practitioners for reviews and also second opinions for critical issues

- Continuous Monitoring: In certain medical cases such as chronic conditions, a patient requires continuous monitoring though it may not be necessary to visit a hospital. Telemedicine is being used in these cases and the usage is expected to rise further as more patients and doctors follow this route.

- Enabling medical practitioners access to larger customer base: Telemedicine is further enabling doctors and medical practitioners to safely continue counselling

- Regulatory Support: Telemedicine Practice Guidelines - Amendment in the Indian Medical Council (Professional Conduct, Etiquette and Ethics) Regulations, 2002 were introduced in March 2020. This has helped industry stakeholders to adopt and put required mechanism and measures in place to practise telemedicine.

Continuing presence in a non-pandemic environment remains a key monitorable

- Adoption: While telemedicine has been in practice for some years, the adoption and penetration was very low before covid 19 pandemic. Adoption of telemedicine in times when it is safer to visit hospitals remains a key monitorable

- Data Maintenance: Telemedicine generates personal data about the patient and medical practitioners. Risks surrounding collection and usage of this data remains a key concern

Regulatory Environment

Telemedicine Practice Guidelines - Amendment in the Indian Medical Council (Professional Conduct, Etiquette and Ethics) Regulations, 2002 were introduced on 25th March 2020 to enable registered medical practitioners to provide healthcare using telemedicine.

The guidelines cover key requirements, applications and scope of telemedicine. The document further explains the duties and responsibilities of registered medical practitioners and framework of telemedicine.

Health Ministry's eSanjeevani initiative completed 1.3 crore consultations since its launch till October 4th 2021 across Pan India. As per the latest press release by Press Information Bureau dated 4th October 2021, eSanjeevani is a telemedicine initiative of Govt. of India. As a digital platform of healthcare services delivery, it has gradually shaped into a parallel stream for the Indian healthcare delivery system.

eSanjeevani Consultations				
Sr No.	**04-Oct-21**	**TOTAL**	**eSanjeevaniAB-HWC**	**eSanjeevaniOPD**
	India	13411325	8033029	5378296
1	**Andhra Pradesh**	4223054	4200870	22184
2	**Karnataka**	2415774	987127	1428647
3	**Tamil Nadu**	1599283	131544	1467739
4	**Uttar Pradesh**	1371799	233572	1138227
5	**Gujarat**	485735	61131	424604
6	**Madhya Pradesh**	447878	442417	5461
7	**Bihar**	436383	413757	22626
8	**Maharashtra**	403376	317931	85445
9	**West Bengal**	369441	361475	7966
10	**Uttarakhand**	271513	662	270851

Source: Press Information Bureau

4 Competitive mapping of key players in the Indian healthcare delivery market

4.1 Competition in Delhi NCR region

The Delhi-NCR healthcare industry is highly competitive with the presence of large private and government hospitals. The region has a large number of private hospitals (chain and stand-alone) some of which include Medanta Medicity – Gurugram, Apollo Indraprastha, BLK Max Super Specialty Hospital, Max Super Specialty Hospital Saket, Sir Ganga Ram Hospital, Batra Hospital, Yatharth Super Specialty Hospitals, Fortis Hospitals, Park Hospitals and Manipal Hospital. The large government hospitals include Lok Nayak Jai Prakash Narayan Hospital, Dr. Ram Manohar Lohia Hospital, GB Pant Hospital and AIIMS (All India Institute of Medical Sciences). Yatharth Super Specialty Hospital (Noida Extension and Greater Noida) are among the top 20 largest hospitals of Delhi NCR region in terms of number of beds, and they come among the top 10 largest private hospitals of Delhi NCR region in terms of number of beds as of fiscal 2021. Government hospitals and charitable entity run hospitals in the region enjoy certain tax incentives, which is not the case for private hospitals.

Key private hospitals in Delhi NCR region

Company	Number of beds
Medanta Medicity – Gurugram	1,250
Indraprastha Apollo Hospitals	718
Sir Ganga Ram Hospital	675
BLK Max Super Specialty Hospitals	650
Max Hospital Saket	530
Batra Hospital	500
Yatharth Super Speciality Hospital Noida Extension	450
Yatharth Super Speciality Hospital -Greater Noida	400
Max Super Specialty Hospital, Patparganj	400
Artemis Hospital, Gurugram	400

Source: Company annual reports, investor presentations, company websites, CRISIL Research

Key government hospitals in Delhi NCR region

Company	Number of beds
Lok Nayak Jai Prakash Narayan Hospital	1,597
Dr. Ram Manohar Lohia Hospital	1,532
AIIMS (All India Institute of Medical Sciences)	1,162
GB Pant Hospital	714

Source: Company annual reports, investor presentations, company websites, CRISIL Research

4.2 Comparative analysis of players in the hospital sector

In this section, CRISIL Research has compared the key players in the hospital industry. Data in this section has been obtained from publicly available sources, including annual reports and investor presentations of listed players, regulatory filings, rating rationales, and/or company websites, as relevant.

For this assessment, we have considered the following key players: Apollo Hospitals Enterprise Limited (AHEL), Fortis Healthcare Ltd (FHL), HealthCare Global Enterprises Ltd (HGEL), Max Healthcare Institute Ltd (MHIL), Narayana Healthcare Limited (NH), Krishna Institute of Medical Sciences Ltd (KIMS), Blue Sapphire Healthcares Pvt Ltd (BSH), Global Health Ltd (GHL), Jaypee Healthcare Ltd (JHL), Kaliash Healthcare Ltd (KHL), Moolchand Healthcare Pvt Ltd (MHPL), Yashoda Hospital & Research Center Ltd (YHRC) and Yatharth Hospital and Trauma Care Services Limited (YHTC)

Company	Year of Incorporation	Geographic Presence
Apollo Hospitals Enterprise Limited (AHEL)	1979	Pan India
Fortis Healthcare Ltd (FHL)	1996	Pan India
HealthCare Global Enterprises Ltd. (HGEL)	1998	Pan India
Max Healthcare Institute Ltd (MHIL)	2001	North and West India
Narayana Hrudalaya Limited (NHL)	2000	Pan India
Krishna Institute of Medical Sciences Limited (KIMS)	1973	South India
Blue Sapphire Healthcares Pvt Ltd (BSH)	2007	North India
Global Health Ltd/Medanta (GHL)	2004	North and Central India
Jaypee Healthcare Ltd (JHL)	2012	North India
Kailash Healthcare Ltd (KHL)	1993	North India
Metro Institutes of Medical Sciences Pvt Ltd (MIMS)	1990	North India
Moolchand Healthcare Pvt. Ltd (MHPL)	2006	North India
Yashoda Hospital & Research Center Ltd (YHRC)	1988	North India
Yatharth Hospital and Trauma Care Services Limited (YHTC)	2008	North India

Note:

Source: Company annual reports/investor presentations, CRISIL Research

The hospital chains mainly provide secondary and tertiary healthcare services (across a myriad of specialties).

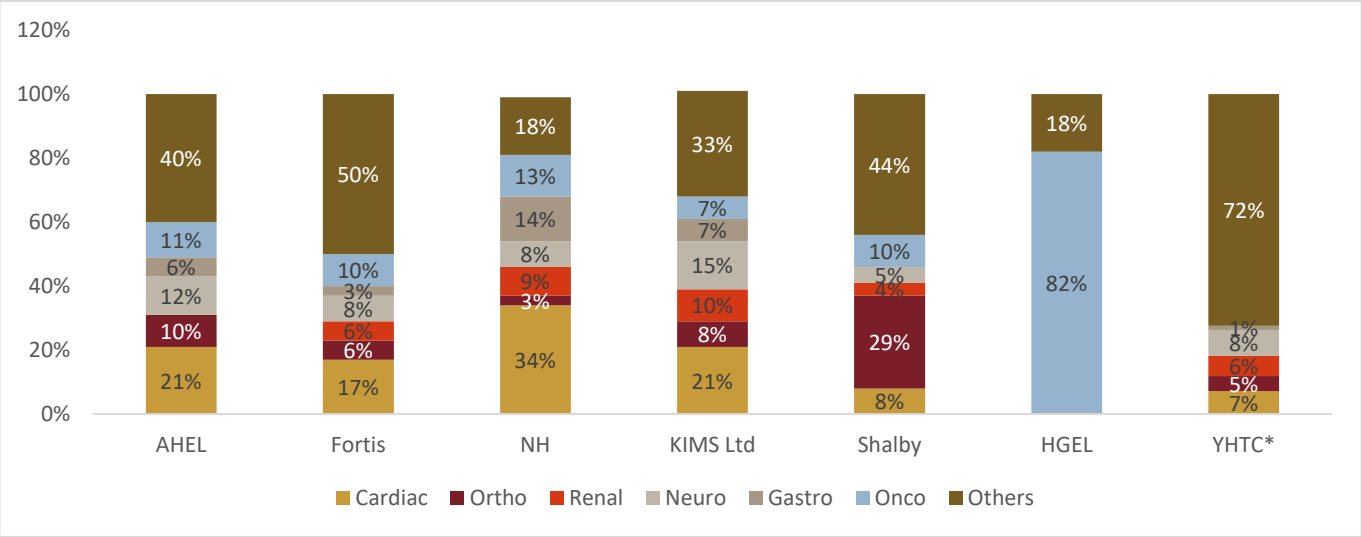
Key specialties undertaken by major players

Player	Key specialties undertaken
AHEL	Multi-national hospital chain covering cardiology, cosmetology, dermatology, orthopaedics, diabetes, gastroenterology, haematology, infertility, nephrology, neurology, oncology, paediatrics, pulmonology, radiology, rheumatology, urology, etc.
FHL	Multi-speciality chain covering cardiology, cosmetology, dermatology, orthopaedics, diabetes, gastroenterology, haematology, infertility, nephrology, neurology, oncology, paediatrics, pulmonology, radiology, rheumatology, urology, etc.
HGEL	Cancer care is the key specialty undertaken. A few of its hospitals in Gujarat provide multi specialty treatments covering cardiology, neurology, orthopaedics, gastroenterology, urology, internal medicine, pulmonary and critical care
MIMS	Multi-speciality covering anaesthesiology, cardiology, dentistry, gastroenterology, internal medicine, neurology, liver transplants, obstetrics & gynaecology, oncology, orthopaedics, paediatrics, cosmetic & reconstructive surgery, pulmonology, rheumatology, stem cell medicine, etc.

Player	Key specialties undertaken
MHIL	Multi-speciality covering oncology, cardiology, neurology, gastroenterology, hepatology endocrinology, orthopaedics, urology, dermatology, dental, eye care, Infertility, IVF, Mental health, nutrition, diabetes, gynaecology, paediatric, etc.
NHL	Multi-speciality covering oncology, neurology, neurosurgery, nephrology, urology, gastroenterology, paediatrics, obstetrics & gynecology, transplants etc.
KIMS	Multi-specialty including cardiac sciences, neurosciences, renal sciences, bariatric surgery, oncology, paediatric, Ophthalmology, cosmetics, dental, intensive, and critical care, diabetes, preventive care, gynaecology, IVF, etc.
BSH	Multi-specialty covering anaesthesia, nuclear medicine, pulmonary medicine, endocrinology, opthalmology, emergency & trauma, radiology, ENT, dental, critical care, dermatology, diatetics & nutrition, physiotherapy, psychiatry, internal medicine, etc.
GHL	Multi-specialty covering cardiology, digestive & hepatobiliary sciences, neurology, urology, transplants & regenerative medicine, oncology, orthopaedics, anaesthesia, etc.
JHL	Multi-specialty covering cardiology, oncology, organ transplant, orthopaedics, minimally invasive surgeries, digestive & hepatobiliary sciences, neurology, renal sciences, aesthetics & reconstructive surgery, etc.
KHL	Multi-specialty covering anaesthesiology, cardiology, paediatrics, psychology, dental, dermatology, dietetics, emergency medical services, endocrinology, ENT, gastro sciences, general surgery, gynaecology, internal medicine, laparoscopy, neurology, nephrology, etc.
MHPL	Multi-specialty covering cardiology, gynaecology, orthopaedics, neurology, laparoscopic surgery, paediatrics, renal care, gastroenterology, critical care, etc.
YHRC	Multi-specialty covering oncology, cardiology, CT surgeries, gastroenterology, liver, transplants, neurosciences, orthopaedics, nephrology, etc.
YHTC	Multi-specialty covering cardiology, orthopaedics, neurology, renal sciences, trauma & critical care, oncology, laparoscopic & bariatric surgery, cosmetic & reconstructive surgery, rheumatology,dermatology,ophthalmology, etc.

Source: Company annual reports, investor presentations, company websites, CRISIL Research

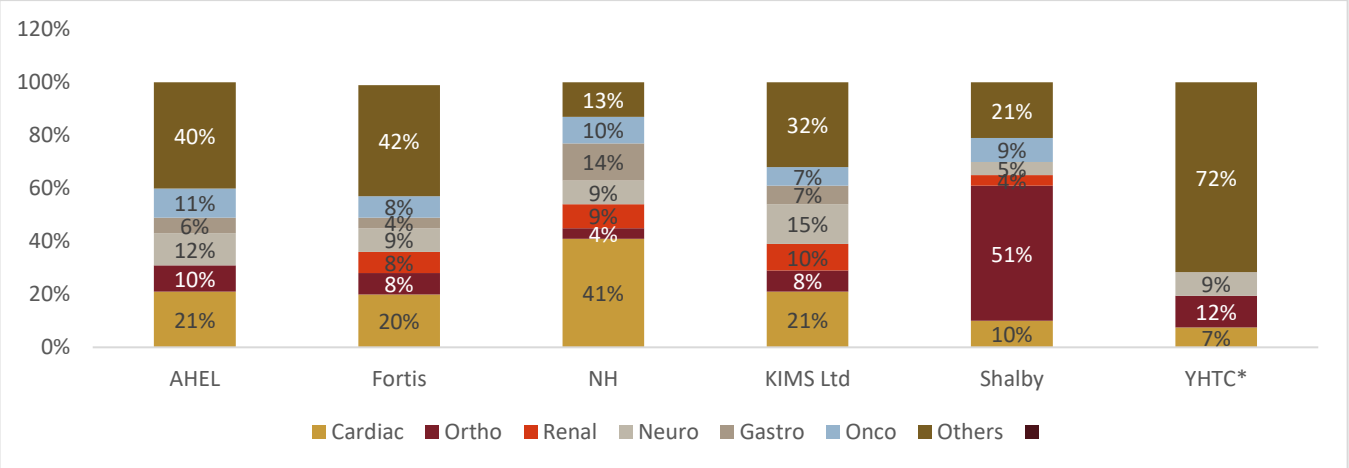
Speciality-wise revenue break-up of key players as of fiscal 2021



*Note: Apollo Hospitals 2021 investor presentation has given fiscal 20 data for specialty mix, as they say fiscal 21 data would be skewed due to Covid-19, KIMS Ltd. Data is for fiscal 20. *For YHTC, others includes medicine as a major component which makes up ~56% out of the total 100% of their specialty-wise break-up*

Source: Companies' annual reports for fiscal 2021, investor presentations in fiscal 2021, CRISIL Research

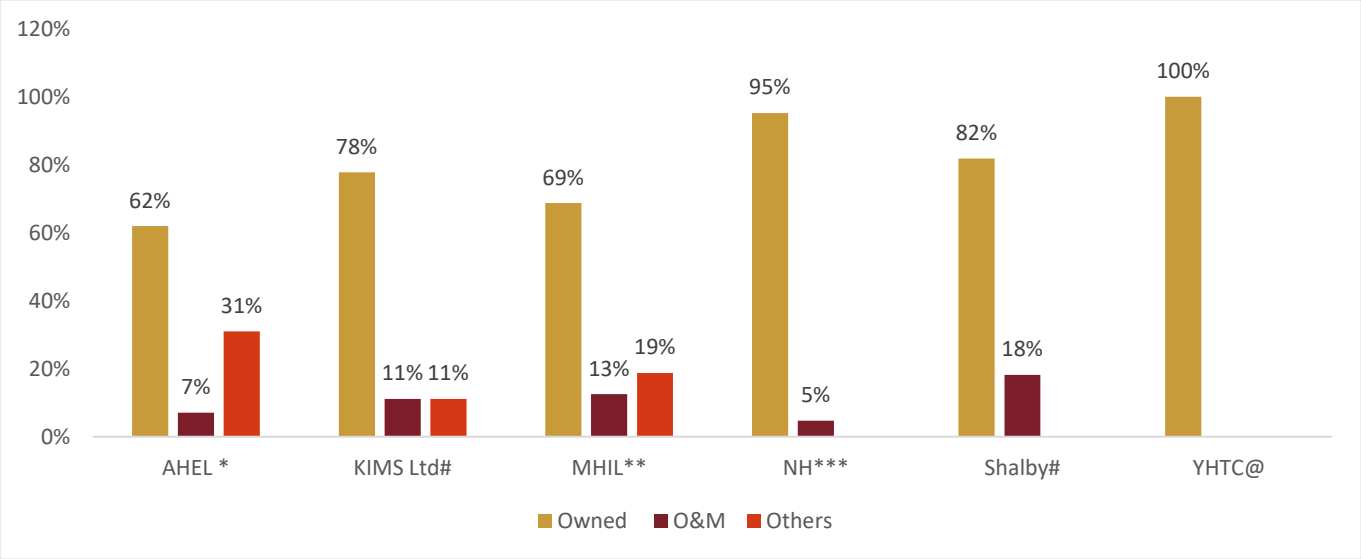
Speciality-wise revenue break-up of key players as of fiscal 2020



Note: For YHTC, others includes medicine as a major component which makes up ~56% out of the total 100% of their specialty-wise break-up

Source: Companies' annual reports, investor presentations, CRISIL Research

Mode of operation of key players as of fiscal 2021



** Others include 11 day-care/ short surgical stay centres with 270 beds and 10 Cradles with 260 beds.*

*** Others include partner healthcare hospitals and medical centres in which the company and subsidiaries provide healthcare services in key specialties for a fee and/or for a share of revenue.*

**** does not include heart centres and primary healthcare facilities*

 # Others include hospital in Kondapur which is rented. Data for KIMS and Shalby for fiscal 2020

@ Out of the 4 hospitals owned by YHTC, for three hospitals, the land is leased by the government

Source: Companies' annual reports/investor presentations, CRISIL Research

Capex planned by key players

Company name	Planned capex in terms of No of beds
Apollo Hospitals Enterprise Limited	765
Fortis	1,300
Healthcare Global Enterprises Limited	185
Max Healthcare Institute Limited	~2,300
Shalby	388
KIMS	1,000

Note: Capex plan is for next 4-5 fiscals and includes potential expansion of the existing facilities and setting up of new facilities. Additionally, Yatharth Hospital and Trauma Care Services Ltd plans to acquire Ramraja Super Multispeciality Hospital which has 305 beds in the next few months

Source: Companies' annual reports for fiscal 2020,2021, investor presentations in fiscal 2020, 2021, CRISIL Research

Capex per operational bed

Company name	Planned capex per bed (in Rs million)
FHL[@]	6.2-6.9 Mn
NHL[#]	3.2 Mn
AHEL*	8-8.2 Mn
Shalby	4.5 Mn
KIMS	~10 mn
YHTC	3.9 mn**

@ - No land cost involved as the number represents brownfield expansion

 # - Based on (Gross Block for Fixed Assets (adjusted for non-cash government grant provision, non-cash financial lease for Dharamshila unit)+ Capital Work in Progress (CWIP)) / Number of operational beds as of March 31st 2021 but excluding Managed Hospitals and Cayman facility

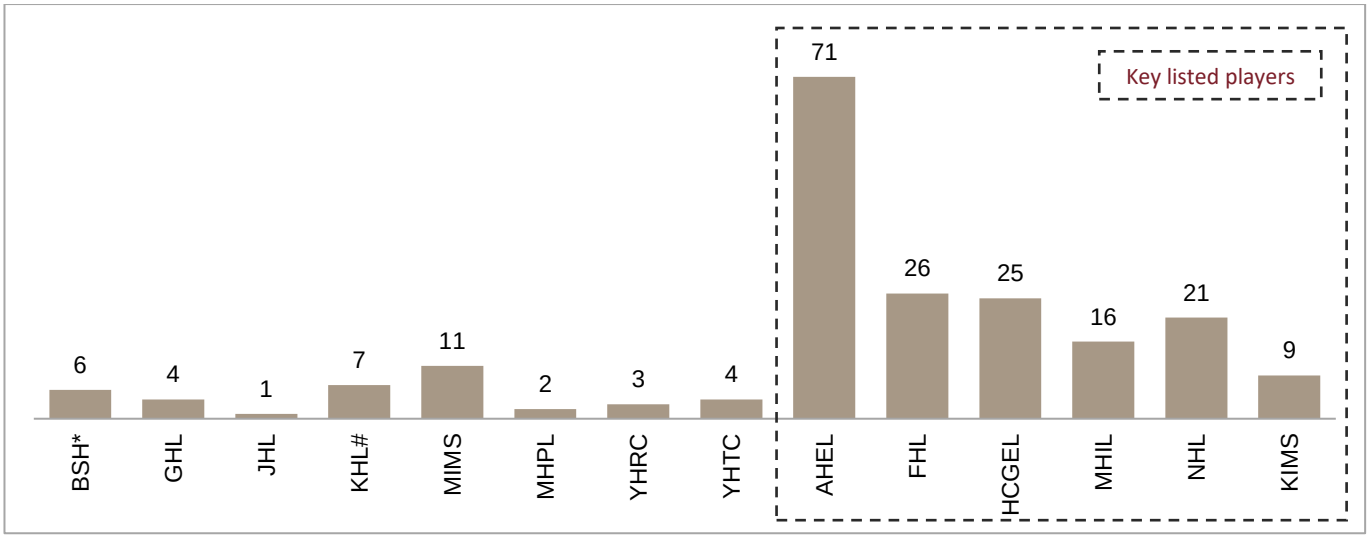
**1 USD=72.1 INR as on September 14, 2018 when the capex expansion for AHEL was announced*

***Existing capex per bed for fiscal 2021 is given and not planned capex*

Source: Companies' annual reports/investor presentations, CRISIL Research

4.3 Key operational parameters of major hospital players

Total number of hospitals (2021)

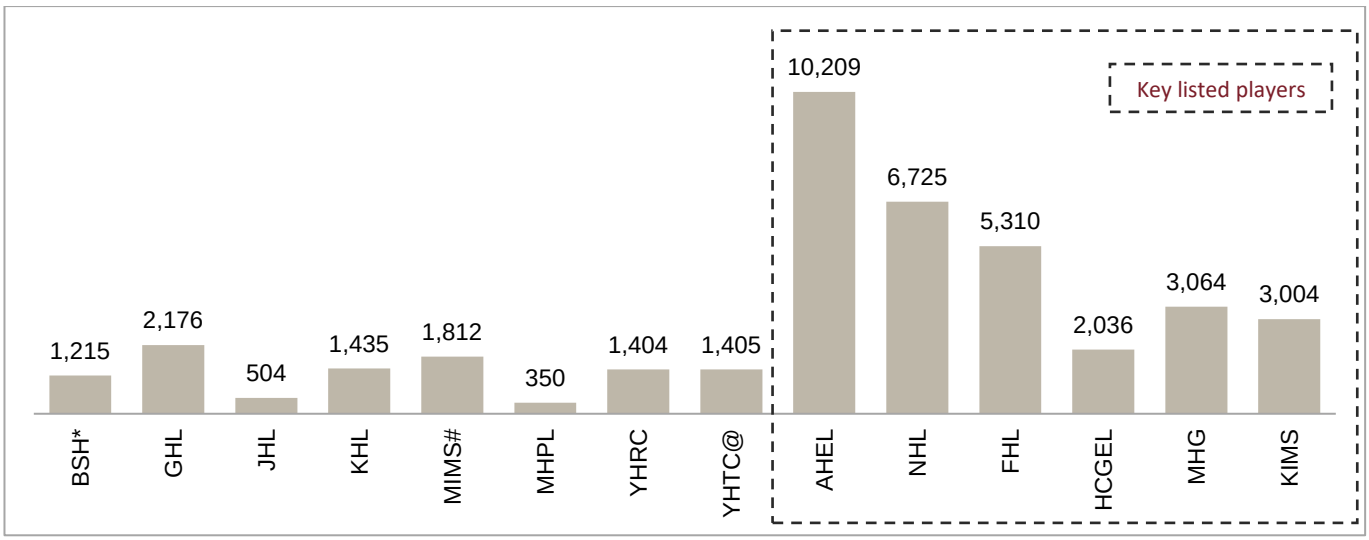


The numbers include only owned and managed hospitals in India; primary healthcare centers and clinics are not considered. Note – Global Health Limited (Medanta) has filed DRHP with sebi in September 2021

**BSH website shows 7 hospitals, but one of them in Noida is not operational. #For KHL, one of the hospitals out of 7 is under renovation as per the website visited on December 7, 2021. @ YHTC hospitals as on February 18, 2022*

Source: Annual reports, Company website, CRISIL Research

Total number of hospital beds available (2020-2021)

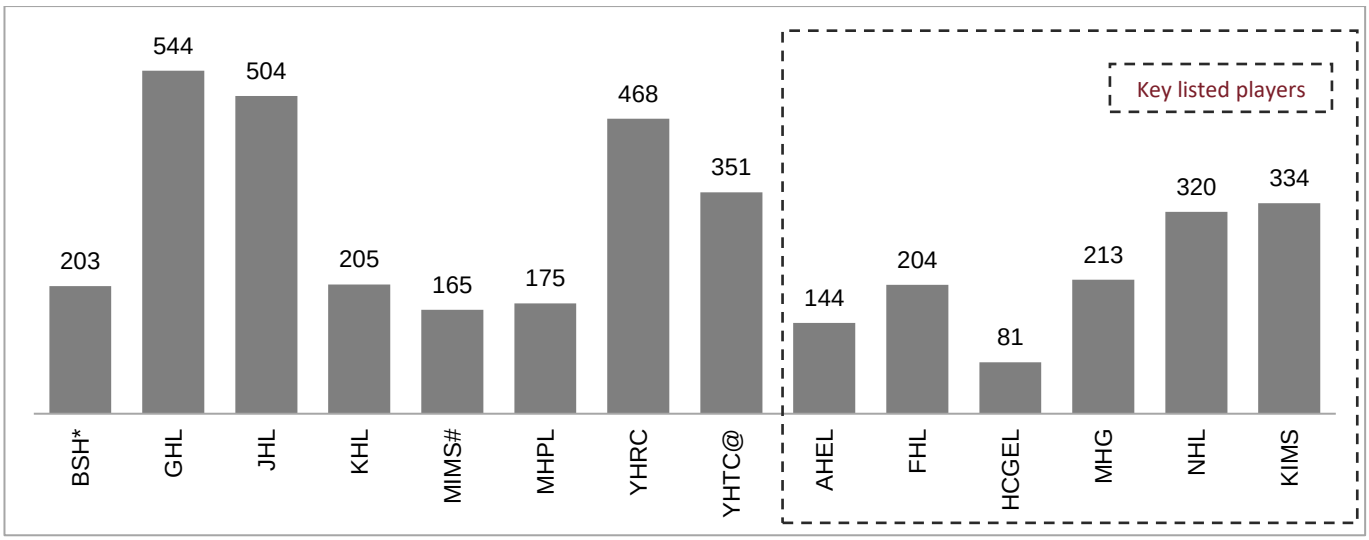


*Note: Numbers pertain to owned and managed hospitals only in India;. Note – GHL has filed DRHP with sebi in September 2021. *BSH website shows 7 hospitals, but one of them in Noida is not operational. #Individually added up for 11 hospitals for MIMS from the website. @YHTC hospital beds as on February 18, 2022*

Source: Companies' annual reports/investor presentations, secondary research, CRISIL Research

- YHTC is among the key healthcare providers in Delhi NCR region & Uttar Pradesh and provides 1405 hospital beds in the region with 4 hospitals as of February 2022
- In terms of critical care, private hospitals in the Delhi NCR region have more ICU beds compared to government hospitals. For large private hospitals in the city, ICU beds range between 15%-30% of their total bed capacities

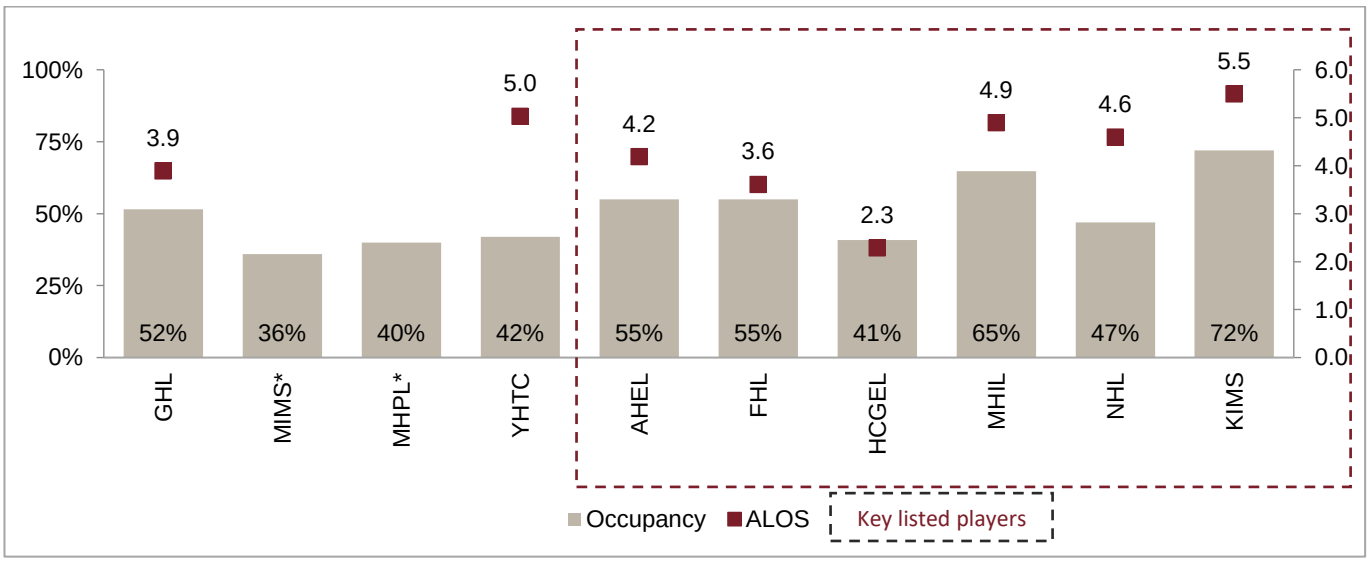
Total number of hospital beds per hospital / average size of hospital (2020-2021)



Note – GHL has filed DRHP with sebi in September 2021. #Individually added up for 11 hospitals for MIMS from the website. @ YHTC hospitals and beds as on February 18, 2022

Source: Companies' annual reports/investor presentations, CRISIL Research

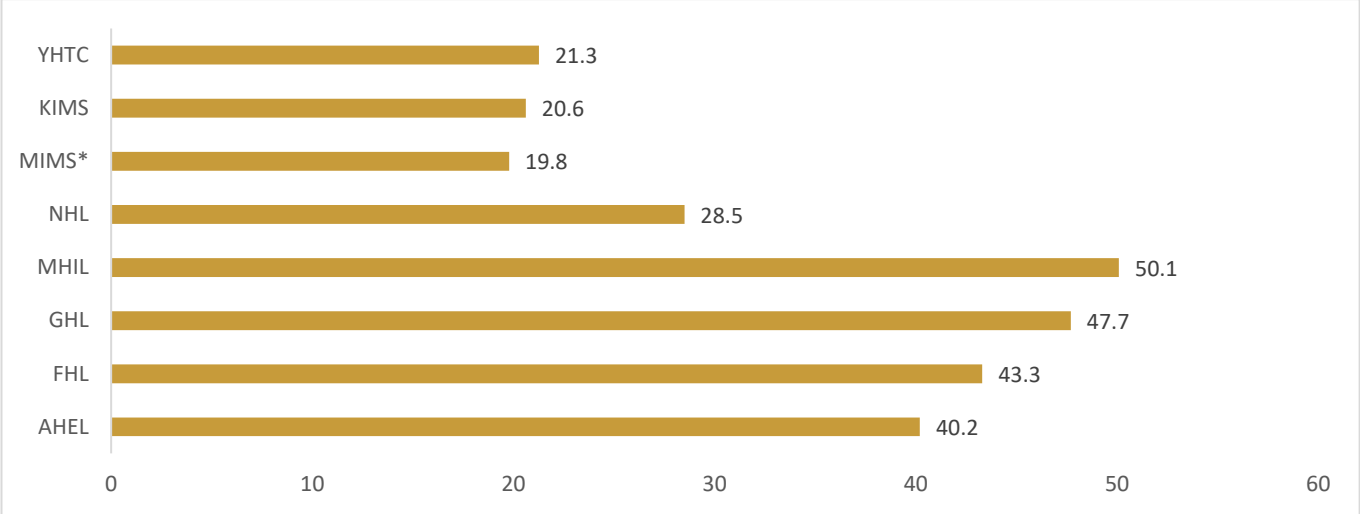
Occupancy rate (OR) and ALOS for FY21



*Note: NHL occupancy rate figure for 9M FY21. * figure for 9M FY21.. Note – GHL has filed DRHP with sebi in September 2021*

Source: Companies' annual reports/investor presentations, CRISIL Research

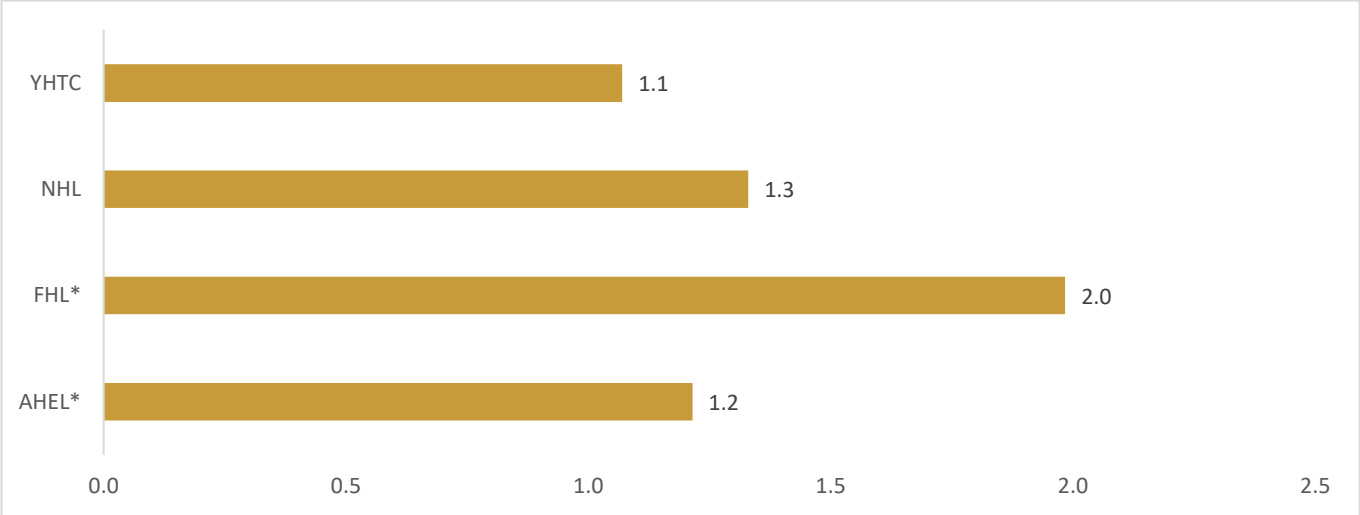
ARPOB of major hospital players for FY21 (Rs. '000)



*Note: ARPOB in '000 per occupied bed. *MIMS figures for 9M 2021*

Source: Companies' annual reports/investor presentations, CRISIL Research

ARPP of major hospital players for FY21 (Rs. lakhs)



Note: ARPP is defined as total revenue divided by number of in-patients. Hospital business operating revenues considered for AHEL and FHL, while total operating revenue considered for YHTC and NHL

Source: Companies' annual reports/investor presentations, CRISIL Research

Key observations:

- In fiscal 2021, Max Healthcare Institute Ltd registered the highest ARPOB, followed by Global Health Ltd (Medanta), Fortis Healthcare Ltd and Apollo Hospital Enterprise Ltd among the peer set compared above

4.4 Key financial parameters of major hospital players

Key financial parameters (FY20)

Key financials (FY20)	Operating income (Rs million)	Y-o-y growth (%)	EBITDA (Rs million)	Y-o-y growth (%)	PAT (Rs million)	Y-o-y growth(%)
AHEL	1,12,530	17%	9,970**	8%	4,315	116%
FHL	45,600	3%	6,398	-8%	915	140%
HGEL	10,968	12%	1,667	NA	-1,250	NA
MHIL	40,236	12%	5897	66%	1,290	N.ap
NHL	31,314	10%	4464	45%	1,190	116%
KIMS	11,262	22%	2,543	51%	1,151	NA
BSH	3,448	1%	267	-30%	-400	97%
GHL	15,070	3%	2,192	16%	201	-57%
JHL	2,940	-8%	82	-63%	-1,073	40%
KHL	3,807	13%	487	11%	103	14%
MHPL	114	29%	195	-25%	-335	283%
MIMS	2,785	1%	522	-9%	249	-10%
YHRC	2,824	17%	570	6%	230	-226%
YHTC	1,460	43%	377	92%	-21	-152%

Note: NA: Not applicable / Not meaningful.

*** EBITDA for healthcare services business only from investor presentation 2019-20*

 # Classification of income from healthcare service revenue for the major listed players:

- *For AHEL, the healthcare services income includes revenue from outpatients (physical examinations, treatments, surgeries and tests), inpatients (clinical examinations and treatments, surgeries, and other fees such as room charges, and nursing care), and other operating income*
- ** (MHIL) Max Healthcare's income includes operating income and income from its network healthcare services, which include: i) all hospitals and medical centres owned and operated by MHIL and its subsidiaries; ii) all hospitals and medical centres owned and operated by Radiant Life Care Private Limited (Radiant) and its subsidiaries; iii) managed healthcare facilities (hospitals operated by MHIL and/ or Radiant and their respective subsidiaries under operations and management agreements); and iv) partner healthcare facilities (hospitals and medical centres in which MHIL and its subsidiaries provide healthcare services in key specialities).*
- *Narayana Hrudayalaya's income from medical and healthcare services has been considered (as per annual report). This excludes revenue from sale of medicals and consumables and other operating revenue*
- *For Fortis Healthcare, healthcare service revenue includes that of hospital business as per the company's investor presentation*
- *For HCG, healthcare service revenue includes revenue from medical services (as per its annual report) and excludes sale of medical and non-medical items and other operating revenue*

Source: Companies' annual reports, CRISIL Research

Key Financial Ratios for major hospital players (FY20)

Key financial ratios (FY20)	Operating Income-FY20 (Rs million)	Operating margin	Net profit margin	RoCE	Interest coverage (times)	Gearing (times)	EBITDA /CFO	CFO / OPBDIT	Working capital days	Asset turnover ratio
AHEL	1,12,530	14.1%	3.8%	17.0%	3.4	1.2	1.7	0.6	3.6	1.0
FHL	45,600	12.2%	2.0%	7.0%	3.6	0.4	6.6	0.2	-178.4	0.6
HCGEL	10,960	15.9%	-11.4%	1.1%	1.2	5.2	1.1	0.9	-161.8	0.1
MHIL#	40,236	14.7%*	2.5%	NA	1.4	0.7	NA	NA	-165.0	NA
NHL	31,314	14.2%	3.8%	16%	5.1	0.9	1.2	0.9	-135.2	1.1
KIMS	11,262	22.6%	10.2%	22.5%	5.8	0.6	1.5	0.7	-119.4	1.0
BSH	3,448	5.9%	-11.6%	-1.0%	0.9	9.5	0.9	1.5	-238.3	0.7
GHL	15,070	13.2%	1.3%	5.3%	3.9	0.5	1.3	0.8	-97.9	0.6
JHL	2,940	2.5%	-36.5%	-5.0%	0.1	-16.4	-0.4	-2.9	-468.3	0.3
KHL	3,807	12.0%	2.7%	10.0%	4.0	1.2	1.0	1.1	-146.9	0.9
MHPL	114	-23.4%	-293.8%	-13.9%	-6.1	0.3	-1.8	4.1	266.0	0.1
MIMS	2785	18.0%	8.9%	12.5%	4.7	0.8	1.8	0.6	-230.9	0.6
YHRC	2,824	19.5%	8.2%	20.4%	13.6	0.2	0.7	1.5	-293.8	1.1
YHTC	1,460	25.7%	-1.4%	7.2%	2.0	3.0	1.5	0.7	-135.7	0.5

Ratios calculated as per CRISIL Research standards as described below:

- *EBIDTA margin = EBITDA / total income*
- *Net profit margin = Profit after tax / operating income*
- *RoCE = Profit before interest and tax (PBIT) / [total debt + adjusted net worth + deferred tax liability]*
- *Interest coverage ratio = Profit before depreciation, interest, and tax (PBDIT)/ interest and finance charges*
- *Gearing = Adjusted total debt / adjusted net worth*
- *CFO / OPBDIT = Cash flow from operations / Operating profit before depreciation, interest and taxes*
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- *Working capital days = Debtors & Bills Disc : as days Gross & Traded Sales + Days Inventory :as cost of sales - Days Payables :as days consumption*

*#For MHIL, operating income and operating margin taken for the whole group from the investor presentation, other available ratios which have been put are for Max Healthcare Institute Ltd. *Operating EBITDA margin used in place of operating margin for Max group*

NA is not available

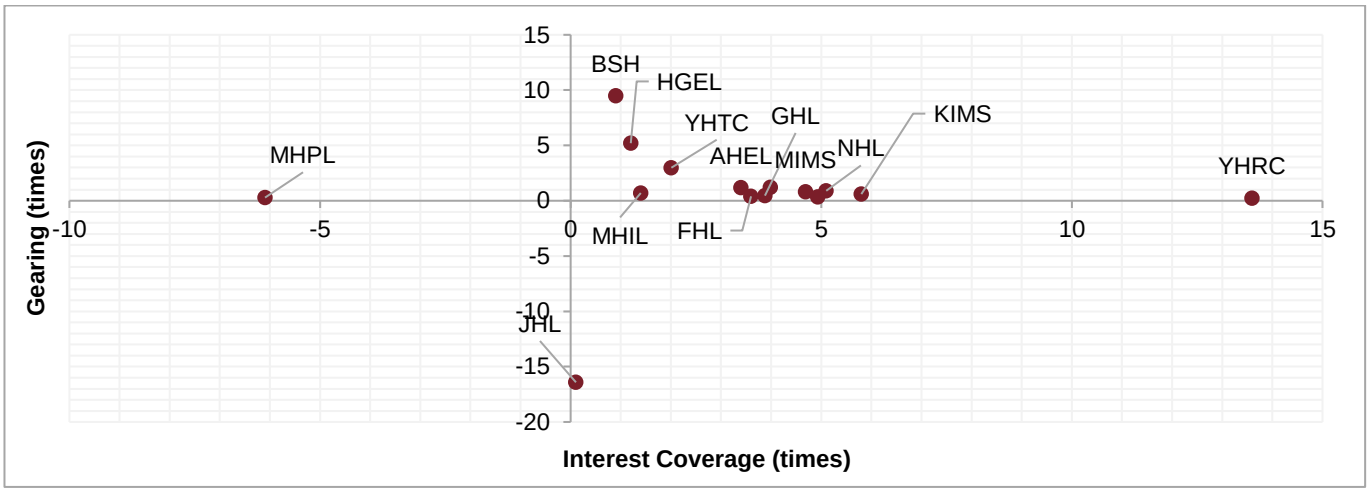
CRISIL Research takes into account tangible net worth for calculation of both ROCE and gearing ratio.

Source: Companies' annual reports, CRISIL Research

Key observations

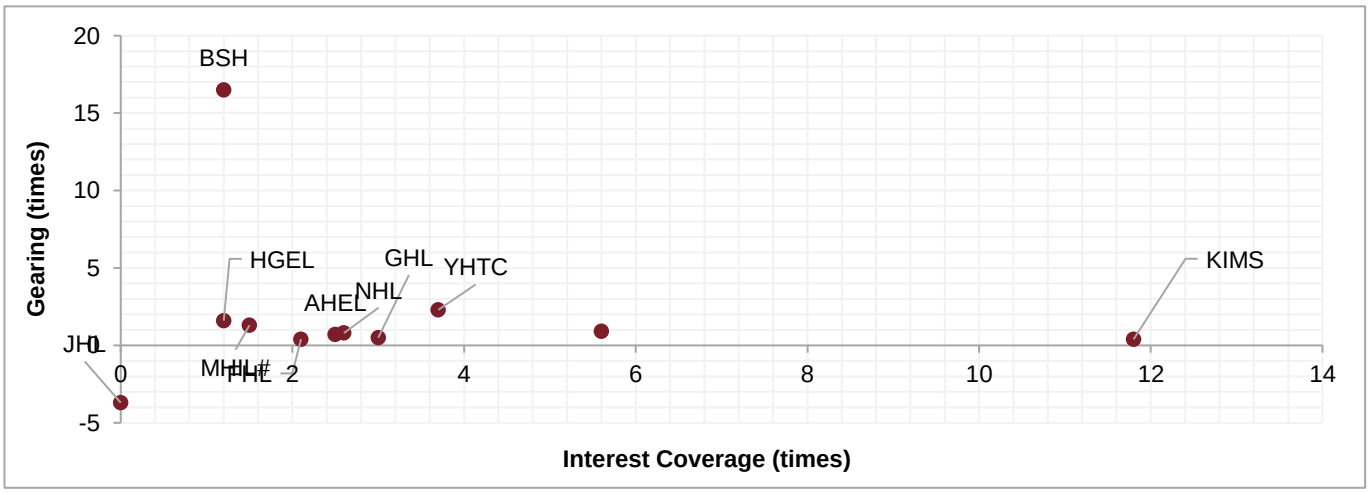
- As of fiscal 2020, AHEL has the highest operating income at Rs 112,530 million, followed by Fortis Healthcare at Rs 45,600 million among the peer set compared above
- YHTC reported the highest year-on-year growth in revenue in fiscal 2020 with 43% growth rate followed by MHPL with 29% on-year growth among the peers compared above

Gearing and interest coverage of major hospital players (FY20)



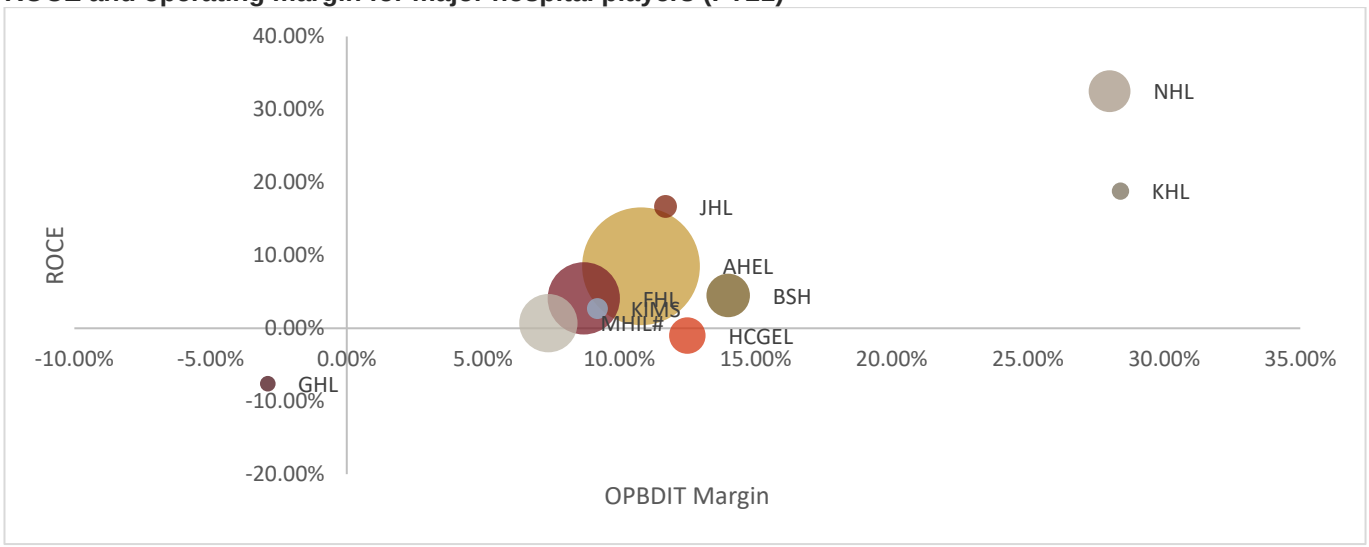
Source: Companies' annual reports, CRISIL Research

Gearing and Interest Coverage for major hospital players (FY21)



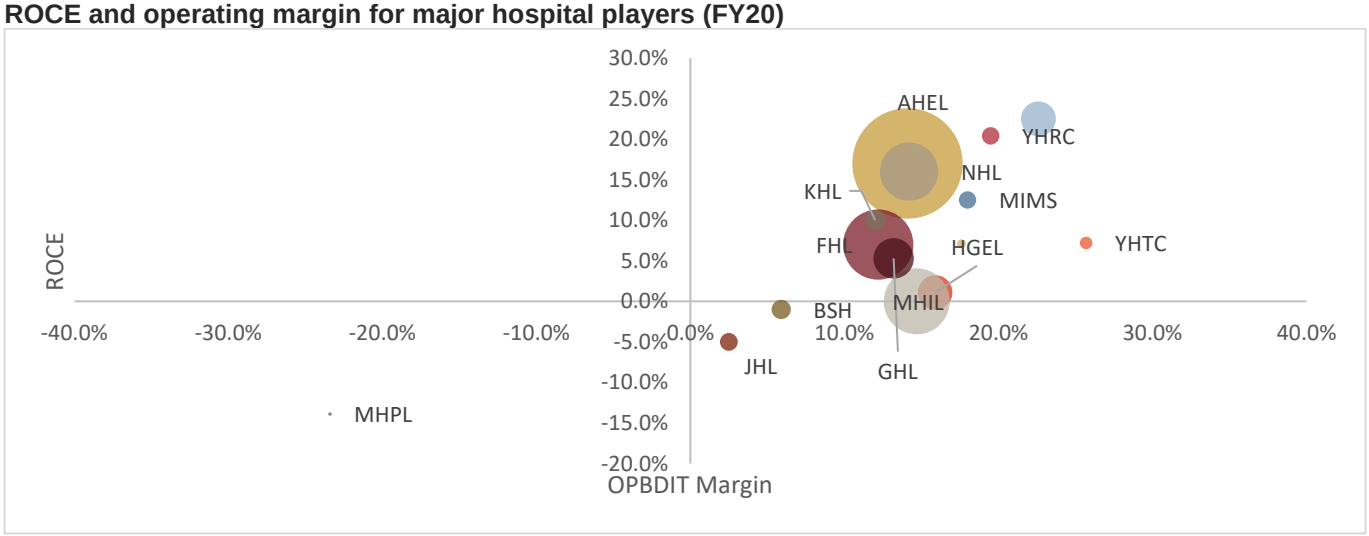
Source: Company annual reports, CRISIL Research

ROCE and operating margin for major hospital players (FY21)



Source: Company annual reports, CRISIL Research

ROCE and operating margin for major hospital players (FY20)



Source: Company annual reports, CRISIL Research

Key financial parameters (FY21)

Key financials (FY21)	Operating income (Rs million)	2-Year CAGR (Mar 2019 to Mar 2021)	Y-o-y growth (%)	EBITDA (Rs million)	Y-o-y growth (%)	2-Year CAGR (Mar 2019 to Mar 2021)	PAT (Rs million)	2-Year CAGR (Mar 2019 to Mar 2021)
AHEL	1,05,607	5%	-13%	6087**	-39%	-25%	1,368	-17%
FHL	39,796	-5%	-14%	4,707	-26%	-18%	-562	-50%
HGEL	10,130	26%	-7%	1,430	-20%	16%	-2,211	N.Ap
MHIL	36,290	46%	-10%	6,360	8%	74%	-950	N.Ap
NHL	25,910	-5%	-18%	1,971	-56%	-20%	-207	N.Ap
KIMS	13,328	20%	18%	3,803	50%	50%	2,055	N.Ap
BSH	3,335	-1%	-3%	358	34%	-3%	-188	N.Ap
GHL	14,410	-1%	-4%	2,224	1%	8%	132	-47%
JHL	1,855	-24%	-37%	-25	-130%	N.Ap.	-1,224	N.Ap
KHL	3,978	8%	4%	800	64%	35%	233	60%
YHTC	2,287	50%	57%	675	79%	85%	196	122%

Note: N.Ap: Not applicable / Not meaningful

% - Latest financials are for FY19

** CAGR over fiscals 2018-2020*

*** EBITDA for healthcare services business only from investor presentation 2020-2021*

 # Classification of income from healthcare service revenue for the major listed players:

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Source: Companies' annual reports, CRISIL Research

Key Financial Ratios for major hospital players (FY21)

Key financial ratios (FY21)	Operating Income-FY21 (Rs million)	Operating margin	Net profit margin	RoCE	Interest coverage (times)	Gearing (times)	EBITDA /CFO	CFO / OPBDIT	Working capital days	Asset turnover ratio
AHEL	1,05,607	10.8%	1.3%	8.5%	2.5	0.7	1.3	0.8	-18.4	1.0
FHL	39,796	8.7%	-1.4%	4.1%	2.1	0.4	3.8	0.4	-154.6	0.6
HGEL	10,130	12.5%	-21.8%	-1.0%	1.2	1.6	-2.8	-0.4	-144.5	0.5
MHIL#	36,290	17.5%*	-2.6%	NA	1.5	1.3	NA	NA	-186.7	NA
NHL	25,910	7.4%	-0.8%	0.7%	2.6	0.8	1.1	0.9	-174.0	1.0
KIMS	13,328	28.0%	15.4%	32.5%	11.8	0.4	1.2	0.8	-127.1	1.0
BSH	3,335	9.2%	-5.7%	2.7%	1.2	16.5	4.5	0.3	-247.1	0.7
GHL	14,410	14.0%	0.9%	4.5%	3.0	0.5	1.8	0.6	-87.8	0.5
JHL	1,855	-2.9%	-66.0%	-7.6%	0.0	-3.7	-0.8	-0.6	-726.4	0.2
KHL	3,978	11.7%	5.8%	16.7%	5.6	0.9	4.1	0.4	-96.6	1.0
YHTC	2,287	28.4%	10.5%	18.8%	3.7	2.3	2.5	0.4	-63.9	0.7

Ratios calculated as per CRISIL Research standards as described below:

- *EBIDTA margin = EBITDA / total income*
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- *Asset turnover ratio = Operating income / Total Assets*

*#For MHIL, operating income and operating margin taken for the whole group from the investor presentation, other available ratios which have been put are for Max Healthcare Institute Ltd. *Operating EBITDA margin used in place of operating margin for Max group*

CRISIL Research takes into account tangible net worth for calculation of both ROCE and gearing ratio.

Source: Companies' annual reports, CRISIL Research

Key observations:

- YHTC recorded the highest operating margin of 28.4% followed by KIMS with 28.0% operating margin in FY21, among the peers compared above
- In FY21, YHTC recorded the highest two-year CAGR in revenue growth between FY19 and FY21 at 50% among the players mentioned above
- In FY21, YHTC had the second highest ROCE among the players mentioned above (18.8%). KIMS reported the highest ROCE of 32.5% in FY21
- KIMS and YHTC were the only two players which recorded a net profit margin above 10% in FY21 among the players mentioned above. KIMS reported a net profit margin of 15.4% followed by YHTC with a margin of 10.5% among the peers compared above

Cost structure of major hospital players (FY21)

Cost structure (FY21)	Material and consumables cost as average% of OI	Power & fuel costs as % of OI	Employee costs as % of OI	Other costs as % of OI
AHEL*	53.8%	1.5%	15.2%	18.8%
Fortis*	24.5%	2.6%	23.6%	40.6%
NHL	26.2%	2.8%	24.2%	39.4%
HGEL	23.7%	3.1%	19.3%	41.3%
MHIL#	22.2%	2.2%	16.2%	39.8%
KIMS	21.7%	1.8%	16.5%	31.9%
BSH	25.6%	0.0%	24.5%	40.7%
GHL	24.2%	2.7%	32.6%	26.5%
JHL	23.1%	5.8%	21.2%	52.8%
KHL	29.2%	3.3%	47.2%	8.6%
YHTC	20.3%	4.1%	20.4%	25.9%

** Cost structure includes all business (standalone pharmacy in case of AHEL and Diagnostic services in case of Fortis).*

#- 2020 numbers for MHIL

Employee cost includes employee benefit expense. Doctor's payout cost, retainer fees to doctor, etc are included in other
Note: OI: Operating income
Source: Companies' annual reports, CRISIL Research

Key observations:

- Material cost and employee cost are two of the largest cost components for the players under study. For most players compared hereby, material cost is in the range of 20-30% and employee cost in 10-20%
- Yatharth Hospital and Trauma Care Services Ltd had the lowest material and consumable as percentage of operating income, amongst all the players compared in this section

Key Financial Ratios for major hospital players (H1 FY22 vs H1 FY21)

Key financial ratios	Operating Income-H1 FY22 (Rs million)	Y-o-y growth (%)	Operating margin (PBDIT/operating income)	Y-o-y growth (%)	Net profit margin	Y-o-y growth (%)	ROCE (%)	Gearing (times)	Asset turnover ratio
AHEL	74,773	51.6%	15.2%	238.5%	10.3%	N.Ap.	18.0%	0.8	1.2
FHL	28,729	79.5%	19.5%	3,248.9 %	19.5%	N.Ap.	10.5%	0.2	0.5

Key financial ratios	Operating Income-H1 FY22 (Rs million)	Y-o-y growth (%)	Operating margin (PBDIT/operating income)	Y-o-y growth (%)	Net profit margin	Y-o-y growth (%)	ROCE (%)	Gearing (times)	Asset turnover ratio
MHIL	26,750	84.1%	27.0%*	NA	15.4%	N.Ap.	NA	NA	NA
NHL	18,001	81.1%	16.8%	571.2%	9.8%	N.Ap.	22.1%	0.6	1.2
KIMS	8,946	45.1%	31.5%	NA	19.7%	77.9%	21.7%	0.0	0.6
YHTC	2,110	NA	31.6%	NA	12.8%	NA	25.3%	1.7	0.6

For MHIL, operating income and operating margin taken for the whole group, other available ratios which have been put are for MHIL.
**Operating EBITDA margin used in place of operating margin for Max group*

N.Ap stands for not applicable as previous year figures were negative

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- *Gearing = Adjusted total debt / adjusted net worth*
- *Asset turnover ratio = Operating income / Total Assets*

Key observations:

- For H1 FY22, AHEL reported the highest operating income among the listed players (Rs 74,773 million). FHL came in second with operating income of Rs 28,729 million
- For H1 FY22, YHTC recorded the highest operating margin at 31.6%, followed by KIMS at 31.5% among the peers compared above
- KIMS reported the highest net profit margin for H1 FY22 at 19.7%, followed by FHL with a margin of 19.5% among the peers compared above
- YHTC reported the highest ROCE of 25.3% in H1 FY22 among the players mentioned above. It was followed by NHL, with an ROCE of 22.1%

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