CRISIL
An S&P Global Company

Assessment of maternity and paediatric healthcare delivery sectors in India

November 2021

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1 Macroeconomic overview of India

1.1 A review of India's GDP growth

GDP grew at 6.6% CAGR from 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 146 trillion in fiscal 2020 from Rs 87 trillion in fiscal 2012.

Fiscal 2021 has been a challenging year for the Indian economy, which was already experiencing a slowdown before the pandemic struck. GDP contracted 7.3% (in real terms) last fiscal, after growing 4.0% in fiscal 2020. At Rs 135.1 billion in fiscal 2021, India's GDP (in absolute terms) went even below the fiscal 2019 level of Rs 140.0 billion.

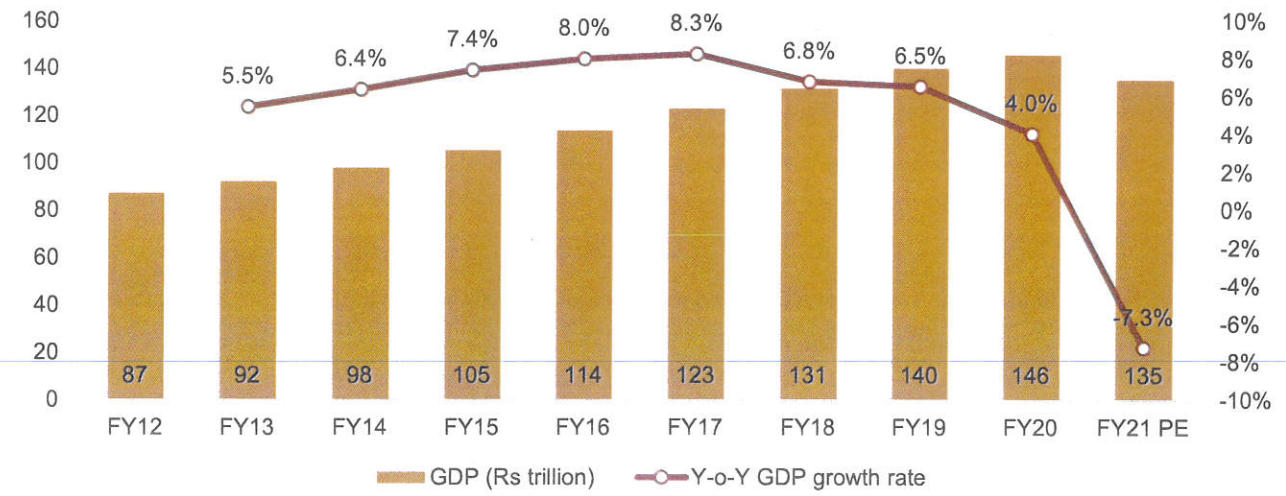
Economy re-bounded in second half of fiscal 2021 after shrinking in first half of the year

India's real gross domestic product (GDP) contracted a sharp 7.3% in fiscal 2021, as the pandemic exacted a heavy toll on the economy. One consequence of this, was the squeezing of the central government's treasury. The year also demanded a massive ramp up in health and welfare expenditure, though the actual spends were quite modest. Nevertheless, declining revenue of the government was a reality.

Just as India was beginning to recover from the first Covid-19 wave came the second, ferocious one at the start of this fiscal. But high-frequency data as well as the first quarter GDP numbers reveal this far more virulent wave did not hit the economy as hard as the first, because of calibrated lockdowns

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% 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.

Real GDP growth in India (new GDP series)

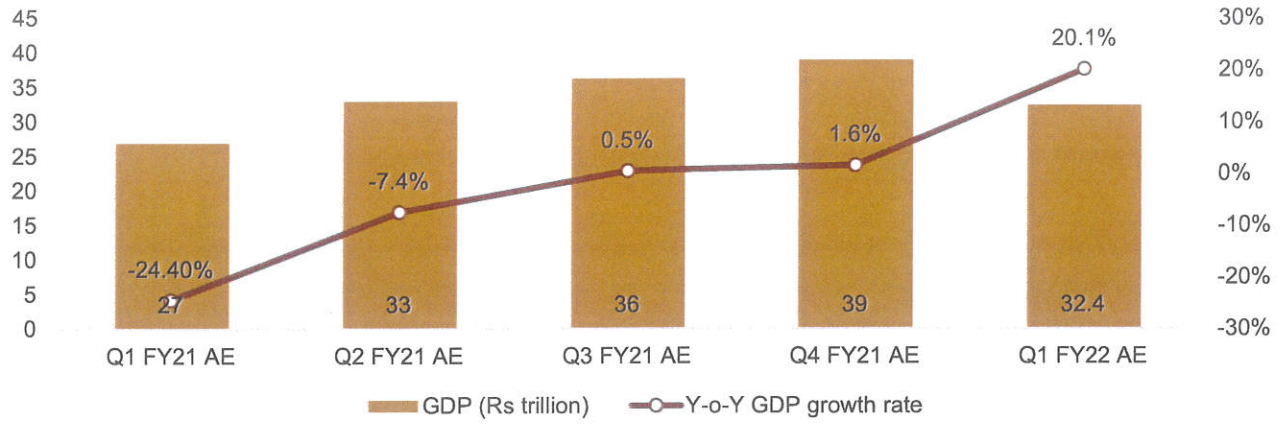


Note: PE: Provisional estimates

Source: Provisional estimates of Annual National Income 2020-21, Central Statistics Office (CSO), MoSPI, CRISIL Research

Economy is in recover mode as GDP growth in Q1 FY2022 grew at 20.1% w.r.t to Q1 FY2021, but still the absolute GDP figures for Q1FY2022 were 9% down when compared to Q1FY2020

Quarter-wise real GDP growth in FY21



Note: AE: Advance estimates

Source: Provisional estimates of Annual National Income 2020-21, 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 6.3% (compared with 4.1% growth in fiscal 2020). In absolute terms, real GVA was Rs 124.5 trillion last fiscal, down from Rs 127.4 trillion in fiscal 2019.

GVA at basic prices (constant FY12 prices)

Rs trillion	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21PE	CAGR
GVA at basic prices	81.1	85.5	90.6	97.1	104.9	113.3	120.3	127.4	132.7	124.5	4.9%
Y-o-y growth (%)		5.4%	6.1%	7.2%	8.0%	8.0%	6.2%	5.9%	4.1%	-6.2%	

Note: CAGR is between fiscal 2012 and 2021

Source: CRISIL Research

Fiscal 2022 base case GDP growth expected to be 9.5%

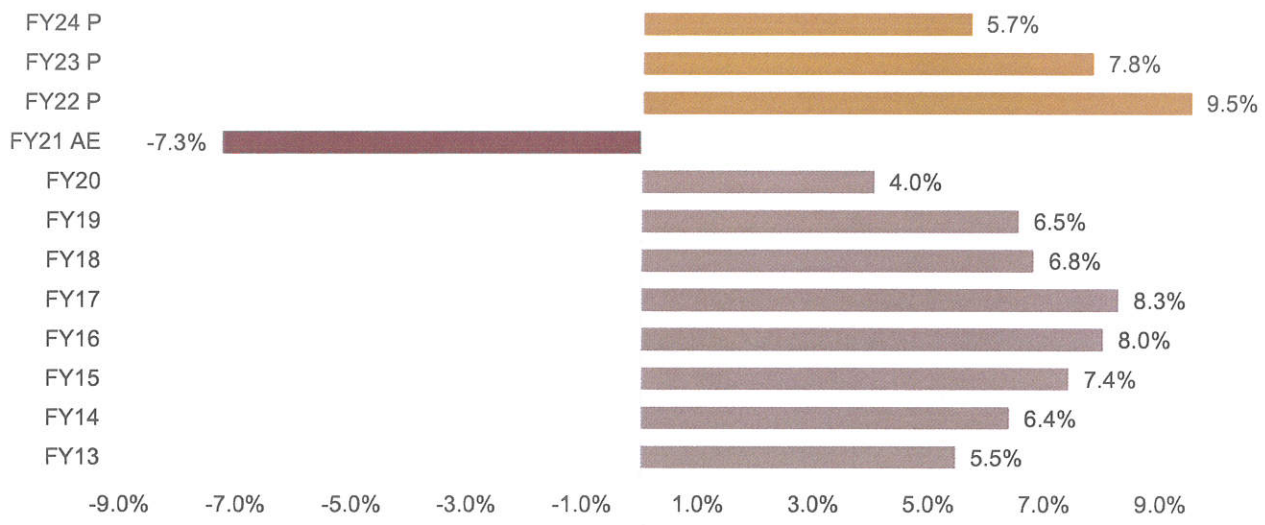
India is getting back on its feet slowly, with divergent growth trends. Though data suggests there has been some pick-up in recent months, recovery is weak and uneven. And indeed, the scars of the pandemic continue to run deep for small businesses, the urban poor and most of the services sector.

Fiscal 2022 is also seen emerging as a story of two halves. The first half will be characterised by a base effect-driven recovery amid the challenge associated with resurgence in Covid-19 infections. 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.

Real GDP growth (% on-year)



AE: Advance estimates; P: Projected by CRISIL Research.
Source: Provisional estimates of national income 2020-21, CSO, MoSPI, CRISIL Research

CRISIL forecasts India's GDP growth to rebound to 9.5% in fiscal 2022 as four drivers converge:

1. **Weak base:** A 7.3% contraction in GDP in fiscal 2021 will provide a statistical push to growth next fiscal.
2. Global upturns: Higher global growth in 2021, i.e., world GDP up by 5.0%, advanced economies 4.3%, emerging economies 6.3%, should lift exports.
3. Covid-19 curve: India is witnessing the second wave of Covid-19 infections and at the same time learning to live with the virus, with the rollout of vaccines. These should broaden growth this fiscal, especially in the services and unorganised sectors.
4. Fiscal push: Stretch in the fiscal glide path and focus of the Union Budget 2021-22 on capex are expected to have a multiplier effect on growth.

Risks to the fiscal 2022 forecast

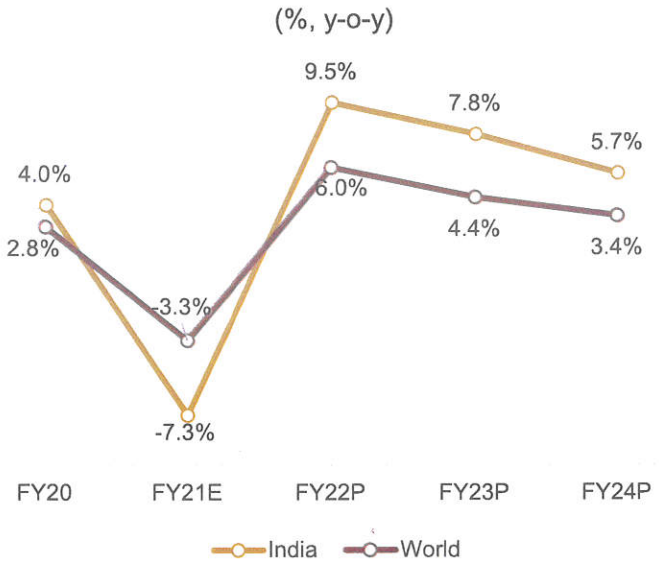
The base case of 9.5% GDP growth assumes that Covid-19 restrictions will continue, and mobility will remain affected in some form or other, at least till August and September. The pace of economic recovery will also be a function of what the pace of vaccination is in the coming months. We find that countries with over 40% of their population vaccinated are seeing a faster and more broad-based economic recovery. The government plans to vaccinate India's entire adult population (68% of total population) by this December – a tall order even if there are sufficient vaccines available. CRISIL's base case is 70% of the adult population vaccinated by December.

A third wave would pose a significant downside risk to the growth forecast, as would a slower-than-anticipated pace of vaccination. In such a pessimistic case, CRISIL sees GDP growing at 8% in fiscal 2022.

GDP growth in FY22 (y-o-y,%)

Source: S&P Global Ratings, CRISIL Research,

India to surpass global GDP growth in next three fiscals



GDP growth to rebound to 9.5% this fiscal on the back of a very weak base and the rising-global-tide effect

CRISIL sees India's GDP growth rebounding to 9.5% 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. Yet, the economy is expected to reach pre-pandemic levels only by the second quarter of this fiscal. Services will take longer to recover than manufacturing. 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 from IMF world economic outlook update as of April 2021.
Source: S&P Global Ratings, CRISIL

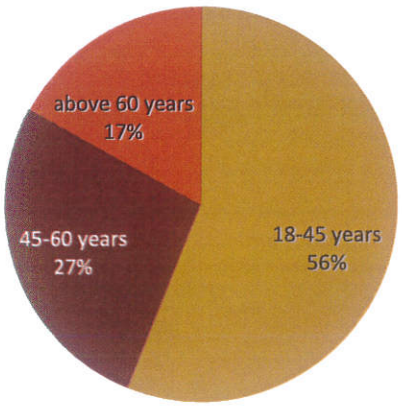
India administered one billion covid vaccination doses till October 2021

India has completed 2nd dose vaccination for nearly 300 million + citizens by mid-October 2021 and has administered total 1 billion+ doses since the nationwide immunization drive was launched on 16 January. First dose contributes to 70% of administered vaccination doses while second dose has remaining 30% share. Age-group wise, 56% of the doses were administered to people with 18-45years age group. Nearly 14 Lakhs pregnant women in India have received their first dose of a covid-19 vaccine by mid-September 2021 as per industry sources.

In the context of current situation of the SARS-CoV-2 pandemic, experts have suggested that the COVID-19 vaccine may be offered to the pregnant women if no contraindications exist. Pregnant women with COVID-19 are at increased risk for preterm birth and might have an increased risk of other adverse pregnancy outcomes including higher chances of neonatal morbidity. WHO recommends vaccination in pregnant women when the benefits of vaccination to the pregnant woman outweigh the potential risks, such as pregnant women at high risk of exposure to COVID-19 and pregnant women with comorbidities that place them in a high-risk group for severe COVID-19 disease.

Emergency authorization approval for children covid vaccination was granted in Aug 2021, but India is yet to roll out its first Covid-19 vaccine for children.

Age-group wise COVID-19 vaccination status



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 has announced a Rs 20.9 trillion package, 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 365.76 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 26.63 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, 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 billion for the Covid-19 vaccine and Rs 131.92 billion as finance commission grant for health.

Key budget proposals

- Budgetary allocation towards health and well-being increased to Rs 2.23 trillion in fiscal 2022
- Rs 350 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 wellbeing)	**862.6**	**944.5**	**1,028.7**	**2,238.5**

BE: Budget Estimates; RE: Revised Estimates;
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 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 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 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.

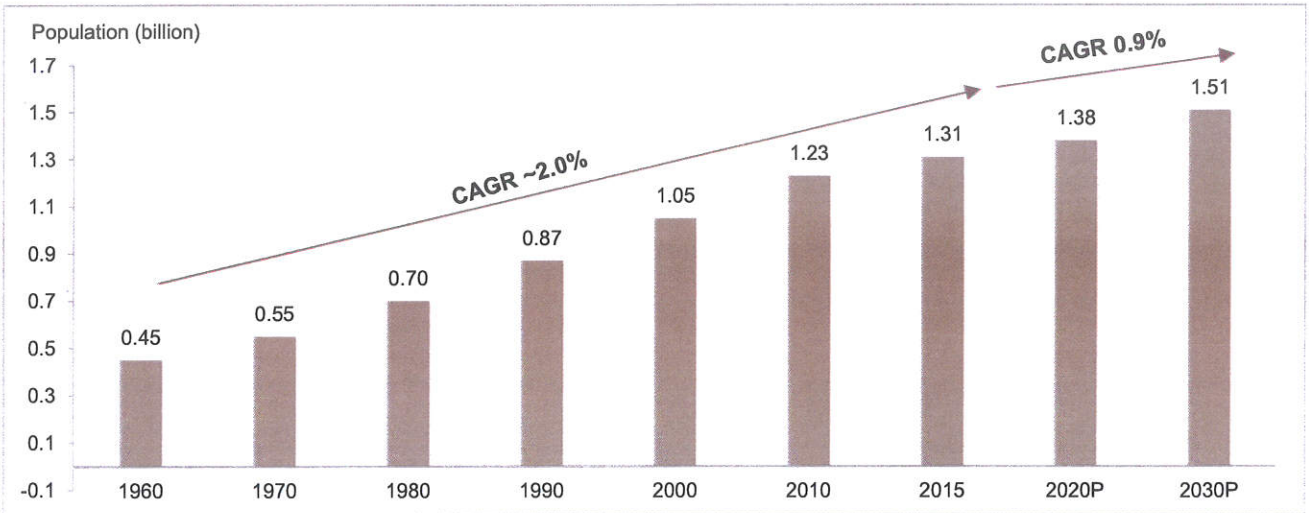
1.2 Fundamental growth drivers of GDP

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

Global population to increase at 0.8% CAGR between 2019 and 2050

According to the latest UN population estimates, world population grew by 1.1% in 2019, or ~80 million people, to reach a global total of 7.7 billion. In the coming decades, the slowdown in the rate of population growth is projected to continue. By 2050, it is forecast to fall below 0.5%.

Global population growth rate

Group of economies	Population (Millions)			Annual growth rate (Percentage)		
	2014	2019	2050	2014–2019	2019	2019–2050
World	7 295	7 713	9 735	1.1	1.1	0.8
Developing economies	5 944	6 338	8 318	1.3	1.2	0.9
Developed economies	1 046	1 065	1 102	0.4	0.3	0.1

Source: United Nations (2019). World Population Prospects 2019, United Nations (2019). World Urbanization Prospects 2018, CRISIL Research

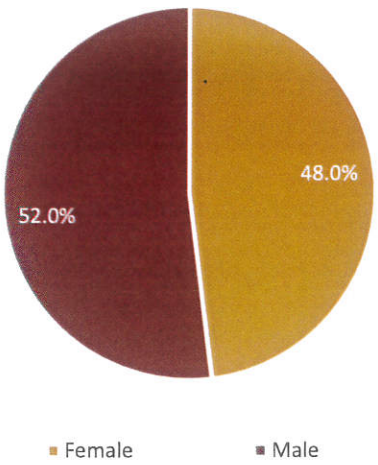
India has more female under reproductive age than whole of Africa or Europe region

India has a 924 females per 1,000 males for the year 2020, as per UN population estimates. This translates to female population share of 48% in the overall demographic.

As per Census 2011, the Gender ratio of India is 943 females per 1000 males. There are 949 females to 1000 men in rural areas, while in an urban area, there are 929 females to 1000 males.

India has nearly 240 million females in the reproductive age of 25-49 years and ranked second after China which reported 263 million females in the reproductive age of 25-49 years as of 2020. The demographic profile of India is still young with bulge in age group of 10-24 years in 2020. Over the next 30 years India will still continue to have higher number of young and mid-age people with the demographic profile changing to nearly equally distributed age groups with population increasing from 1.3 Bn in 2020 to 1.7 Bn in 2050.

Gender distribution of population in India : 2020

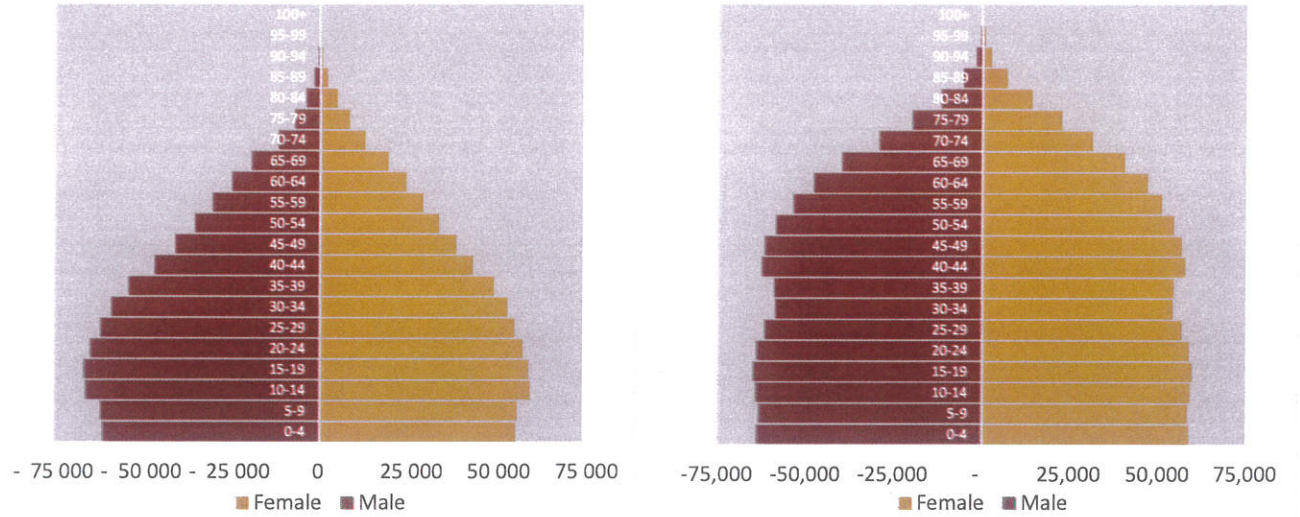


Source: UN World Population estimates, CRISIL Research

Sex ratio	2011 Census
Rural	949 females per 1000 males
Urban	929 females per 1000 males
Total	943 females per 1000 males

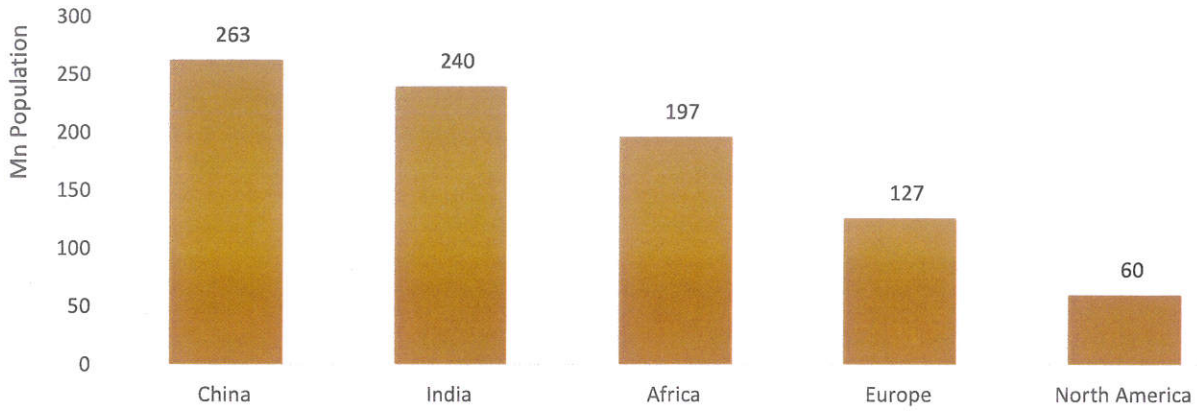
Source: UN World Population estimates, CRISIL Research

Age distribution of India population: 2020 (on left) and 2050 (on right)



Source: UN World Population estimates, CRISIL Research

Women of reproductive age (15–49 years) : 2020

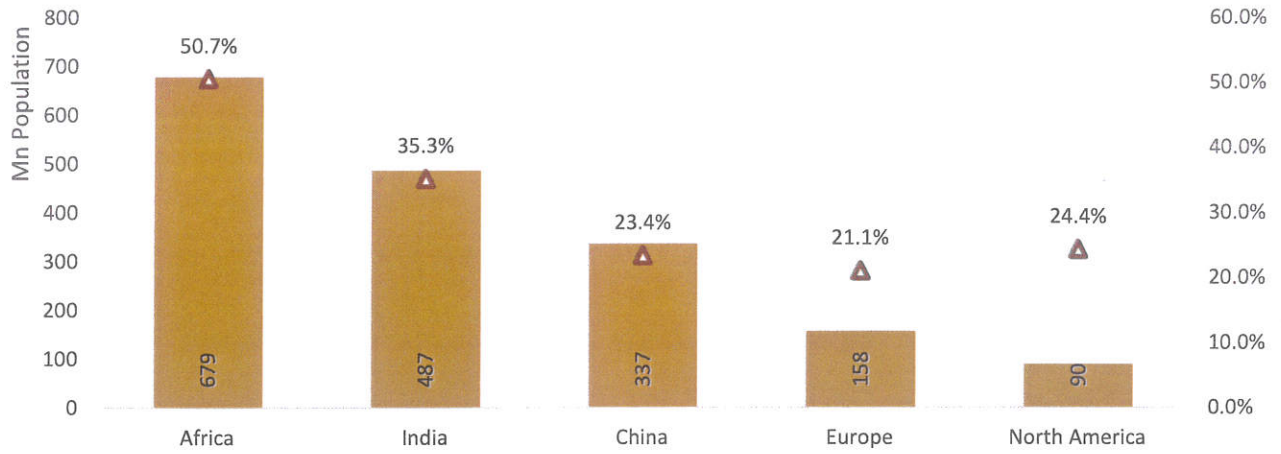


Source: UN World Population estimates, CRISIL Research

India has higher adolescents populations in comparison to China

India ranks first among various countries in terms of adolescents population. When compared to regions, India ranks lower than Africa region in terms of adolescents population number and its share in overall population. India has total 487 Mn adolescents in the year 2020, whereas Africa reported adolescents population of 679 Mn for 2020. India reported 8.5% of the total population under the age of 5 (0-4yrs) in 2020 with 116 Mn kids. India registered 2.5-2.6 million live birth on annual basis over the last five to seven years period.

Adolescents age group in demographic profile : 2020



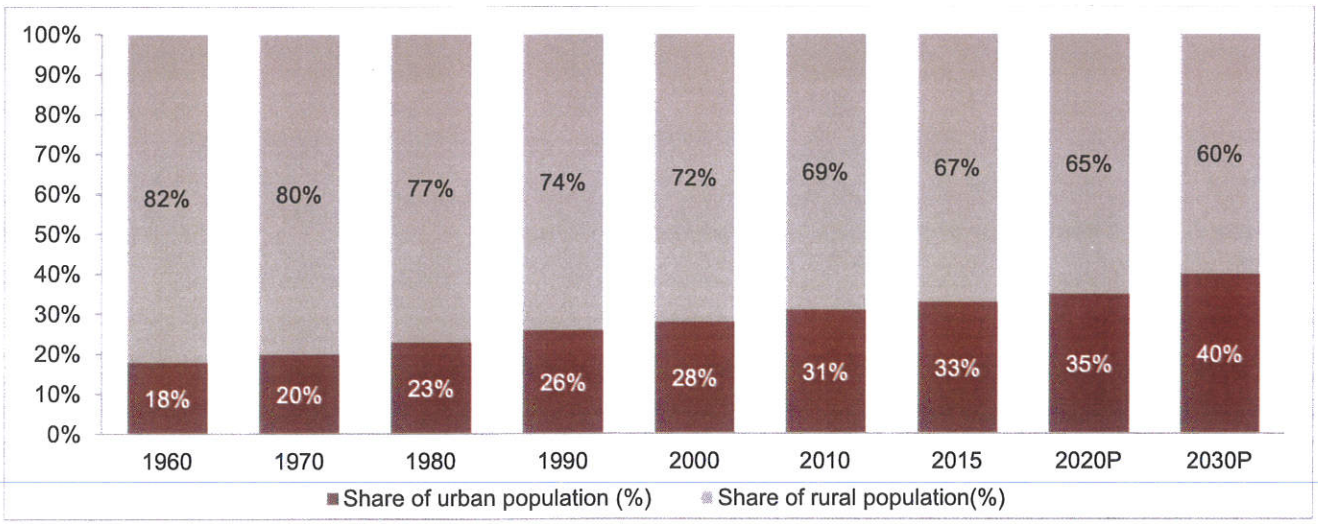
% share represents age group as a percentage of total population
Source: UN World Population estimates, CRISIL Research

Kids below the age of 5 years in demographic profile : 2020

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 years and printed ~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 63,642 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

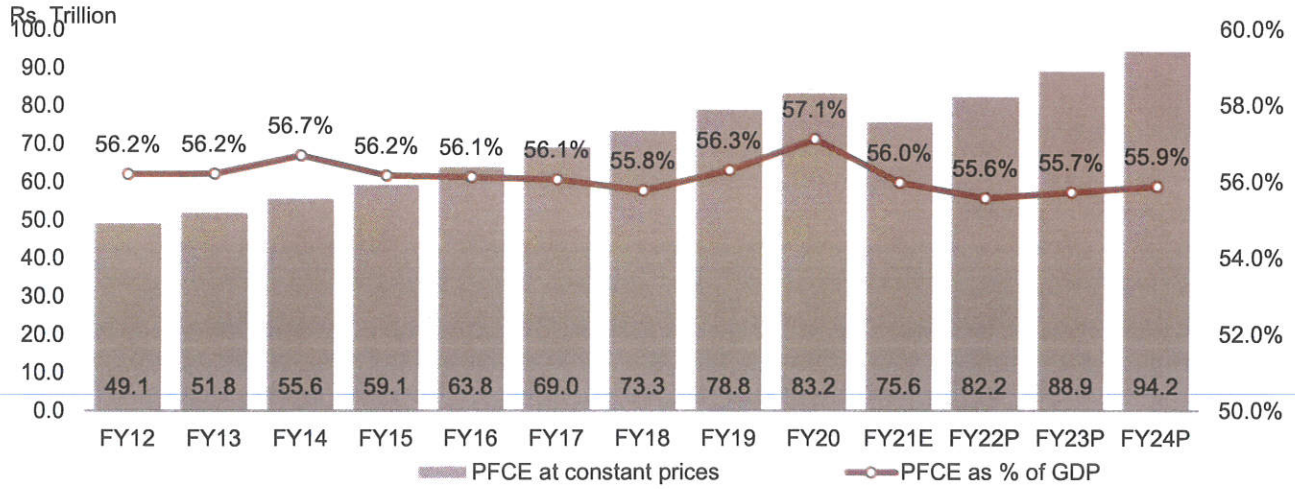
Source: Second advanced estimates of Annual National Income, 2020-21, CSO, MoSPI, CRISIL Research

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 6.8% CAGR between fiscals 2012 and 2020, maintaining its dominant share in the GDP pie, at ~57% or Rs 83.3 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)



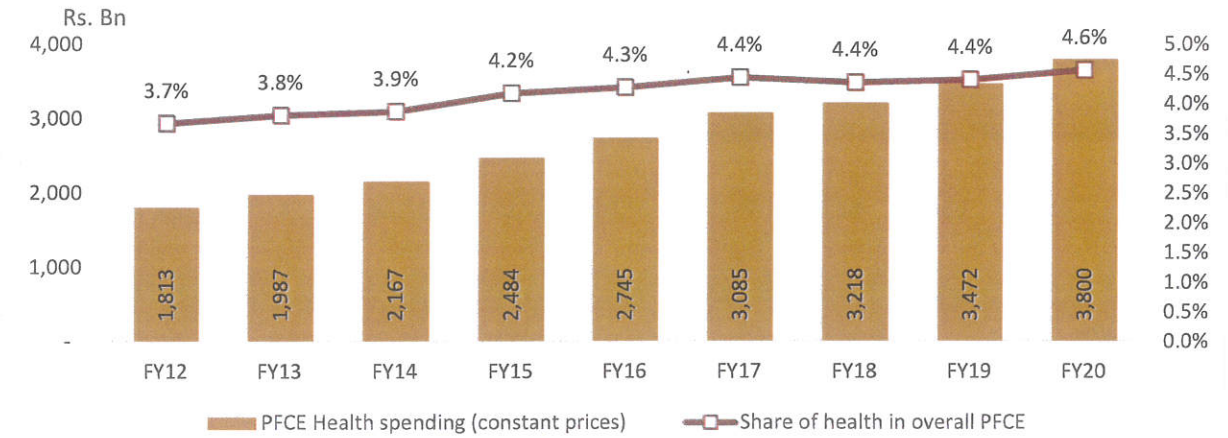
P: Projected E: Estimated

Source: Second advance estimates of national income 2020-21, CSO, MoSPI, CRISIL Research

Consumption expenditure on health increased at faster clip at 9.7% between FY12 and FY20

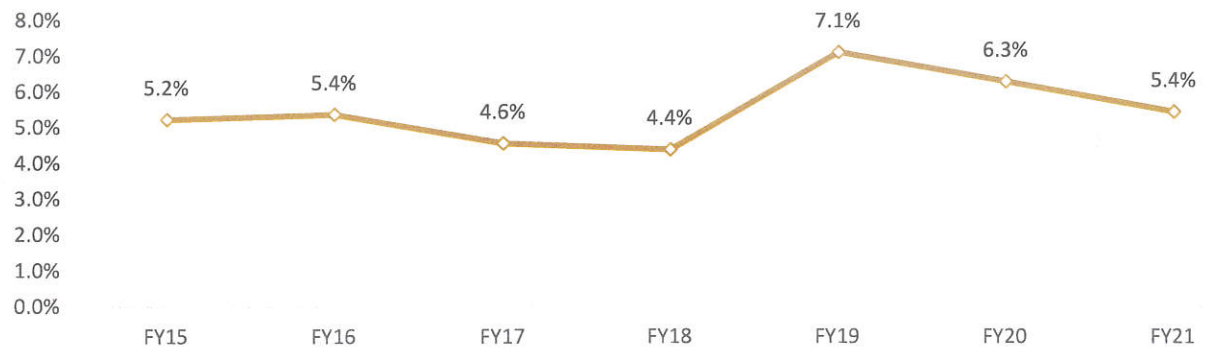
PFCE on health increased at 9.7% CAGR between fiscal 2012 and 2020 faster than overall PFCE growth at 6.7%. Share of Health PFCE in overall PFCE has increased from 3.7% in fiscal 2012 to 4.6% in fiscal 2020 at constant prices. Inflation rate for health sub-group has largely be in the range of 4-5% expect for fiscal 2019 and 2020, when the inflation rate for health was at 7.1% and 6.3%.

PFCE Health spending



Source: MOSPI, CRISIL Research

Inflation rate – health (CPI)



Source: MOSPI, CRISIL Research

PFCE (constant FY12 prices)

Rs billion	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21PE	CAGR FY12-20
PFCE	49,360	52,134	55,932	59,428	64,239	69,446	73,841	78,844	83,217	75,609	6.7%
Y-o-y growth (%)		5.6%	7.3%	6.3%	8.1%	8.1%	6.3%	6.8%	5.5%	-9.1%	-
PFCE Health	1,813	1,987	2,167	2,484	2,745	3,085	3,218	3,472	3,800	N.A	9.7%
Share in overall PFCE (%)	3.7%	3.8%	3.9%	4.2%	4.3%	4.4%	4.4%	4.4%	4.6%	N.A	-

Y-o-y growth (%)		9.6%	9.1%	14.7%	10.5%	12.4%	4.3%	7.9%	9.5%	N.A	-

Note: CAGR is between fiscal 2012 and 2020
Source: MOSPI, CRISIL Research

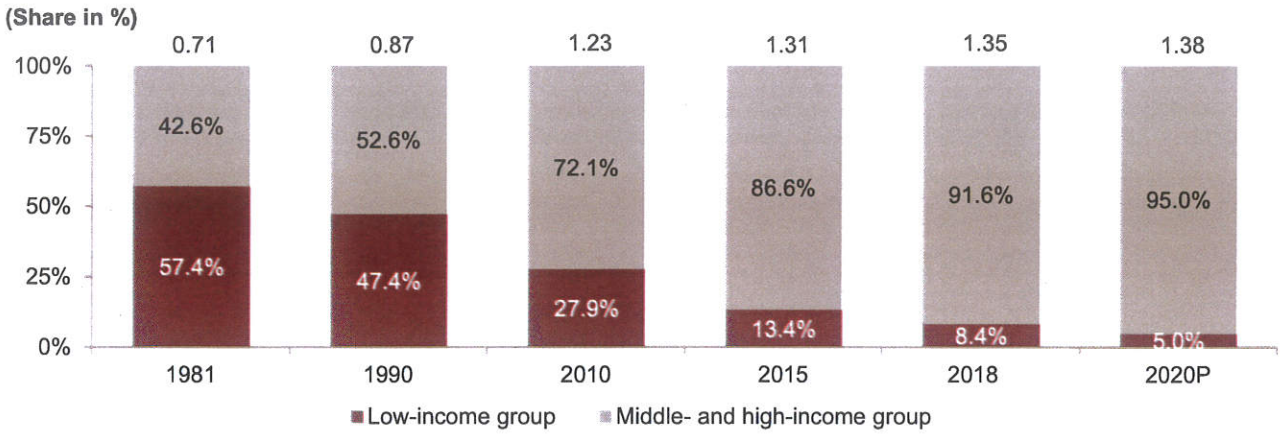
Decline in poverty levels indicates rise in middle- and high-income group in India

The World Bank, in its report Global Economic Prospects, January 2019, estimates the number of poor (defined as those living at or below the international poverty line of purchasing power parity of $1.90 per day) in India dropped from 405 million people in 1981 to 175 million in 2015. The share of poor in India's total population declined from 57.4% to ~13.4% over the period, and was estimated at 8.4% in 2018. Poverty has declined thanks to improvement in macroeconomic parameters such as growth of the economy, employment rate and income equality, and adoption of employment and other public welfare schemes by the government.

In 2020, the World Bank projected the absolute number of poor in India reduced to ~68-77 million people, lowering the percentage share to 5-5.5%.

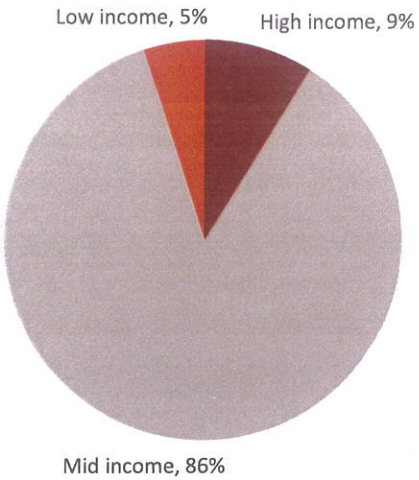
Decline in poor population indicates that the middle and high-income group in India has grown at a fast clip, from 42.6% in 1981 to 86.6% in 2015. It was estimated to reach 94.5-95.0% by 2020. The middle income group forms ~86% of total population in fiscal 2020 as per PEW Research Center estimates. A positive economic outlook along with growth across key employment-generating sectors, such as real estate, infrastructure and automobiles, is expected to have a cascading effect on overall per capita income levels in the medium to long term. This will drive consumption expenditure as well as basic and discretionary spending.

Broad split of population into income groups (Pre-COVID)



E: Estimated, P: Projected
Notes:
The values bar column indicates the total population in billion for respective years as per UN population estimates.
The World Bank defines poor as those living at or below the international poverty line of purchasing power parity of $1.90 per day. Data for 2018 is an estimate, and data for 2020 is projection and calculated using data from the World Bank (2018).
The low-income group includes the proportion of the population earning less than or equal to $1.90 per day; the middle- and high-income group includes the proportion earning more than $1.90 per day.
Source: World Bank, CRISIL Research.

Broad split of population into income groups type



Note: The low-income group includes the proportion of the population earning less than or equal to $1.90 per day; Mid-income group includes population earning $2.0 per day to $10, while high income group includes population earning $10 and above per day. Share based on Pew Research analysis of the World Bank's PovcalNet Database. PovcalNet is an interactive computational tool that allows users to replicate the calculations made by the World Bank's researchers in estimating the extent of absolute poverty in the world

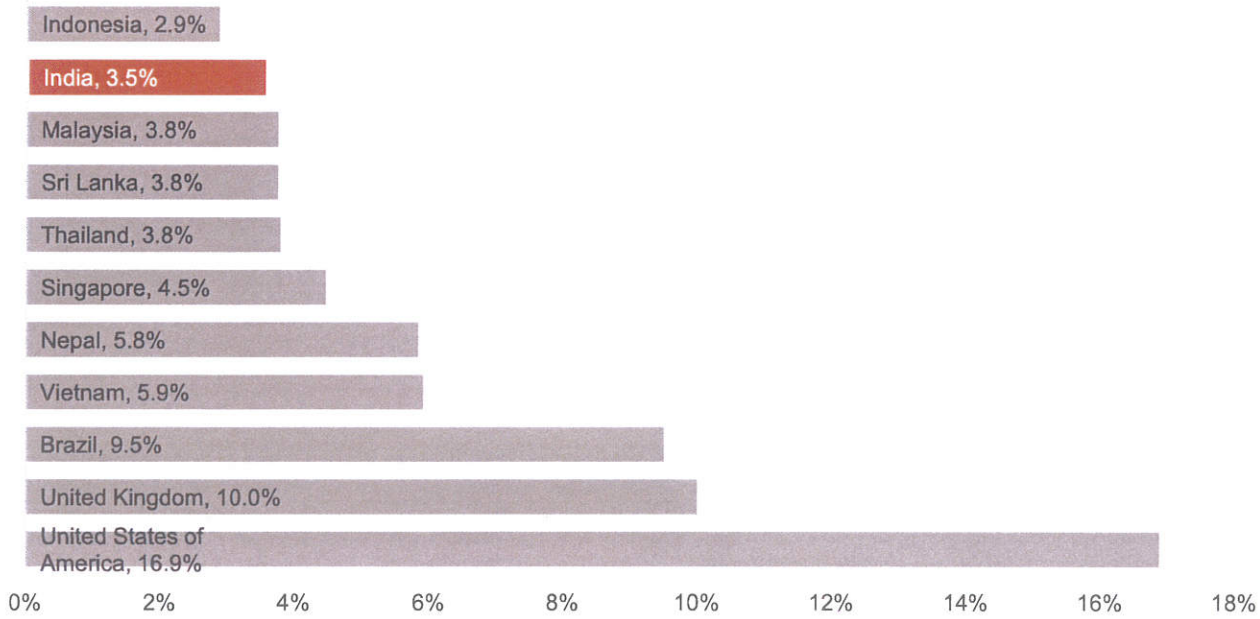
Source: "In the pandemic, India's middle class shrinks and poverty spreads while China sees smaller changes" Pew Research Center, Washington, D.C., PovcalNet Database – World Bank, CRISIL Research

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

Total healthcare expenditure as % of GDP (2018)

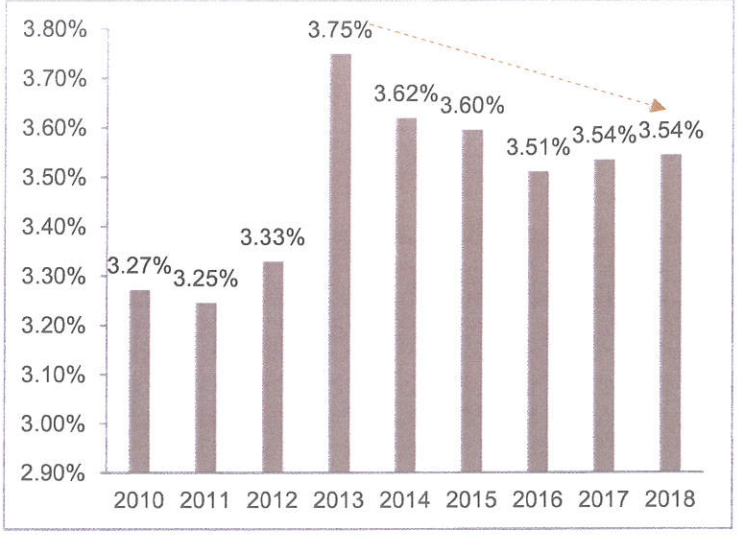


Source: Global Health Expenditure Database- World Health Organisation, CRISIL Research

According to the Global Health Expenditure Database compiled by the World Health Organisation (WHO), India's current expenditure on healthcare was 3.5% of gross domestic product (GDP) in 2018. India's real GDP in fiscal 2019 was Rs 139.8 trillion (constant fiscal 2012 prices). Accordingly, India' current healthcare expenditure during fiscal 2019 is estimated at ~Rs 4.9 trillion. India trails not just developed countries such as the United States (the US) and the United Kingdom (the UK), but also developing countries such as Brazil, Nepal, Vietnam, Singapore, Sri Lanka, Malaysia, and Thailand in terms of healthcare spending as a percentage of GDP as of CY2018.

India spends too little on healthcare

Current healthcare expenditure (CHE) as % of GDP in India (2010-2018)



Per capita current expenditure on health in USD (2018)

Bangladesh, 42
Nepal, 58
India, 73
Indonesia, 112
Vietnam, 152
Sri Lanka, 157
Thailand, 276
Malaysia, 427
Brazil, 848
Singapore, 2,824
United Kingdom, 4,315
United States of America, 10,624

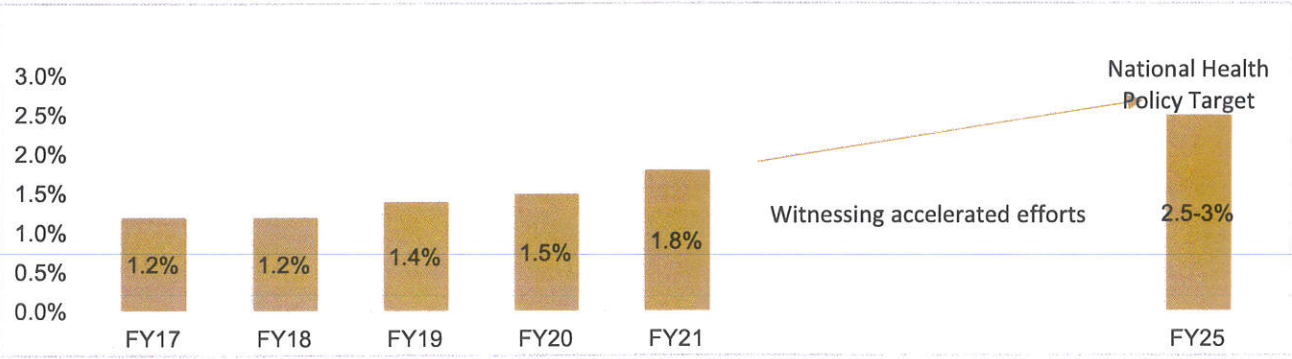
Source: Global Health Expenditure Database- World Health Organisation, CRISIL Research

India's current healthcare expenditure decreased from calendar year 2013 to 2018. The skew, however, is more towards private expenditure compared with public expenditure. Low healthcare expenditure in India is primarily due to under-penetration of healthcare services, low insurance coverage, lack of adequate awareness and inability of patients to afford desired/required healthcare.

Further, the share of public spending on healthcare services remains much lower than global peers. For example, India's per-capita total expenditure on healthcare (at an international dollar rate, adjusted for purchasing-power parity) was only $73 in 2018 compared with $10,624 for the US, $4,315 for the UK and $2,824 for Singapore.

The government of India is targeting to increase government expenditure on healthcare from 1.2% of GDP in FY17 to 2.5-3% in FY25. The Covid pandemic has accelerated the pace of spending in healthcare sector and has made research on infective diseases equally important

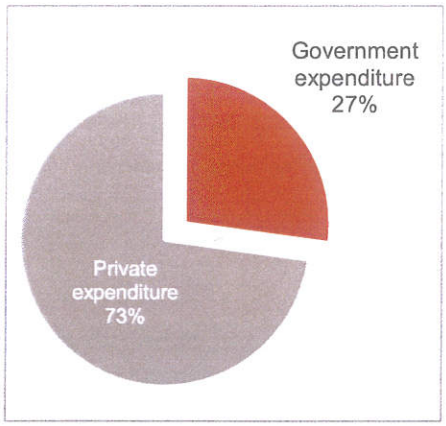
Expenditure on health by center and state government as % of GDP in India (2017 onwards)



Source: National health profile, budget documents, CRISIL Research

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

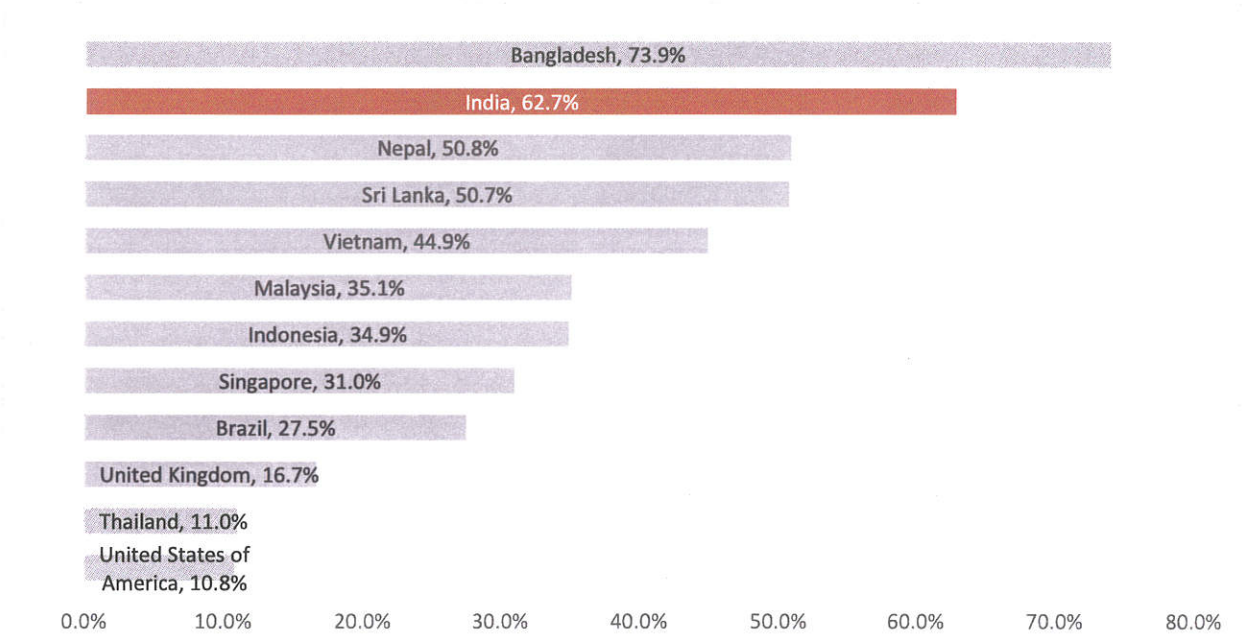
General expenditure on health as % of CHE (2018)



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 2018. 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 from the current 1%, as per the National Health Policy.

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

Out-of-pocket (OOPS) as % of CHE (2018)



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

In India, out-of-pocket (OOP) expenditure on health accounted for nearly 63% of total health expenditure as of 2018 (the highest among all the other countries compared above). Insurance does not cover out-patient treatments (an insurance company started covering OPD treatments under health insurance only recently). Hence, OOP expenditure on out-patient treatments greater than in-patient treatments.

Nearly 25% of the rural population and 18% of the urban population are dependent on borrowings for funding their healthcare expenditure. And nearly 68% of the rural population and 75% of the urban population use their household savings on healthcare-related expenditure. 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.

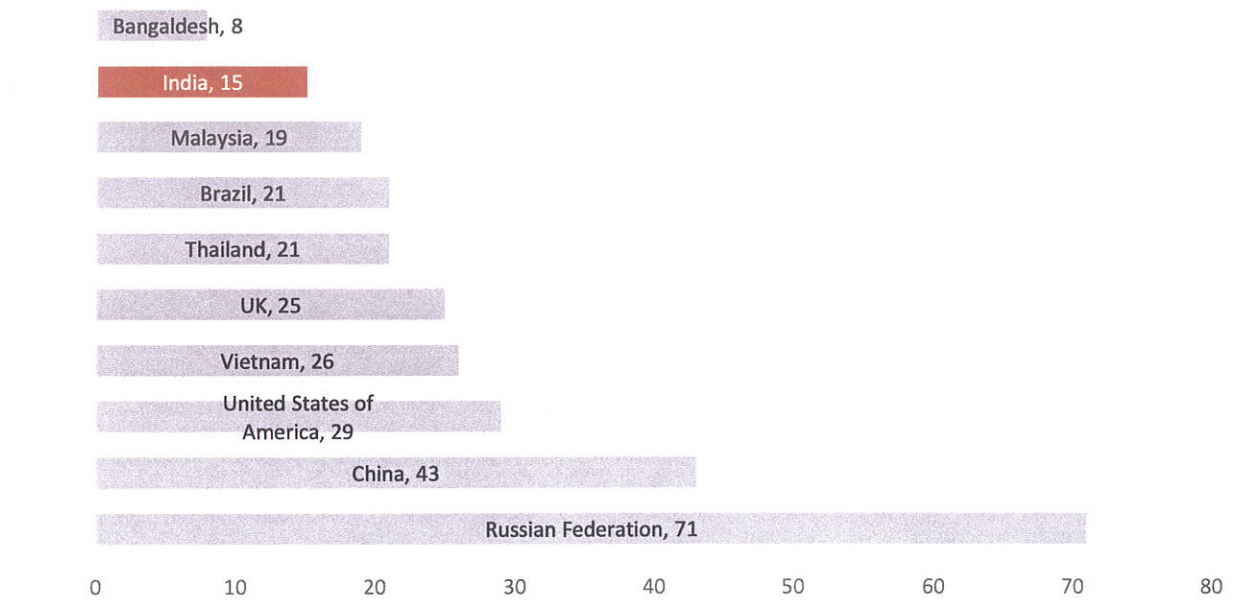
Though it represents a pain point in healthcare financing, it also means that there exists a substantial potential for those involved in provision of auxiliary healthcare services.

The quality of healthcare in a country can be gauged through the adequacy of healthcare infrastructure and personnel in that country. It can be assessed through bed density (bed count per 10,000 population) and the availability of physicians and nurses (per 10,000 population).

Health infrastructure of India in dire need of improvement

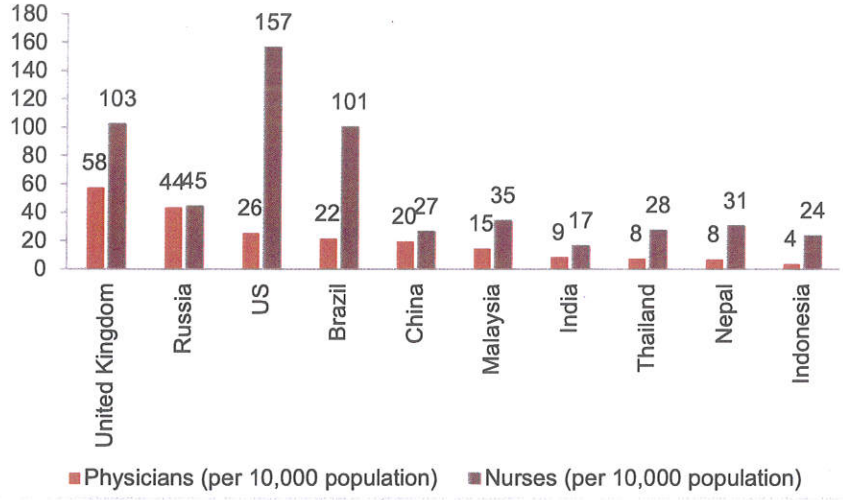
The adequacy of a country's healthcare infrastructure and personnel is a barometer of its quality of healthcare. The country accounts for nearly a fifth of the world's population, but has an overall bed density of merely 15, with the situation being far worse in rural than urban areas. India's bed density 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 17 nursing personnel per 10,000 population, India trails the global median of 17 physicians and 39 nursing personnel. Even on this parameter, India lags developing countries such as Brazil (22 physicians, 101 nurses), Malaysia (15 physicians, 35 nurses) and other South East Asian countries.

Physicians (per 10,000 population)

World average **India**

Nurses (per 10,000 population)

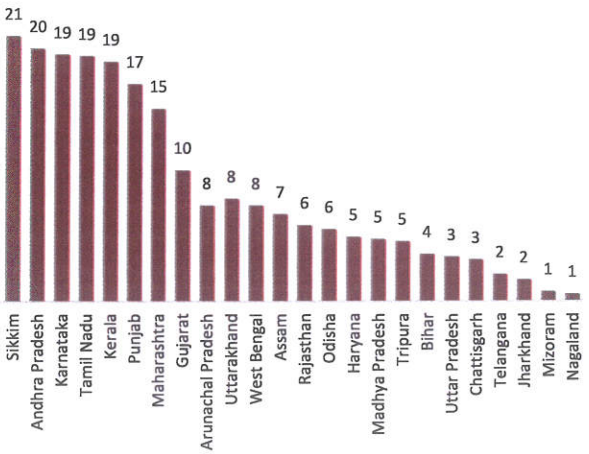
World average **India**

Source: WHO World Health Statistics 2021

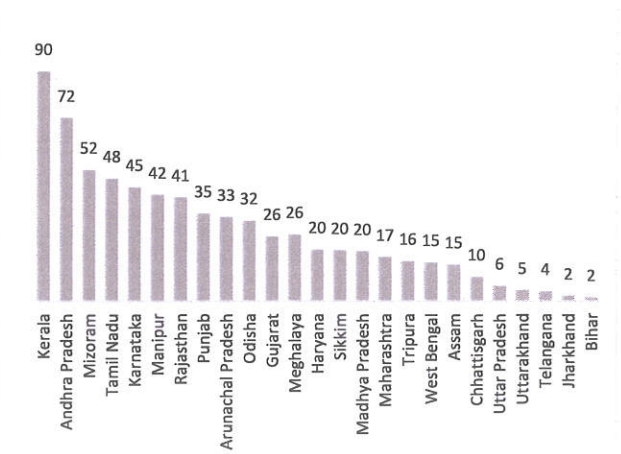
West Bengal leads in terms of absolute number of doctors as of CY 2019 for East India states, but lags behind in terms of doctor and nurse density per 10,000 population compared to states with more developed health infrastructure

Availability of allopathic medical practitioners, dental surgeons and nurses per lakh population has improved over the years. The number of doctors with recognised 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

In terms of health infrastructure, West Bengal is the most developed in East India. It leads in absolute number when it comes to number of doctors and nurses in the region with 74,054 registered doctors up to 2019 and 1,48,919 nurses as of 2018. Sikkim is an outlier in terms of doctors per 10,000 population due to the low

population in the state. If we compare region wise, East India region as defined above has the lowest doctors and nurses per 10,000 population.

1.5 Overview of maternity and childbirth in India

India reports around 36-37 million pregnancies every year

India reports roughly 70,000 live births every day representing one sixth of the world's child births. This translates to 25-26 million live births every year. India reports 36-37 million pregnancies in a year.

India saw an increase in women registered for antenatal care (ANC) from fiscal 2015 to fiscal 2020. Nearly 97% of registered pregnancies register for ANC. Total 79% of registered pregnancies had at least 4 antenatal care visits in fiscal 2020. In fiscal 2015 at pan-India level only 51.2% of registered pregnancies had at least 4 antenatal care visits.

Estimated annual pregnancies

Area	Value	FY 2014-15	FY 2019-20
Estimated number of annual pregnancies	Nos in Million	37.4	36.6
Pregnant women registered for ANC (reported pregnancies)	% of estimated annual pregnancies	95.5%	97.0%
Live births	Nos in Million	26.2	25.4

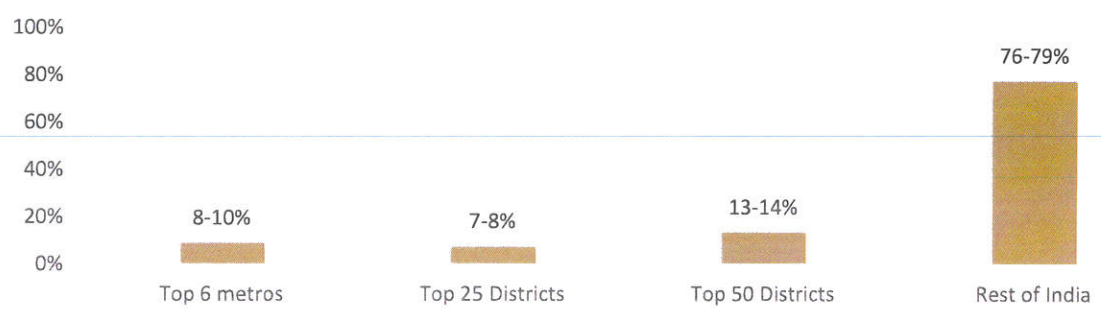
Source: United Nations Population Fund – UNPFA, Health Management Information System (HMIS), Govt. of India

Maternity Care

Maternity Care	FY 2015-16	FY2019-20
	%	%
Mothers who had an antenatal check-up in the 1st Trimester	58.6%	70.6%
Mothers who had an antenatal check-up least 4 antenatal care visits	51.2%	79.0%
Mothers who received postnatal care from a doctor/nurse/ LHV/ ANM/ midwife/other health personnel within 2 days of delivery	62.4%	75.3%

Source: National Family Health Survey (NFHS)- 4 and National Family Health Survey (NFHS)- 5
Average data of 17 states namely, Andhra Pradesh, Assam, Bihar, Goa, Gujarat, Himachal Pradesh, Karnataka Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Telangana, Tripura, West Bengal for FY20 data

Total number of pregnant women registered for ANC



Source: Health Management Information System (HMIS), Govt. of India

Top 6 metro cities in India has share of 8-10% in registered ANCs

The metro cities contributes to 8-10% of the women registered for ANC in India whereas in terms of population the 6 metro cities contributes to 7.2% of India's population. The next top 25 districts have share of 7-8% and top 50 districts in total have a share of 13-14%. Thus rest of India contributes to 76-79% of total registered ANCs in India.

Indian eastern states report the highest fertility rates

India reported fertility rate of 1.9 children per women in fiscal 2020 down from 2.1 children per women in fiscal 2016 as per NFHS survey data. At global level, India reports 18.0 births per 1,000 population which is slightly below the global average of 18.5 births per 1,000 population. The world's most populous country, China, reported birth rate of 11.9 births per 1,000 population for 2015-2020 period.

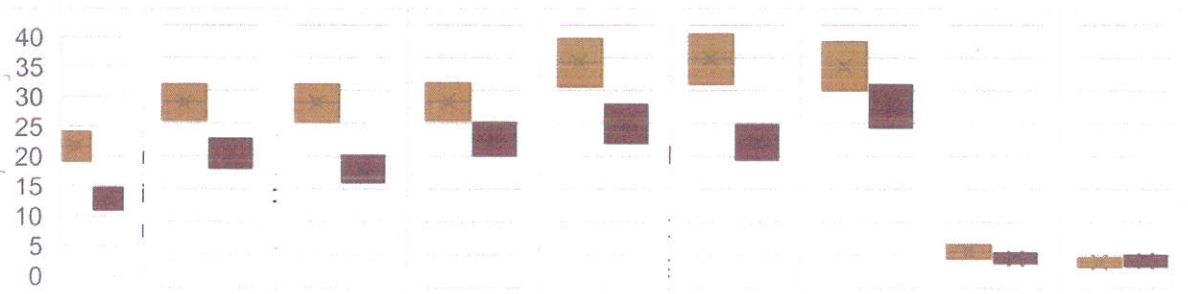
Total fertility rate (children per woman)

Total fertility rate (children per woman)		
States	2015-16	2019-20
	Nos	Nos
Andhra Pradesh	1.8	1.7
Assam	2.2	1.9
Bihar	3.4	3.0
Goa	1.7	1.3
Gujarat	2.0	1.9
Himachal Pradesh	1.9	1.7
Karnataka	1.8	1.7
Kerala	1.6	1.8
Maharashtra	1.9	1.7
Manipur	2.6	2.2
Meghalaya	3.0	2.9
Mizoram	2.3	1.9
Nagaland	2.7	1.7
Sikkim	1.2	1.1
Telangana	1.8	1.8
Tripura	1.7	1.7
West Bengal	1.8	1.6
Average	**2.1**	**1.9**

Source: National Family Health Survey (NFHS)

Crude birth rate (births per 1,000 population) 2015-2020

Countries	Crude birth rate (births per 1,000 population)
South Africa	20.7
Afghanistan	32.9
Global Average	**18.5**
India	18.0
Asia	16.4



Europe	10.4
Japan	7.5

Source: United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019

India reports the highest global number of pregnancies as of 2020

India reports the highest global pregnancies across all countries as of 2020. The total fertility rate for India was estimated to be 2.2 for 2015-2020. India also reports the highest maternal mortality death and neonatal mortality rates among the key countries mentioned below.

Global maternity health parameters

Countries	Total fertility rate, per woman (2015-2020)	No of pregnancies (2020)	Maternal mortality ratio maternal deaths per 100,000 live births	Neonatal mortality rate (deaths within 28 days per 1,000 live births)
India	2.2	**36.7**	145	22.7
China	1.7	28.6	29	4.3
Brazil	1.7	4.9	60	8.1
South Africa	2.3	1.4	119	10.7
United States	1.8	6.2	19	3.5
United Kingdom	1.8	1.2	7	2.6

Source: United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019

Comparison of health care infrastructure in south-east asia and India (overall healthcare)

India reports higher mortality rates for infants and children as compared to south-east Asian countries. India also spends lower on healthcare as compared to south east asian countries. India spent nearly USD 72.84 per capita on healthcare whereas south-east Asian countries spent USD 537.73 per capita on healthcare in 2018.

Mortality rates for childcare

Neonatal mortality rate (both sexes)	Infant mortality rate (both sexes)	Infant mortality rate (Female)	Infant mortality rate (Male)	Under-five mortality rate (both sexes)	Under-five mortality rate (Female)	Under-five mortality rate (Male)	Child Mortality rate age 5-14	Adolescent Mortality rate age 15-19

Note: index is per 1,000 live births
Source: World Bank, CRISIL Research

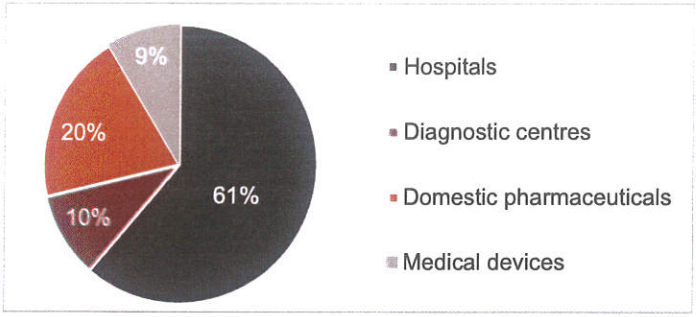
India reports lower health infrastructure as compared to south-east Asian countries

Parameters	Year	India	South-East Asia
Nurses and midwives (per 1,000 people)	2018	1.73	2.85
Hospital Beds per 1000 people	2017	0.53	1.86
Current Health Expenditure per capita (current US$)	2018	72.84	537.73
Current Healthcare expenditure as a % of GDP	2018	3.54	4.28
Out of pocket expenditure as a % of current health expenditure	2018	62.67	35.67

Source: World Bank, CRISIL Research

2 Structure of the healthcare delivery industry in India

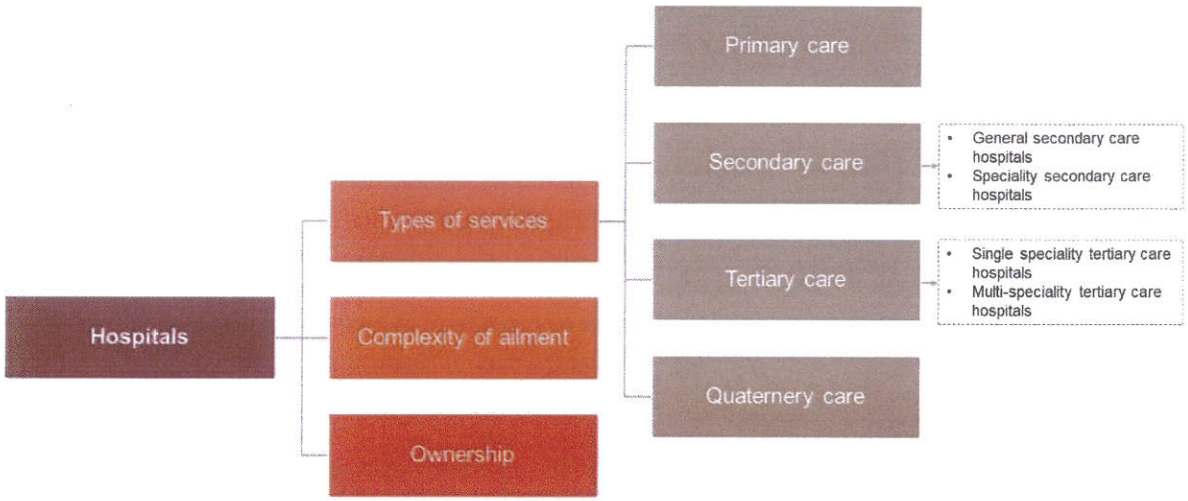
2.1 Overview



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, usually on referral from primary or secondary medical care providers.

- 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 are multi-specialty tertiary care hospitals.

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.

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

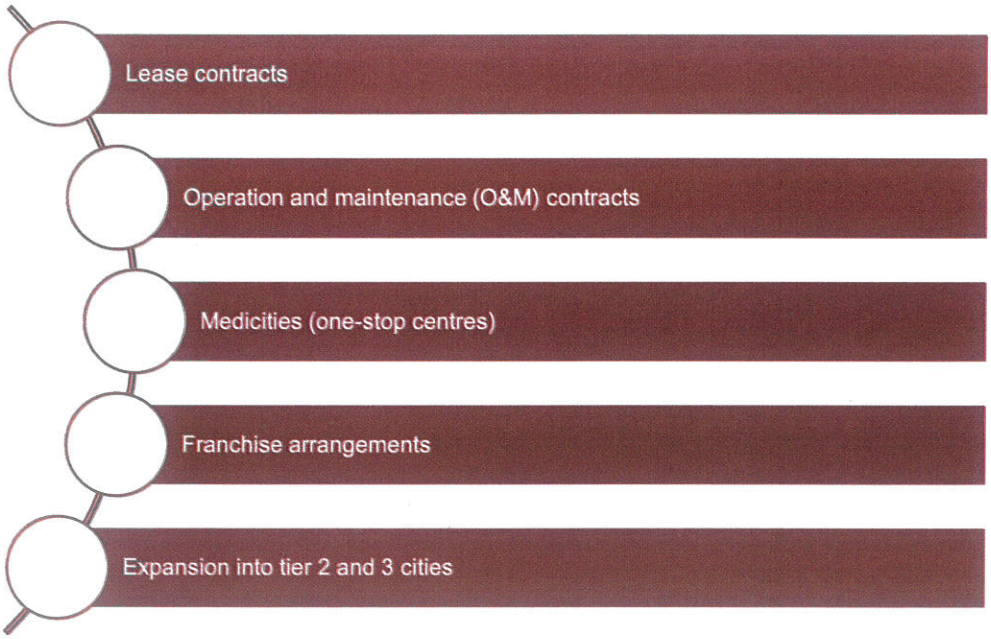
Classification based on ownership

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

Government	• Brihanmumbai Municipal Corporation hospitals, KEM Hospital, Cooper Hospital (Mumbai), AIIMS Raipur
Private	• Asian Heart Institute, Apollo Hospitals, Fortis, Max Healthcare, ILS Hospitals (GPT Healthcare), Shri Balaji Institute of Medical Science, Shija Hospitals and Research Institute, Amri Hospitals
Trust	• Lilavati (Mumbai), Hinduja (Mumbai), Kolkata Port Trust Hospital (Kolkata), Tata Medical Center (Kolkata)
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

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 through primary and secondary hospitals

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 Supply chain dynamics of the healthcare delivery sector

Allied industries complete the healthcare value chain

The healthcare value chain comprises healthcare delivery via hospitals/ clinics, diagnostic centres, medical devices, and pharmaceuticals. The sector can also be divided on the basis of functionality as curative services, manufacturing of equipment, medicines, preventive care, and support services to care providers.

Curative services	Manufacturing	Preventive care services	Services to care providers
• Primary care • Secondary care • Tertiary care • Alternate systems of medicine	• Devices and consumables • Medical equipment • Pharmaceuticals	• Wellness/Fitness centres/Spas • Women wellness clinics • Comprehensive checkups • Diabetes/Hypertension/ Obesity care	**- India** • Food and beverages, housekeeping, laundry • Biomedical waste management • Diagnostic facility/chain • Pharmacy facility/chain • HIS telemedicine products **- Abroad** • Medical transcription • Claims processing • Support with medical research • Medical tourism services **- Other services** • Third-party administrator (TPA) • Insurance • Group procurement services • Training/Education

Curative services

Curative services form the core of the healthcare industry. These include services provided in primary, secondary and tertiary care hospitals. The primary care segment is dominated by small clinics/ single doctor establishments. While private players pervade the entire chain, they are major providers of tertiary and quaternary healthcare. Alternative systems of medicine such as Ayurveda and homeopathy also come under these services.

Manufacturing

Manufacturing of medical equipment, devices, and consumables is a large allied sector of the healthcare industry. The demand for healthcare directly percolates into demand for medical devices. Medical devices encompass different categories, from low-end consumables such as bandages and gauges, to implants and higher order sophisticated machines such as computed tomography (CT) and magnetic resonance imaging (MRI) scanners. Some of the major Indian players in this sector are Sahajanand Medical Technologies and Meril Life Sciences. Multinational companies (MNCs) like Philips, Siemens and GE Healthcare are also present in this space.

Pharmaceuticals is another value chain component which involves manufacturing. Indian players contribute ~50% of domestic production and exports.

Preventive care

With rising incidence of lifestyle diseases (hypertension, diabetes, cardiac ailments to name a few) and growing healthcare awareness, demand for health and wellness packages is on the rise. This, aided by rise in disposable incomes, has fuelled growth of fitness centres. Different verticals such as various forms of health counselling, including nutrition consultancy, exercising, and non-medicinal cure for certain diseases can also act as potential revenue streams for such set-ups. Rejuvenation centres offering services based on naturopathy and yoga, also come under this segment.

Popularity of regular health check-ups (inclusive of blood sugar, cholesterol, urine, stool, digital chest X-ray, ECG, general examination, and renal profile) for preventive healthcare, has led major diagnostic chains to introduce health and wellness packages. These packages have begun to contribute significantly to revenue of these centres.

Support services

Diagnostic centres and pharmacies are major allied sectors that complement hospitals. Other support services include management services for hospitals such as food and beverages (F&B), housekeeping, and waste management, which are outsourced. In addition to this, foreign healthcare providers outsource medical transcription and claim processing to Indian companies; this sector has boomed over the past few years.

- **Diagnostic centres**

  Diagnostic centres (consisting of independent laboratories, hospital-based centres, and diagnostic chain companies) form an integral part of the healthcare industry. They offer services ranging from routine examinations to complicated hormonal assays and immunological investigations, in case of pathology, and from basic X-rays to MRIs, in case of radiology.

  The diagnostics industry can be broadly divided into pathology and radiology:

- **Pathology** involves tests from simple blood analysis to sophisticated techniques such as deoxyribonucleic acid (DNA) tests that aid the diagnosis/ prognosis of ailments and other medical conditions.

- **Radiology** involves using minimally invasive techniques to generate film or video images of the internal anatomy for quick and accurate diagnosis of diseases and injuries.

- Home services for **pathological tests.**

- **Pharmacy store chains**

  As is the case with almost all verticals within the healthcare delivery industry, pharmacies are highly fragmented and dominated by standalone units. In recent years, however, corporate presence in this segment has increased. Corporate hospital players have in-house pharmacies (within the premises) and some have also ventured into standalone pharmacies.

  Hospital-based pharmacies have direct access to patients and require relatively low investments. In addition, there is a healthy demand for high-margin surgical items at these pharmacies, which boosts their profitability compared with standalone pharmacies.

- **Online pharmacies**

  With Covid-19 and induced lockdowns, online pharmacies have emerged as a beneficiary as people are switching to online pharmacies to avoid the risk of virus.

  This sector is seeing a lot of investments in the recent past with Reliance acquiring majority stake in Netmeds, and Tata in 1mg.

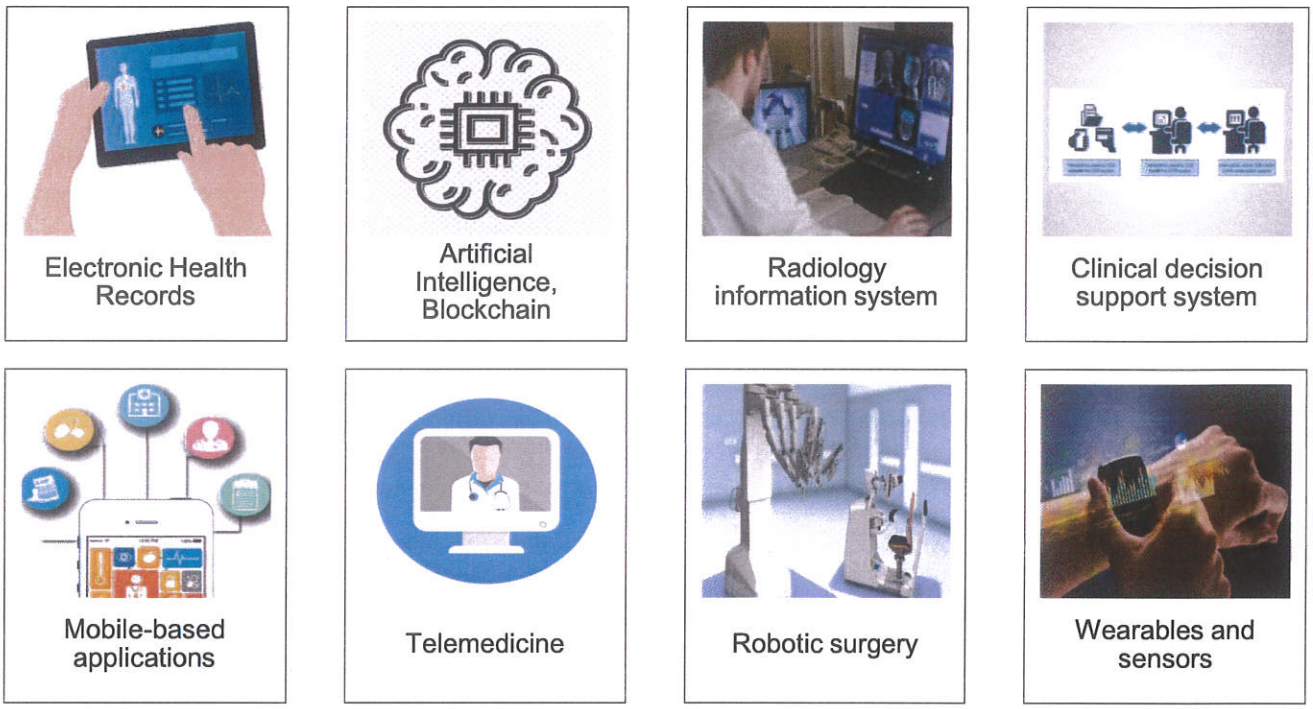
- **Outsourced non-core activities**

  Hospitals are increasingly outsourcing several non-core activities such as housekeeping, laundry, F&B and security to third parties. There is a clear opportunity for third party providers who add value through economies of scale, specialised skills, and better manpower capabilities. This enables hospitals to reduce costs and improve efficiency.

- **Third party administrators**

A third party administrator (TPA) functions as an intermediary between the insurer and the insured to facilitate claim settlements. TPAs are paid a fixed percentage of the insurance premium as commission for their service. This business has developed on account of a growing need for cost-effective healthcare financing options. Health insurance penetration in the country is merely ~37% as of March 31, 2020, according to the Insurance Regulatory and Development Authority annual report 2019-20. As per IRDAI data, a total of 498 million lives were covered under 17.9 million policies. In terms of number of lives covered, 72% of the lives were covered under government sponsored health insurance schemes, 19 % of the lives were covered under group business and the remaining 9% of the lives were covered under individual policies issued by general and health insurers.

2.5 Emerging technologies in healthcare delivery



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.

Telemedicine

Telemedicine is a technology designed to improve accessibility of healthcare services from remote locations. Telemedicine, through its extensive use of information technology, creates a connection between doctors at the main hospital and patients at remote locations or telemedicine centres. The doctor analyses the patient through telephonic conversation or video conferencing and is assisted by a junior doctor or health worker who is physically present at the telemedicine centre. The junior doctor physically examines the patient and conveys the information, based on which the doctor confirms the diagnosis and prescribes medication. If the ailment is complex, the patient is advised to get admitted at the main hospitals and avail the intensive care facility. This model is useful when there is a dearth of healthcare professionals in the country.

Robotic surgery

Robotic surgery or robot-assisted surgery (RAS) is a surgery conducted by using a robotic arm that is controlled electronically by a control pad. The pad may be located at a local or remote place and is equipped with high-definition cameras allowing surgeons to take a closer look at the areas being operated. Since RAS can be performed from remote locations, it allows patients to avail the treatment from the desired specialist surgeons across the globe without having to travel. RAS has been used to conduct general surgery, bypass surgery, colorectal surgery, gastrointestinal surgery, neurosurgery, orthopaedic surgery, etc.

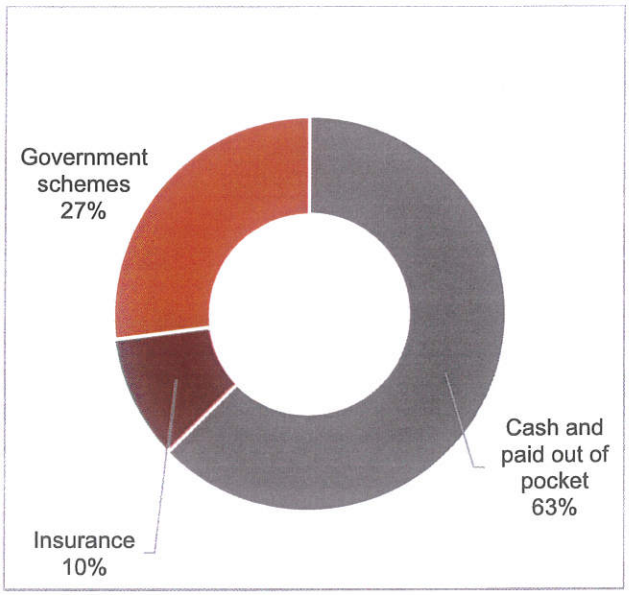
Wearables and sensors

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.

Payment modes in Indian healthcare

Government schemes accounted for 27% health expenditure in the country in 2018. PMJAY's contribution was low and accounted for less than 5% of the total healthcare expenditure. 73% was privately funded. Out of this 73%, ~62.7% was out-of-pocket expense and the remaining 10% was funded by insurance.

Payor mix (India) 2018



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

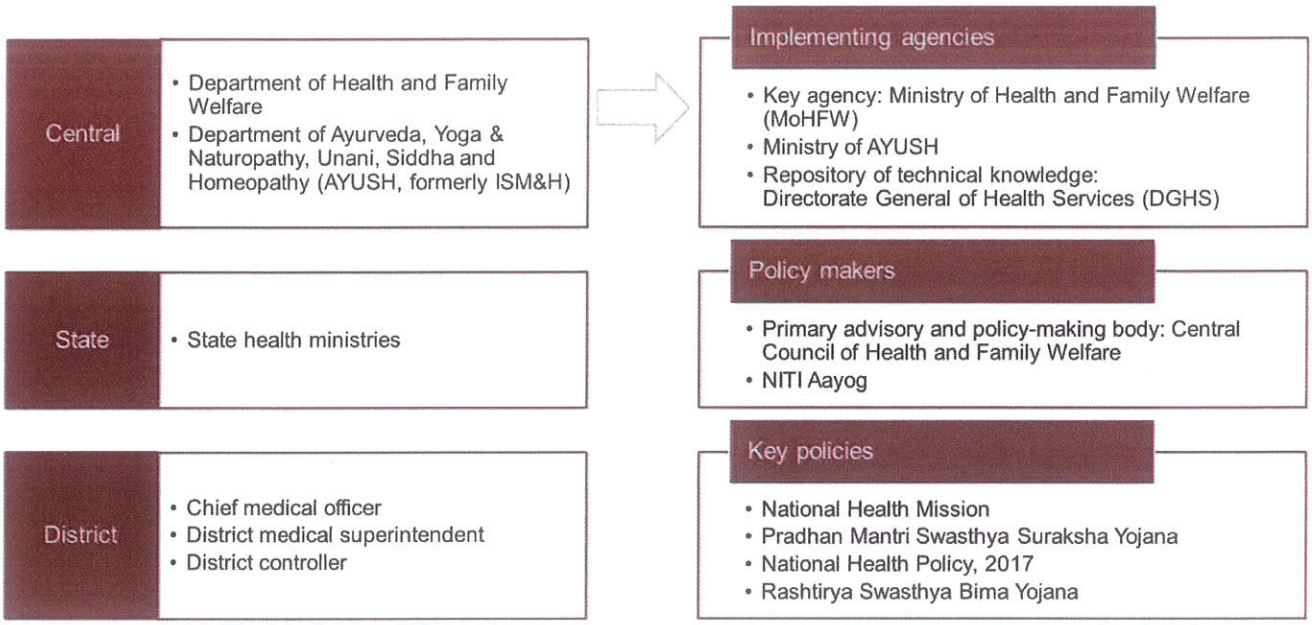
Digital India Programme

The Digital India Programme is a flagship initiative of the Indian Government to turn India into a digitally empowered society. Accordingly, promotion of digital payments was one of the key highlights of the Union Budget 2017-2018, and a pan-India target of 2,500 crore digital transactions through five payment modes namely UPI, USSD, Aadhar Pay, IMPS and debit cards was set. The Government was successful in achieving 2060 crore digital transactions during fiscal 18.

Specifically, for healthcare, a new target of 110 crore transactions was assigned to department of Health and Family Welfare for fiscal 19. Various incentive schemes have been initiated for promotion of digital payments in the sector. Ministry of Health & Family Welfare requested all the public and private Health Care Organisations (HCO) for enabling all customer touch points with digital payment acceptance infrastructure. People can pay by means of UPI, BHIM, mobile wallet, credit & debits cards at various health care centres and organisations.

2.6 Regulatory framework for hospitals and healthcare in India

Government framework for healthcare delivery



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 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

Policy environment for Maternity healthcare delivery in India

Policies / missions	Details
The National Health Mission (NHM)	The National Health Mission (NHM) encompasses its two Sub-Missions, The National Rural Health Mission (NRHM) and The National Urban Health Mission (NUHM). The main programmatic components include Health System Strengthening, Reproductive-Maternal- Neonatal-Child and Adolescent Health (RMNCH+A), and Communicable and Non-Communicable Diseases. The NHM envisages the achievement of universal access to equitable, affordable & quality health care services that are accountable and responsive to people's needs. It has six financing components: (i) NRHM-RCH Flexipool, (ii) NUHM Flexipool, (iii) Flexible pool for Communicable disease, (iv) Flexible pool for Non-communicable disease including Injury and Trauma, (v) Infrastructure Maintenance and (vi) Family Welfare Central Sector component.
Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH+A)	The programme address the major causes of mortality among women and children. It evaluates delays in accessing and utilizing health care services. Initiatives like the use of Score Card to track health performance, the National Iron + Initiative to address the issue of anaemia across all age groups and the Comprehensive Screening and Early interventions for defects at birth, diseases, and deficiencies among children and adolescents were introduced as a result of RMNCH+A
Rashtriya Bal Swasthya Karyakram (RBSK)	This scheme aims at early identification and early intervention for children from birth to 18 years to cover 4 'D's viz. Defects at birth, Deficiencies, Diseases, Development delays including disability. Early detection and management of diseases including deficiencies bring added value in preventing these conditions to progress to their more severe and debilitating form.
Janani Shishu Suraksha Karyakaram	This scheme provides free service guarantees at Public Health Facilities. It was launched on 1st June 2011 to eliminate out of pocket expenditure for pregnant women and sick newborns on drugs, diet, diagnostics, user charges, referral transport. It aims to motivate those who still choose to deliver at their homes to opt for institutional deliveries. It is an initiative with the hope that states would come forward and ensure that benefits under JSSK would reach every needy pregnant woman coming to government institutional facility.
Janani Suraksha Yojana	JananiSurakshaYojana (JSY) is a safe motherhood intervention under the National Health Mission
Mission Indradhanush	This scheme aims of improving coverage of immunization in the country. It aims to achieve at least 90% immunization coverage by December 2018 which will cover unvaccinated and partially vaccinated children in rural and urban areas of India. Recently, the Intensified Mission Indradhanush (IMI) 3.0 scheme has been rolled out to cover children and pregnant women who missed routine immunisation during the Covid-19 pandemic. It will have two rounds which will be conducted in 250 pre-identified districts/urban areas across 29 States/UTs. The districts have been classified to reflect 313 low risk, 152 medium risk and 250 high-risk districts.
Pulse Polio	This is an immunization campaign established by the government of India to eliminate polio in India by vaccinating all children under the age of five years against the poliovirus.
Pradhan Mantri Swasthya Suraksha Yojana (PMSSY)	This scheme was announced with the objectives of correcting regional imbalances in the availability of affordable/ reliable tertiary healthcare services and also augmenting facilities for quality medical education in the country by setting up various institutions like AIIMS and upgrading government medical colleges institutions.

Rashtriya Arogya Nidhi	This scheme provides financial assistance to the patients that are below the poverty line and are suffering from life-threatening diseases, to receive medical treatment at any government-run super speciality hospital/ institution.
POSHAN Abhiyaan	This is a part of the National Nutrition Mission (NNM) initiated by the GoI in FY 2017-18. The programme through the targets strive to reduce the level of stunting, under-nutrition, anaemia and low birth weight babies. It plans to create synergy, ensure better monitoring, issue alerts for timely action, and encourage States/UTs to perform, guide and supervise the line Ministries and States/UTs to achieve the targeted goals. NNM targets to reduce stunting, undernutrition, anaemia (among young children, women and adolescent girls) and reduce low birth weight by 2%, 2%, 3% and 2% per annum respectively. Although the target to reduce Stunting is at least 2% p.a., Mission would strive to achieve a reduction in Stunting from 38.4% (NFHS-4) to 25% by 2022 (Mission 25 by 2022).
Rashtriya Swasthya Bima Yojana	This is a government-run health insurance programme for the Indian poor. It aims to provide health insurance coverage to the unrecognized sector workers belonging to the below poverty line and their family members shall be beneficiaries under this scheme.
Integrated Child Development Service	This scheme aims to improve the nutrition and health status of children in the age group of 0-6 years, lay the foundation for proper psychological, physical and social development of the child, effective coordination and implementation of policy among the various departments and enhance the capability of the mother to look after the normal health and nutrition needs through proper nutrition and health education.
Pradhan Mantri Matru Vandana Yojana (PMMVY)	The efforts of the Ministry, along with constant monitoring and facilitation efforts, have resulted in the enrollment of 1.94 crore beneficiaries (pregnant women and lactating mothers) nationally and successful disbursement of Rs 7,408.60 crore under the scheme, up to 18 November 2020.
National Family Health Surveys	The NFHS is a collaborative project of the International Institute for Population Sciences(IIPS), Mumbai, India; ICF, Calverton, Maryland, USA and the East-West Center, Honolulu, Hawaii, USA. The Ministry of Health and Family Welfare (MOHFW), Government of India, designated IIPS as the nodal agency, responsible for providing coordination and technical guidance for the NFHS. NFHS was funded by the United States Agency for International Development (USAID) with supplementary support from United Nations Children's Fund (UNICEF).
Rashtriya POSHAN Maah, September 2020:	The third POSHAN Maah was repositioned to a digital mode due to the Covid-19 situation. The two major activities of Rashtriya POSHAN Maah 2020 were: (i) identification and tracking of children with severe acute malnutrition (ii) plantation drive for promotion of kitchen gardens at the grassroots level
The Rashtriya Kishor Swasthya Karyakram	The key principle of this programme is adolescent participation and leadership, Equity and inclusion, Gender Equity and strategic partnerships with other sectors and stakeholders. The programme enables all adolescents in India to realize their full potential by making informed and responsible decisions related to their health and well-being and by accessing the services and support they need to do so.
Surakshit Matritva Ashwasan (SUMAN)	The Surakshit Matritva Aashwasan (SUMAN) has been launched by the Ministry of Health and Family Welfare on 10th October 2019 with the commitment to provide Assured, dignified, respectful and quality healthcare, at no cost and zero tolerance for denial of services, for every woman and newborn. Under the SUMAN initiative, all Pregnant Women/Newborns visiting public health facilities are entitled to a set of free services. However, since all services cannot be provided at all facilities, each health facility is expected to notify the service guarantee package based on their current resources and service availability with measures put in place to reach 100% of the expected service standards for the level of that facility. The packages under SUMAN has been divided into Basic, BEmONC and CEmONC for both maternal and newborn services.
Pradhan Mantri Surakshit Matrutava Abhiyan (PMSMA)	The Pradhan Mantri Surakshit Matritva Abhiyan has been launched by the Ministry of Health & Family Welfare (MoHFW), Government of India. The program aims to provide assured, comprehensive and quality antenatal care, free of cost, universally to all pregnant women on the 9th of every month.
Jan Swasthya Abhiyan	The Jan Swasthya Abhiyan (JSA) was formed in 2001, with the coming together of 18 national networks that had organised activities across the country in 2000, in the lead up to the First Global Peoples Health Assembly, in Dhaka, in December 2000. The JSA forms the Indian regional circle of the global People's Health Movement (PHM). At present, it is the major national platform that coordinates activities and actions on health and health care across the country. The JSA, today, is constituted of 21 national networks and organisations and state-level JSA platforms (which are present in almost all states in the country). Network partners of the JSA include a range of organisations, including NGOs working in the area of health, feminist organisations, people science organisations, service delivery networks and trade unions.

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.

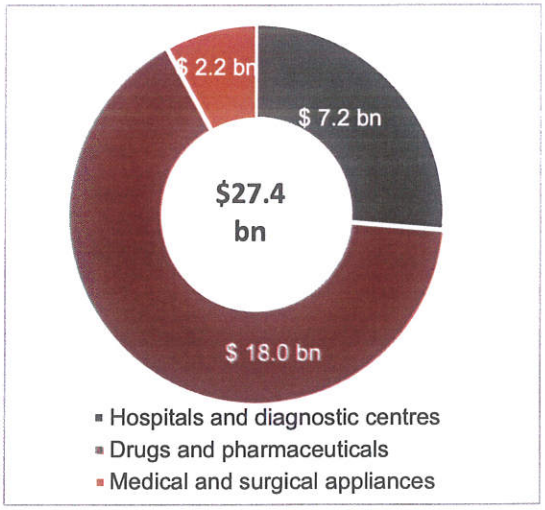
Apart from these, the government provides tax relief to hospitals with 100 beds or more in the form of investment-linked deduction (on capital expenditure other than for land acquisition, goodwill and financial instruments incurred prior to the commencement of business) under Section 35AD of the Income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

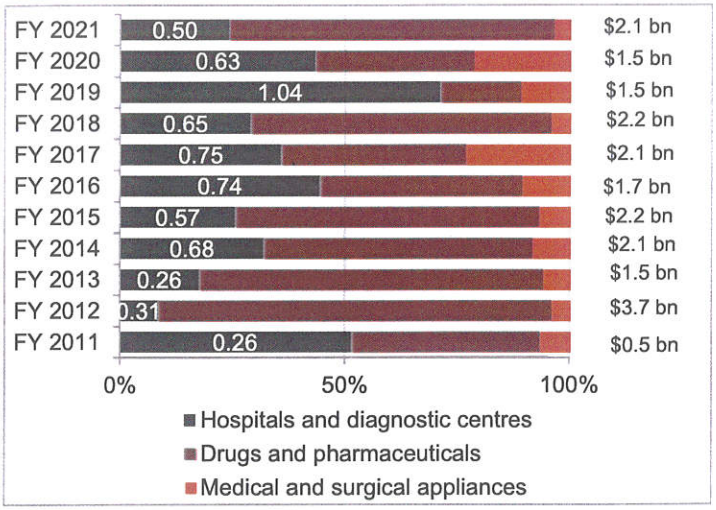
FDI of up to 100% is permitted under the automatic route in Indian hospitals from 2000. This means foreign investment in hospitals does not require prior approval either from the government or the Reserve Bank of India. Investors are only required to notify the concerned regional RBI office within 30 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 $7,228 million, (2) drugs & pharmaceuticals amounted to $17,991 million and (3) medical & surgical appliances totalled $2,198 million.

Annual cumulative FDI inflow for fiscal 2021



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).

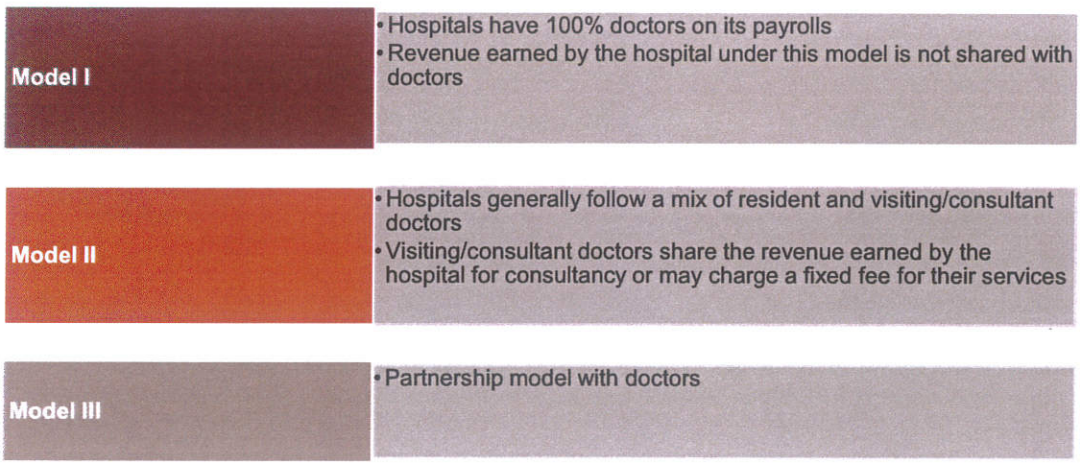
The NPPA's initial intention was to bring eight new medical device segments – all implantable devices, CT scanning equipment, X-ray equipment, MRI equipment, dialysis machine, bone marrow cell separators, defibrillators, and PET equipment – under the Drugs and Cosmetics Act. This would have subjected 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.

2.7 Doctor engagement models

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



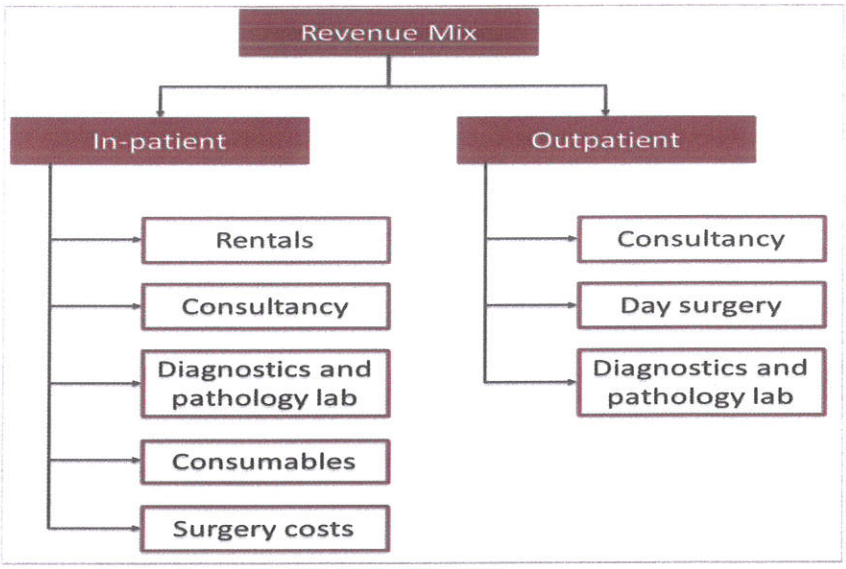
Large Indian hospitals typically follow the second model. The visiting/ consultant doctor shares a percentage of the consulting fee and the in-patient department (IPD) income (for surgeries done on the hospital premises) with the hospital. Even mid-sized hospitals (defined as 100-400 beds at pan India level and 75-300 bed hospital for eastern India) 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.

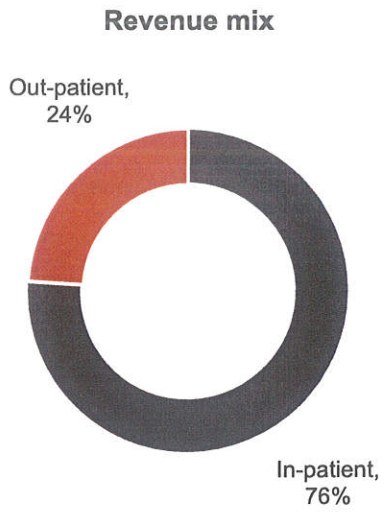
However, there are some hospitals that have to give equity stakes to reputed doctors to attract and retain them in their hospitals.

2.8 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 76% of the overall revenue. This ratio could vary with hospitals, depending on the type of services rendered and the ailment mix.





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

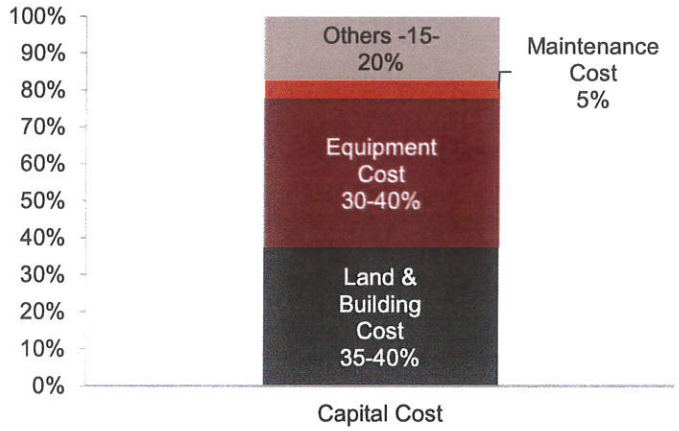
Ailment	ALOS	Remarks
Cardiac	5 days	In complex, surgical cases, ALOS is 7-8 days Angiography – day care; and angioplasty – 2 days
Orthopaedics	3-4 days	
Oncology	5-6 days	Hospitalisation is for surgical cases only. For chemotherapy, there are day-care beds and for radiotherapy, no stay is required
Neurosurgery	8-10 days	Would vary on case-to-case basis depending on the complexity of the case
Ophthalmology	1 day	Day care
C-section	6-10 days	In caesarian deliveries, length of stay is longer in public than in private health facility
Childbirth	1-4 days	Day care in 20% of the cases

Source: 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 into 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 Kolkata for a large multi-speciality hospital is scarce and would cost huge capital. Hence, players with available land bank in Kolkata 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 20-25% on raw material/consumables versus more than 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

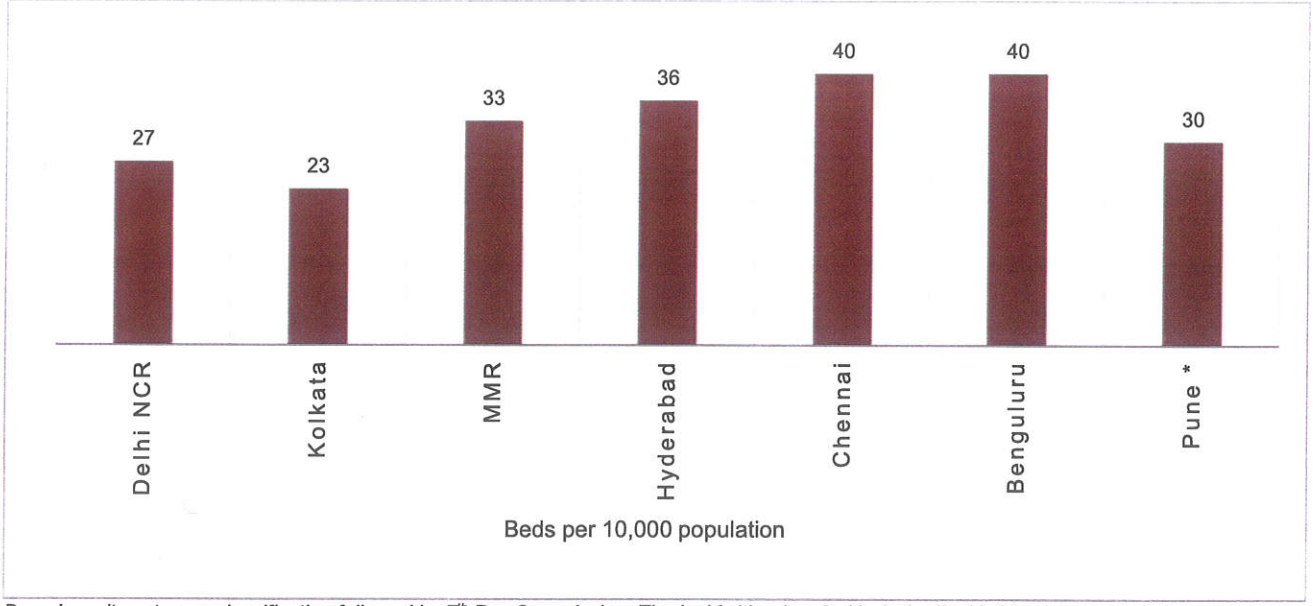
- *Employee costs:* These costs account for 25-30% of the overall operating costs. While salaries are fixed costs, consultants' fees can be linked to operations, making it a variable expense. The bed-to-staff ratio also varies from 1:3 to 1:5, with multi-specialty and super-specialty hospitals having 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

2.9 Estimated bed density across key cities in India

Estimated bed density across key tier – I cities in India



Based on city category classification followed by 7th Pay Commission, Tier I – X cities (top 8 cities), tier II – Y cities (next 88 cities)
** Pune metropolitan region **Agartala is a Tier – III city*
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 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.

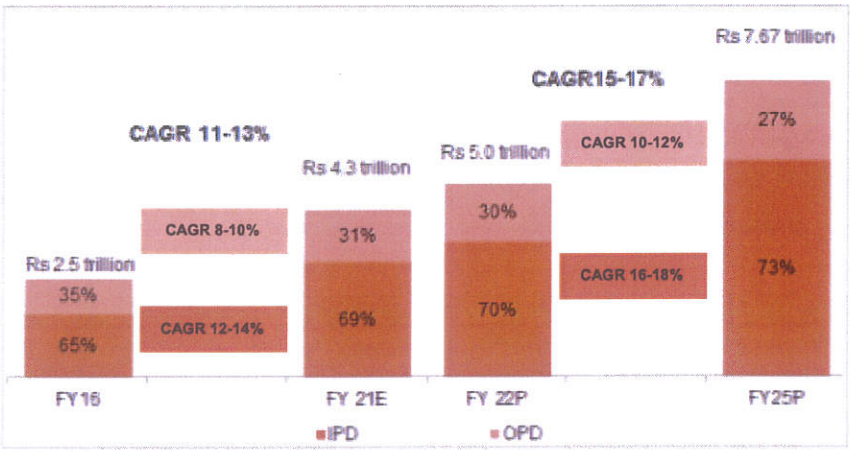
3 Assessment of India's hospital market

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 2021 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.

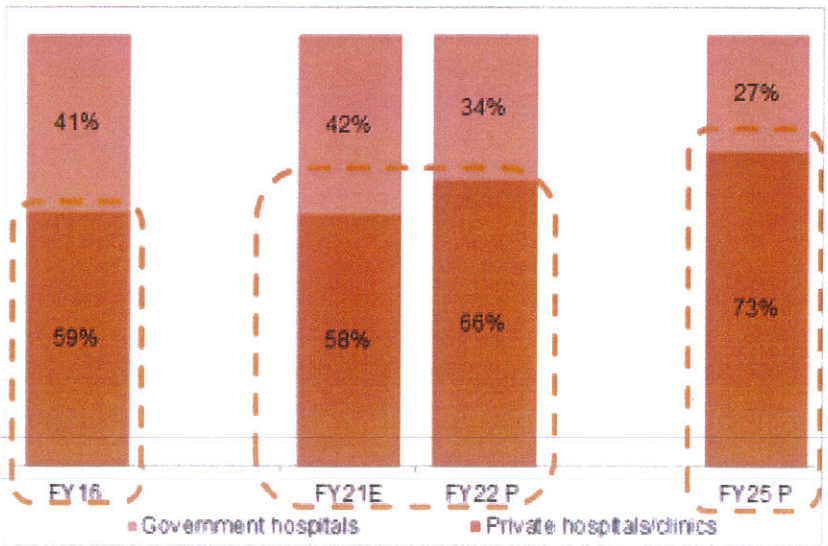
The other contributors to the demand are more structural in nature, like, increase in lifestyle-related ailments, increasing medical tourism, rising incomes and changing demography.

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

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.

Low base and pent up demand to lead revenue growth of hospital firms by 20-25% in FY 22

In fiscal 2022, with pent up deferred procedures as well as some benign push from the low base of the preceding year, the revenues of hospital chains is expected to grow by 20-25% .Hospitals focused primarily on critical specialities are expected to arrest losses (as pent up demand to be fulfilled at a faster pace). Margins are also expected to bounce back to pre-covid levels owing to high realisation procedures being catered to, majorly in the second half. However, the pace of recovery is contingent on the resurgence of covid cases in the country.

During the pre-Covid era, aggregate revenue of the key listed players rose at a healthy 12% compounded annual growth rate (CAGR) between fiscals 2016 and 2020. And during fiscal 2020, aggregate revenue of the key listed players grew by ~ 14% (on-year). This growth was driven by Apollo Hospitals Enterprise Ltd (AHEL), which formed nearly 64% of the set revenue.

AHEL witnessed a growth of 17% during the same period, due to increase in occupancy and increase in revenue of their standalone pharmacies, coupled with improvement in their average revenue per occupied beds.

However, as opposed to the earlier growth trajectory, restricted movement following and during the lockdown in the month of March on account of Covid-19, with revenue growth to the tune of 13-14% in fiscal 2020 (and it was primarily on account of the increase in average ARPOB, with hospitals focusing on value). In fiscal 2021, revenues of private hospitals declined by 10-15%, due to reduction in both out-patient and inpatient footfalls (with OR falling to 25-30% in the month of April). The extent of revenue loss was wholly dependent on recovery in footfalls and resolution of deferred surgeries, as spread of Covid 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.

The impact of PMJAY on the revenues of the key listed players could be minimal in the medium term, as decisions to empanel under the scheme would take place at a unit level rather than on a group level.

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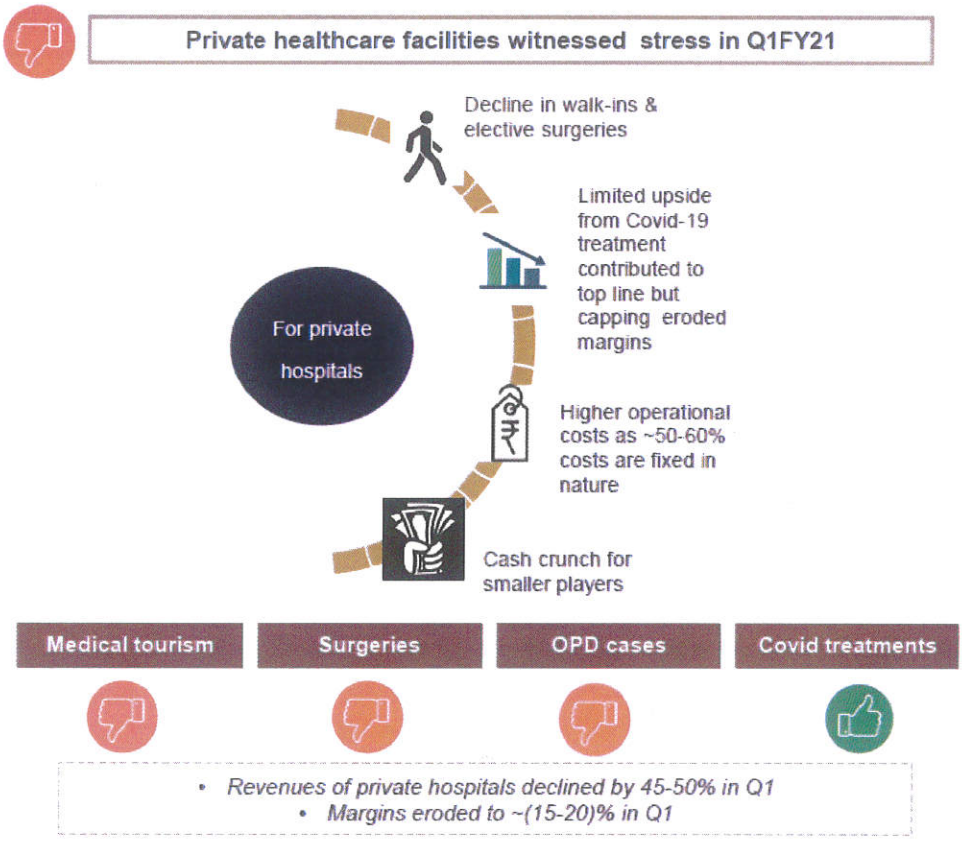
3.2 Impact of Covid-19 on healthcare delivery market



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.

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 is also witnessing 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 minimize 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.

As per our primary interactions, occupancy in private hospitals had fallen up to ~25-30% in Apri,l but witnessed a gradual pick-up in the following months. Most of the pent-up demand is likely to be met in the second half of the fiscal. Major listed hospitals have seen an improvement in occupancy, both from deferred treatments as well as Covid treatments. However, a renewed surge in Covid cases and consequent diversion of critical beds towards Covid care could hamper revenue prospects from regular channels that are a higher revenue contributor.

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 this fiscal,

as people would continue to exercise caution while travelling even though travel bans have been lifted and India has entered into a travel bubble arrangement with some countries.

As Covid has curved downwards, return to normalcy has begun in most parts of the country during the second half of the fiscal. Even as private hospitals find it difficult to set course to their erstwhile growth levels, hospitals focused on critical specialties are expected to be able to recoup their lost revenues faster, making them relatively lesser vulnerable to the pandemic at the end of the fiscal. As the impact of Covid-19 is touted to be greater in urban areas, where major hospital chains have greater presence, smaller hospitals may stand to benefit from volume impetus provided by government schemes as this ensures at least some level of occupancy. The impact would be limited further for those hospitals who have tighter control on their operating costs (hospitals with higher EBITDA/bed). CRISIL Research estimates revenues of private hospitals to decline by 10-15% in the near term. This decline would vary across geographies, with a caveat that private hospital revenues could witness a potential upside from increasing Covid cases being treated at private hospitals (which could bring in revenues, but price capping will restrict any gains on margins), as major metros continue to see a spike in the number of positive cases. Also, OPD levels are still hovering at 50-55% of pre-Covid levels, recovery could be delayed vis-a-vis IPD treatments.

Private hospitals have also witnessed higher demand due to increase in Covid cases

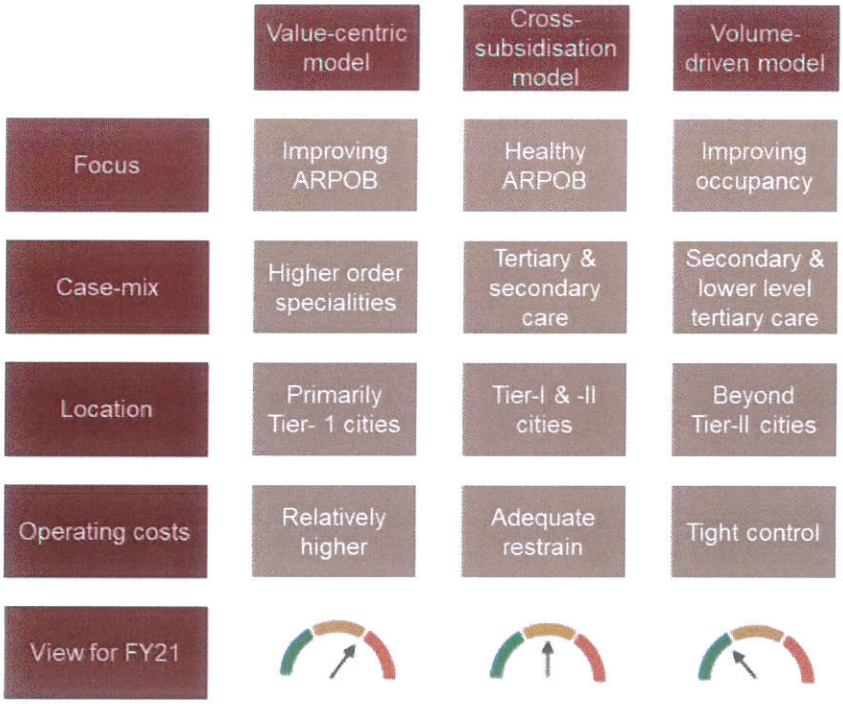
Private players have also fought the battle against Covid-19. They reserved some of their beds exclusively for treating Covid patients. Some private players have gone ahead and converted their whole facility into a Covid centre, adhering to the standard operating procedures.

Hospital industry margins estimated to have eroded by 400-500 bps in fiscal 2021

Loss of revenues translated into margin erosion for hospitals (as the sector has higher share of fixed operating costs), CRISIL Research estimates an erosion of 400-500 basis points in margins in fiscal 2021. Though the entire sector would be under fiscal stress (especially in the first two quarters of the current fiscal owing to cash flow concerns), major listed hospital chains which have had better financials vis-à-vis their unlisted regional chained peers were able to face relatively lesser difficulty in tiding over this stress.

The government bore the cost of Covid-19 in the healthcare space with the central government release of an emergency fund of ~Rs 15,000 crore for a three year period for procurement of PPE(personnel protective equipment),N-95 masks and 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 which have a better public healthcare infrastructure in place. And with some of those former states witnessing faster pace of increase in number of cases and subsequent increase in fatalities (as was seen in the second wave), the reliance of these states on private sector will be greater for testing as well as treatment facilities. Some of the private facilities in places like Mumbai, Pune, Ahmedabad etc. had been converted into Covid-only hospitals.

Impact of the pandemic on different business models



Value- centric model of hospitals are focused on high ticket size and high value services. Cross subsidisation is the practice of charging higher prices to one type of consumers to artificially lower prices for another group. Volume- driven model is where the players focuses on high volumes and faster turnaround time.

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 this fiscal
- 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

Emerging trends

- **M-health** (health tracking apps)
- **Home healthcare services**
- **E-consultation / Tele-medicine**
- **Online pharmacy**
- **Bio-Pharma**
- **Artificial Intelligence**

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.

Online spends during Covid-19 towards healthcare sector

E-consultation / Tele-medicine

No. of people using online health consultations

~3 times
between March to November 2020

Online pharmacy

No. of users using e-pharmacy website/apps

2.5-3 times
between March and June 2020

On account of the nationwide lockdown imposed to contain the Covid-19 pandemic in India during the last week of March 2020, there has been higher dependence on the internet to serve basic healthcare needs of individuals. Convenient, affordable and personalised treatments have been preferred as opposed to traditional hospital-based treatments. Increasing use of e-pharmacy websites/apps has been evident as the number of users using e-pharmacy website/apps shot up nearly 2.5-3 times between March and June 2020. E-consultation/tele-medicine also gained traction as they omitted the need to visit hospitals. As per a recent report 'Rise of Telemedicine - 2020', published by the Telemedicine Society of India, the number of people using online health consultations increased three times between March to November 2020. The advent of 5G, artificial intelligence and machine learning is expected to further accelerate online spending towards healthcare.

3.3 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.

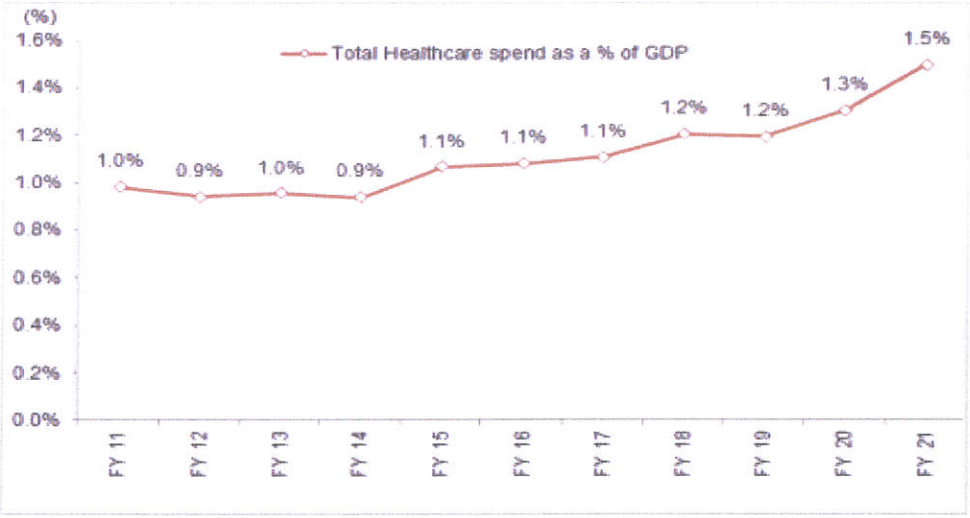
Source: CRISIL Research

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 712.7 billion, although the incremental allocation in fiscal 2021 and fiscal 2022 is more for covid related expenditure (emergency aid and vaccination drive). Nonetheless, the focus seems to have shifted from curative aspect to preventive health and well-being under the ambit of holistic healthcare. The long-term goal is to raise its healthcare spending to 2.5% of GDP by 2025 under the National Health policy 2017 from the current 1.3% of the GDP

Public expenditure as a proportion of GDP



Note: Total public healthcare expenditure includes budgeted expenditure for states and centre together
Source: Budget documents, Economic survey 2021

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

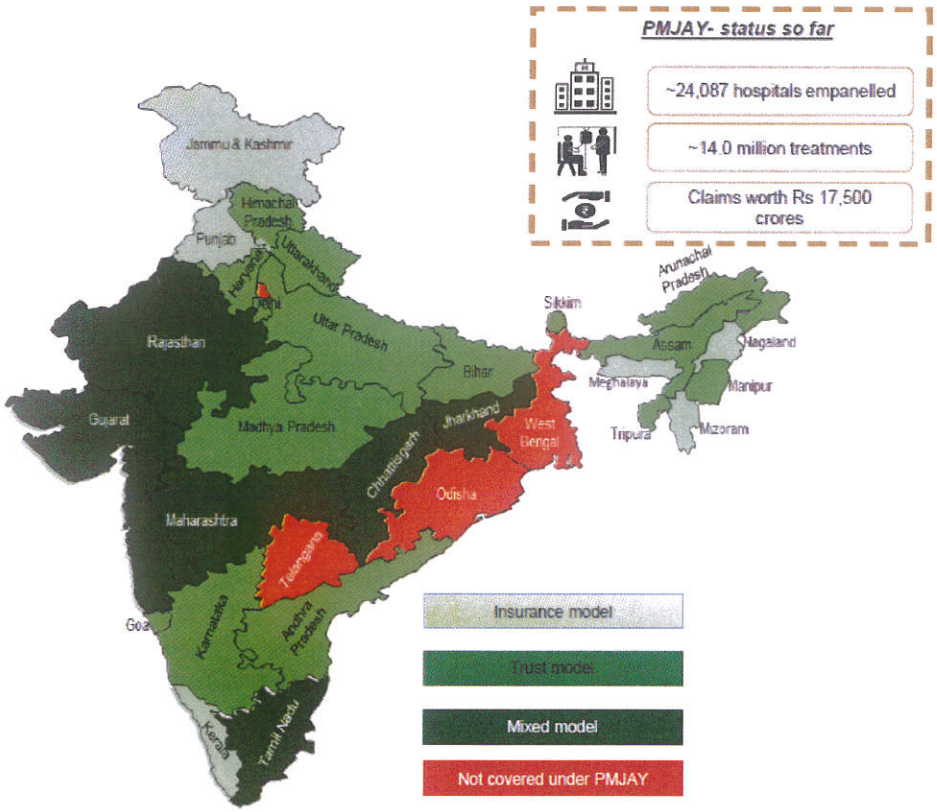
Setting up of 24 new government hospitals and medical colleges and upgradation of existing district hospitals. The intention is to have at least one medical college for three parliamentary constituencies. The government already has a scheme in place, Pradhan Mantri Swasthya Suraksha Yojana (PMSSY), to 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 10.74 crore 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

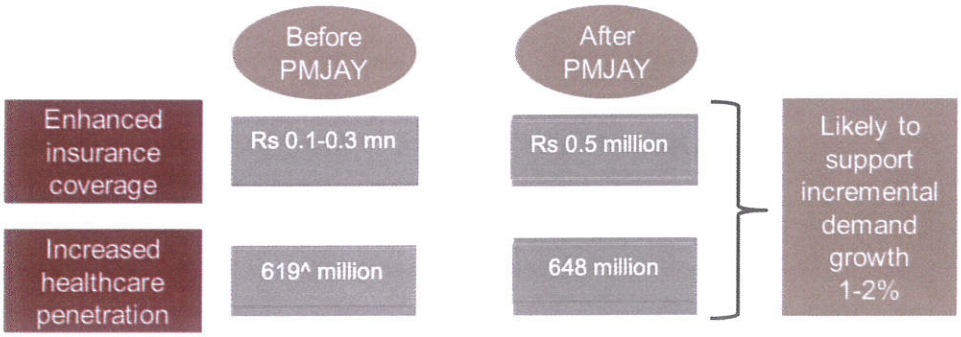
Under the trust-based model, the scheme is directly implemented by the State Health Authority (SHA) without the intermediation of the insurance company. The financial risk of implementing the scheme is borne by the government in this model. Even though no insurance company is involved, the SHA employs 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 providing healthcare assurance of Rs 0.5 million per family (on floater basis) to nearly 10.74 crore families (the actual coverage would be greater on account of states extending the scheme to even some sections of the uncovered populace). As of November 2020, nearly 14 million treatments had taken place under Ayushman Bharat since the inception of the scheme in September 2018. More recently, nearly 32,000 patients have received treatment for Covid under the scheme (as of September 2020).

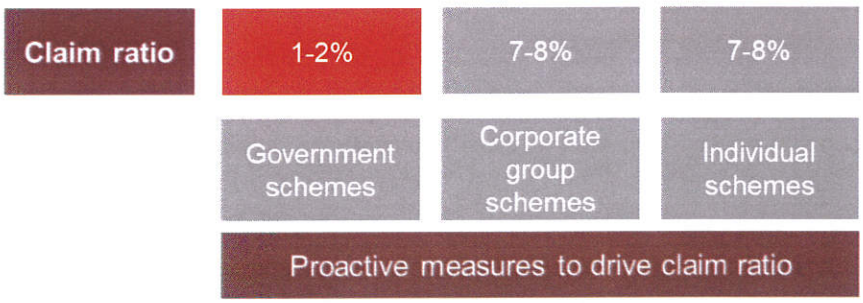
In terms of implementation till date, most states have signed a MoU with the National Health Agency (NHA) under varied implementation models, i.e., trust-based, insurance-based or mixed model; however, some states are yet to kick-start full-scale adoption. However, Madhya Pradesh, Uttar Pradesh and Bihar,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



Note: ^ Includes data from IRDA report FY19; healthcare penetration denotes persons covered
Source: PMJAY, CRISIL Research

Claim ratio likely to go up under PMJAY

CRISIL Research believes with increased coverage and increased awareness, the claim ratio under the scheme is expected to improve, unlike in the past when the claim ratio under government schemes has remained at 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 100-200 basis points for the hospital sector is expected on account of the PMJAY.



Source: PMJAY, CRISIL Research

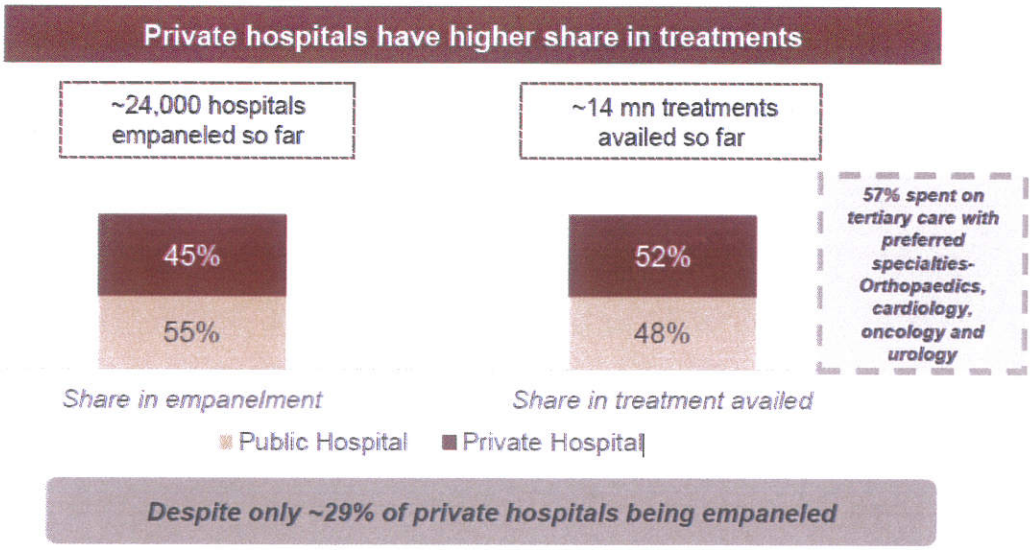
But the scheme's progression and adoption by private players will be primarily dependent on a) timely payment of dues to hospitals and b) attractive package rates.

For assessing the probable fiscal requirements of the scheme, (considering the Rs 17,500 crore spend on nearly 10 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 crore. 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 the 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 such as Bihar, Uttar Pradesh and Madhya Pradesh which are implementing health insurance schemes for the first time and have a fiscal deficit of 1.7-3.2%.

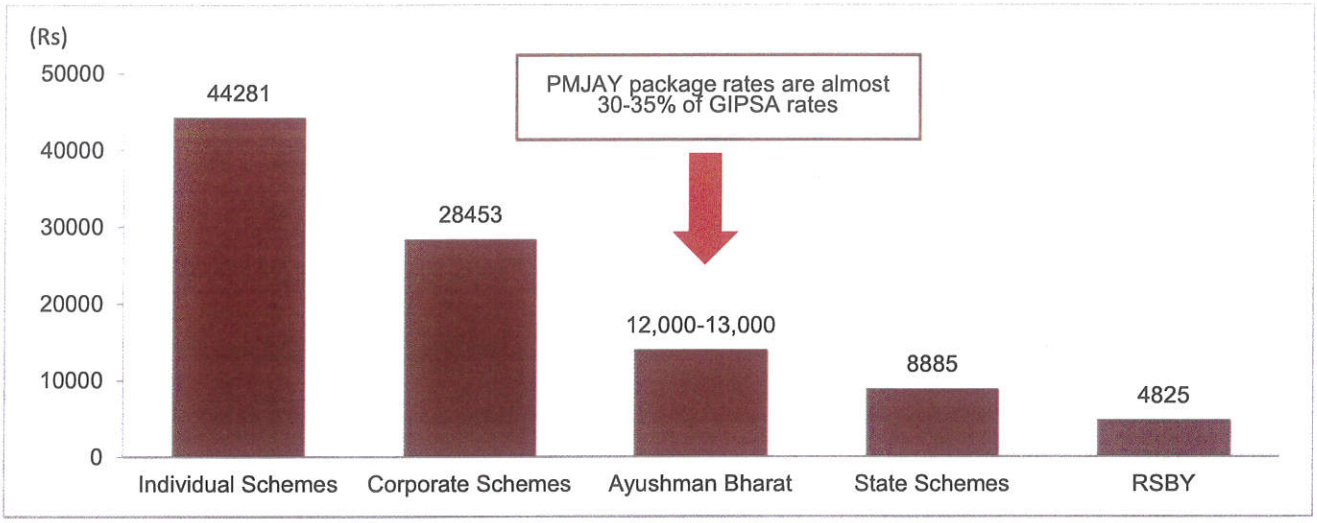
Participation of private hospitals remains a key monitorable; however, private hospitals have a higher share in treatments



Note PMJAY stands for Pradhan Mantri Jan ArogyaYojana; # denotes persons covered; ^ includes data from IRDA report FY19*
Source: Ayushman Bharat updates, ROHINI (Registry of Hospitals in Network of Insurance) registrations,

Package rates have been another area of concern for most corporate hospitals, reflecting the low participation of the private sector. Of the 33,000 private hospitals (as per the ROHINI database), only 29% have participated in the scheme. However, it should be noted that though the private sector's share is 44% in facilities enrolled for the scheme, ~64% of spending has taken place here. This clearly indicates the preference of beneficiaries for private hospitals, given that the government infrastructure is already overburdened. Amongst the treatments sought, 57% of the total spend has been on tertiary treatments, with orthopaedics, cardiology, cardiothoracic, oncology and urology being the most preferred, indicating the unmet demand in this category.

Average treatment cost under various schemes

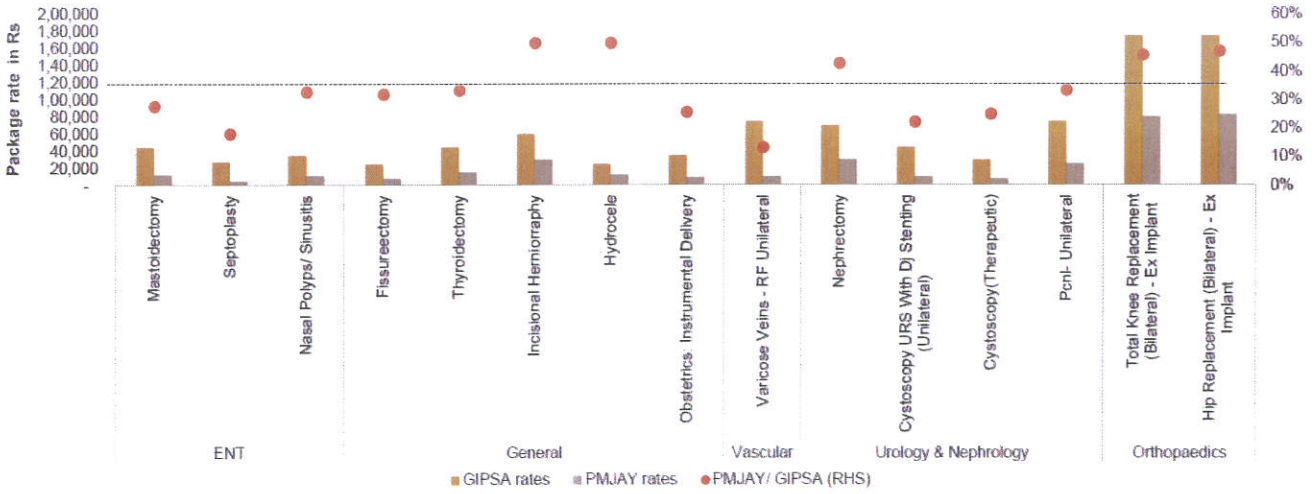


Note: GIPSA (General Insurance Public Sector Association) is a group made up of four top public sector insurance companies, namely Oriental Insurance Company, New India Assurance Company, National Insurance Company and United India Insurance Company. They have negotiated special package rates from many hospitals across India for a good number of procedures commonly undergone. Cashless facility for those procedures is available only in the GIPSA Network Hospitals. Claim for treatment taken elsewhere will have to be submitted for reimbursement.

RSBY-Rashtriya Swasthya Bima Yojana

Source: GIPSA, RSBY, Ayushman Bharat updates, IRDA annual report

PMJAY package rates almost 33% of GIPSA rates



Note: ^ Based on set of treatments highlighted above

Source: GIPSA package rates and AB-PMJAY package rates from respective websites

Another point to note is the average treatment cost increases as healthcare coverage increases. For instance, 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 0.1 to Rs 0.2 million, witnessed an average treatment cost of Rs 8,900. In case of PMJAY, the average claim is is around ~Rs 16,000 till date. PMJAY provides health assurance coverage of 0.5 million per family (on floater basis).

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

Given that 65% of the population is living in rural areas, the government is incentivising private investments in these regions. Currently, 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 because of the low-paying capacity in these areas and occupancy of existing facilities. CRISIL Research believes that a volume-centric model, focusing on secondary- and tertiary-care segments with tight cost control, will allow private players to enter and be profitable in rural areas, too.

To encourage creation of medical infrastructure in Tier-2 and Tier-3 cities, the government has announced viability-gap funding of 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 study, 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 1x), for an EBITDA margin of 10-12%, 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 the private sector's perspective, participation will be assessed from the view of utilisation and not profitability. Hence, over the medium term, significant supply addition just on account of Ayushman Bharat is unlikely, unless the government makes the VGF model more lucrative. However, players operating at low occupancy are more likely to participate to improve utilisation.

IRR lucrative for higher VGF

Project IRR		VGF %		
		40%	50%	60%
EBIDTA margin %	8%	3-4%	7-8%	11-12%
	10%	7-8%	11-12%	16-17%
	12%	10-11%	14-15%	20-21%
	14%	13-14%	17-19%	23-24%

Assumptions

- Hospital size – 100 beds with total capex of Rs 20 crore
- Debt-equity – 1.0 time
- Discounting rate for NPV calculation: 11%
- Assumed 5% increase per annum on PMJAY treatment cost
- ALOS – 4 days

Government's broad guidelines for private investments in Tier-2 & -3 cities

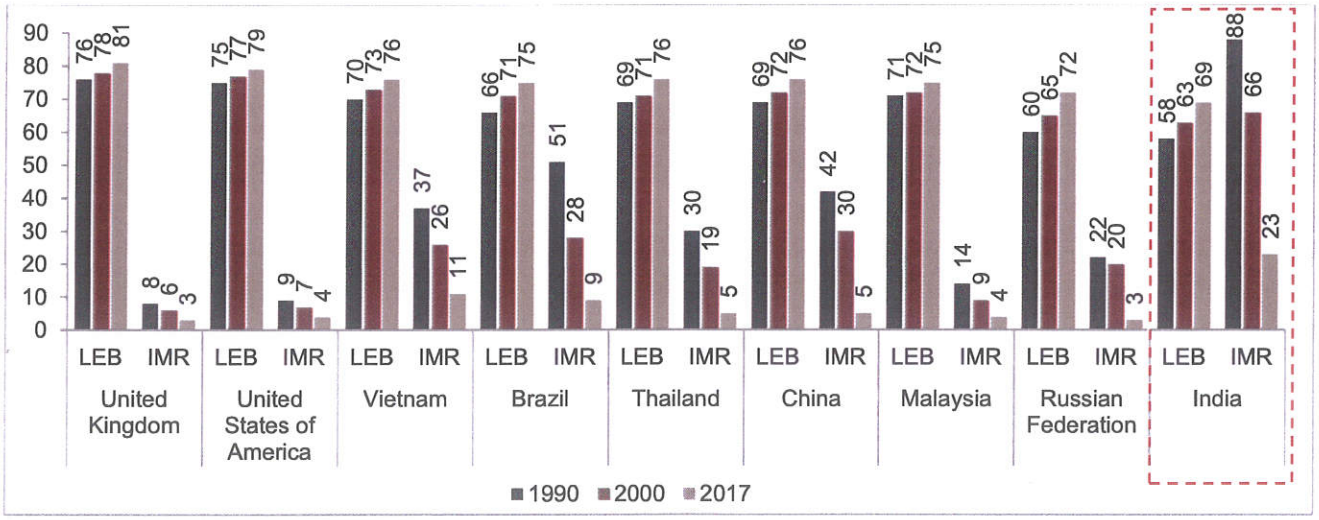
Interventions & incentives

- Land allotment
- Permissions and clearances within specific timelines
- Viability gap funding (VGF) up to 40% of total project cost
- Gap funding up to 50% of tax on capital cost
- Industry status for hospital sector

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.

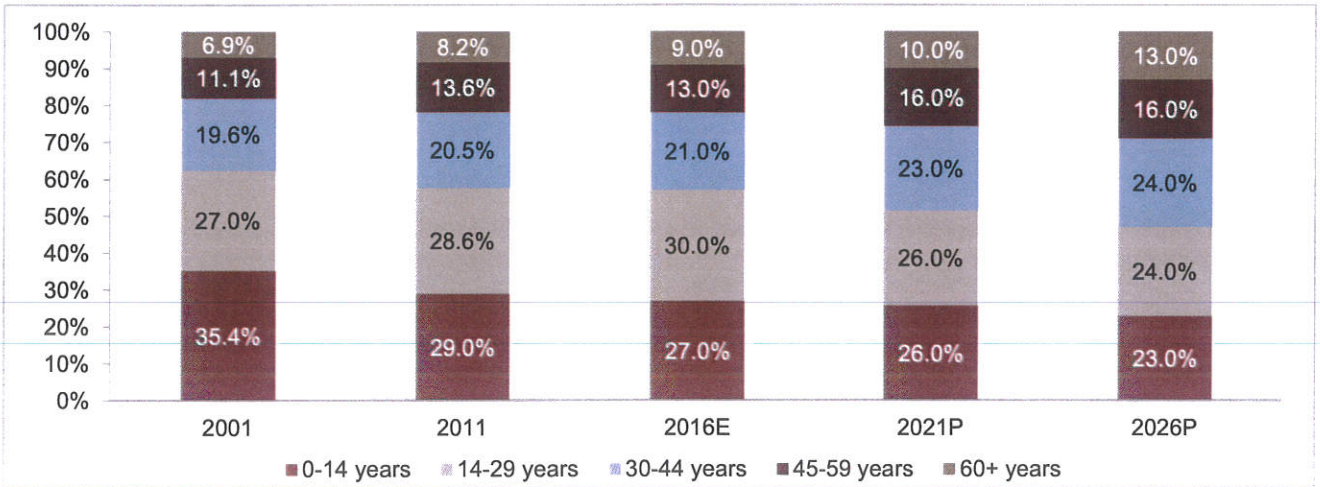
Life expectancy (at birth) and infant mortality rate: India vs others



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

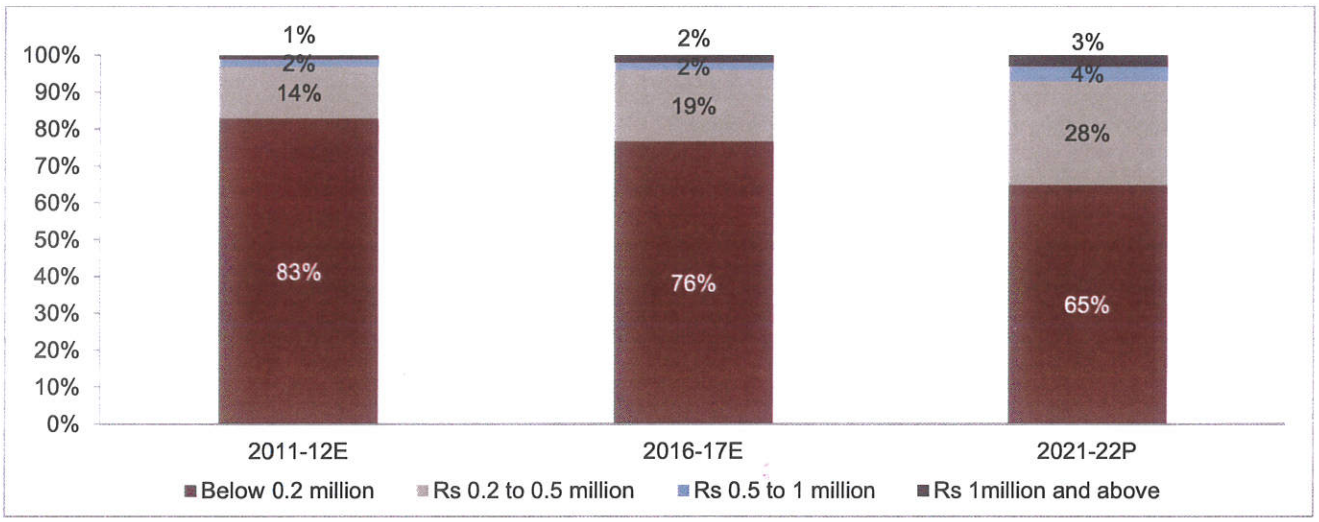
With the Indian population expected to grow to ~1.4 billion by 2026 and considering the above mentioned factors, the need to ensure healthcare services to this vast populace is imperative. This also provides a huge opportunity to expand into a space that bears enormous potential.

Rising income levels to make quality healthcare services more affordable

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



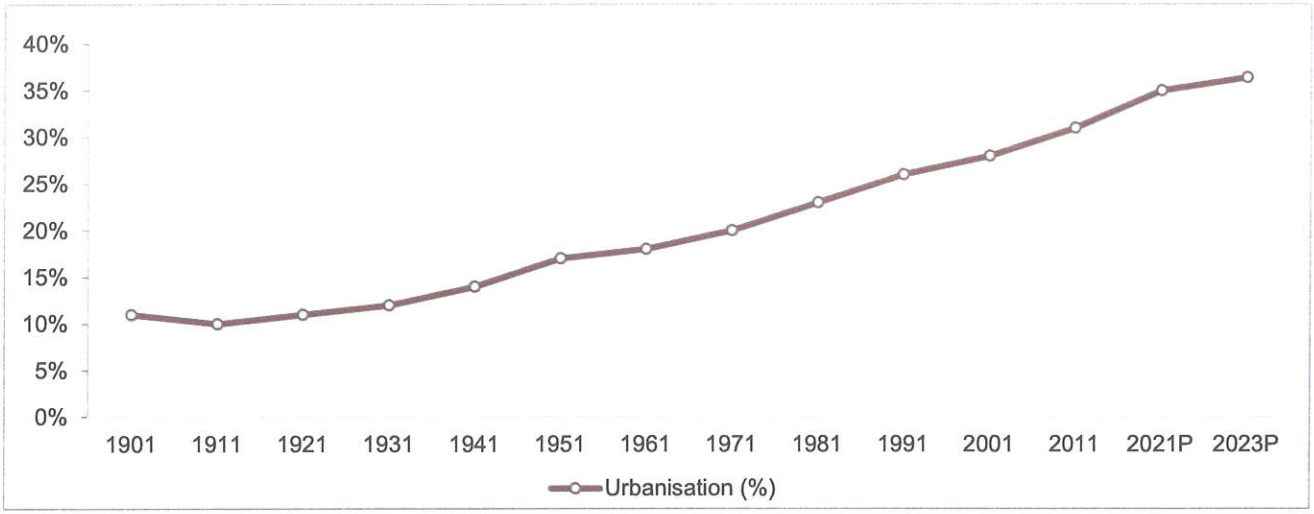
Source: CRISIL Research

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.

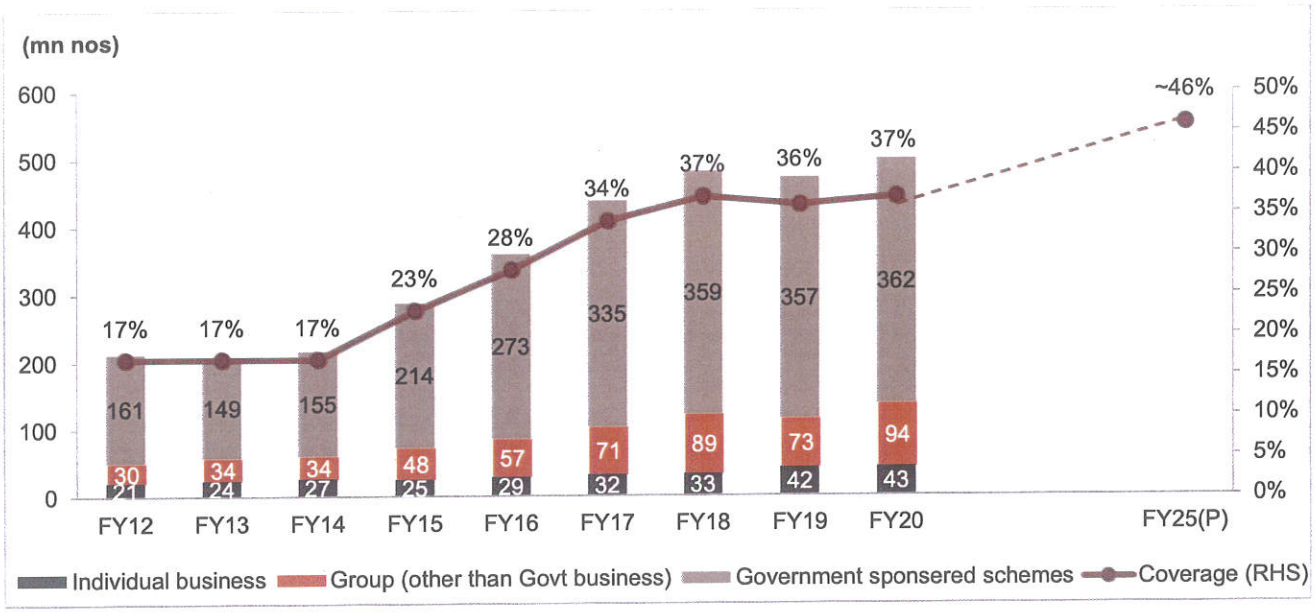
Another emerging market in the country is orthopaedics, which currently comprises a very small proportion compared with NCDs, but has a potential market in the country. The orthopaedics market can be classified into four different segments, viz., knee, hip, trauma, and spine, of which the knee-replacement 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 ~37% 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 37%.

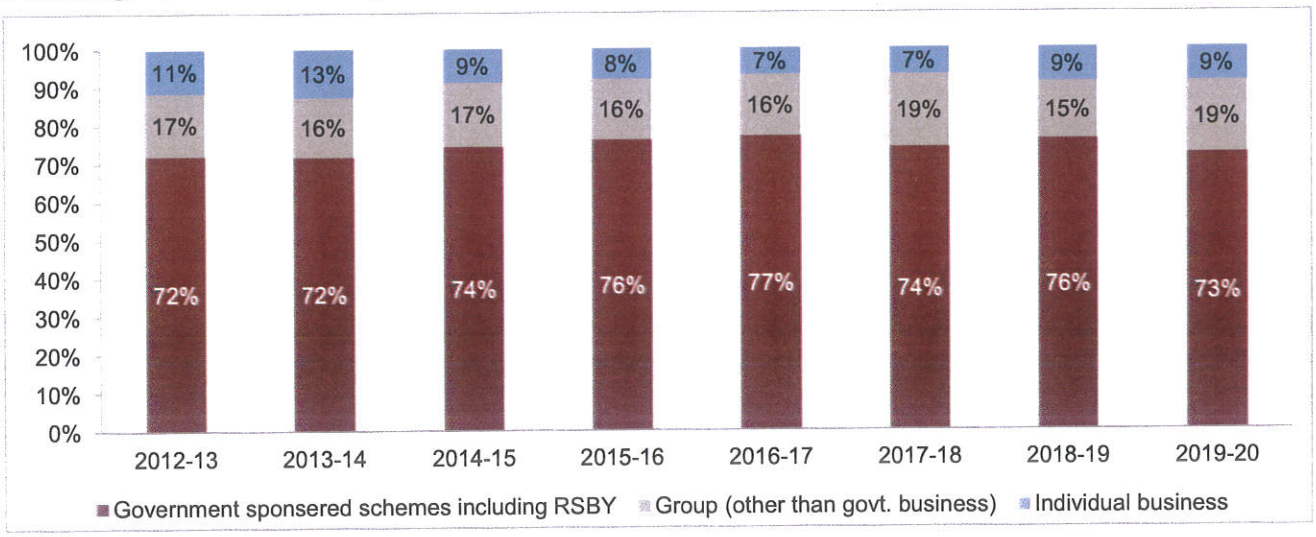
Population-wise distribution among various insurance businesses (million)



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. Covid-19 has also accelerated the coverage and also online channels which make it easier to get insurance.

3.4 Key challenges for the healthcare delivery industry

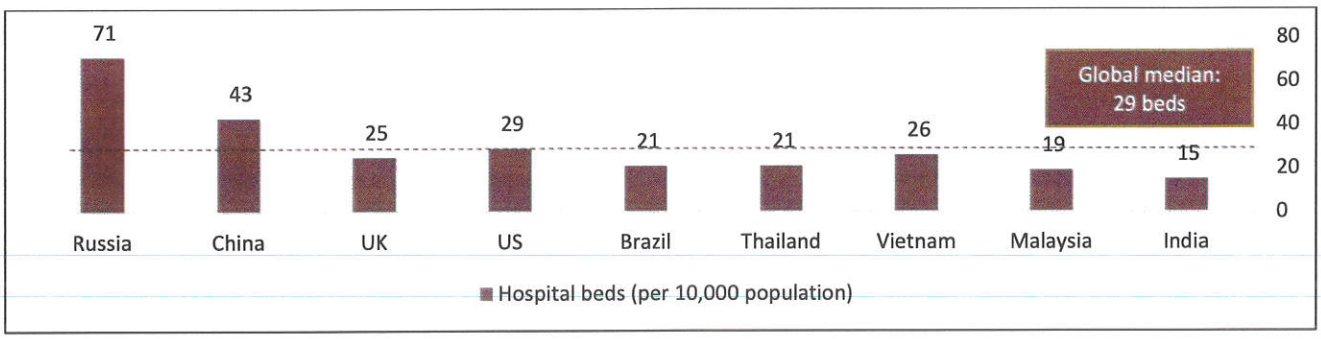
The potential demand and opportunities in healthcare in India aside, many challenges exist, mainly: inadequate health infrastructure and unequal quality of services provided based on affordability and healthcare financing.

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 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 nations, such as Brazil (21 beds), Malaysia (19 beds), and Vietnam (26 beds).

Hospital bed density: India vs. other countries

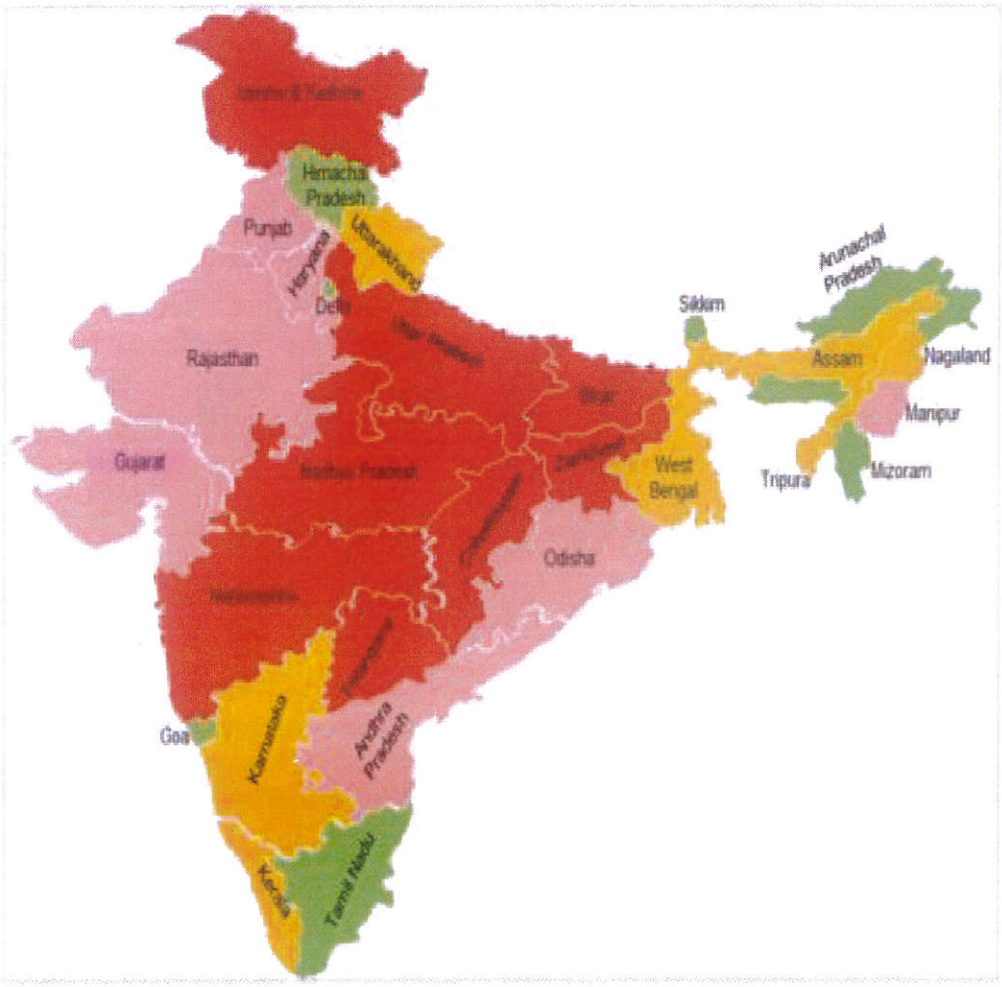


Note: India bed density is estimated by CRISIL Research

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

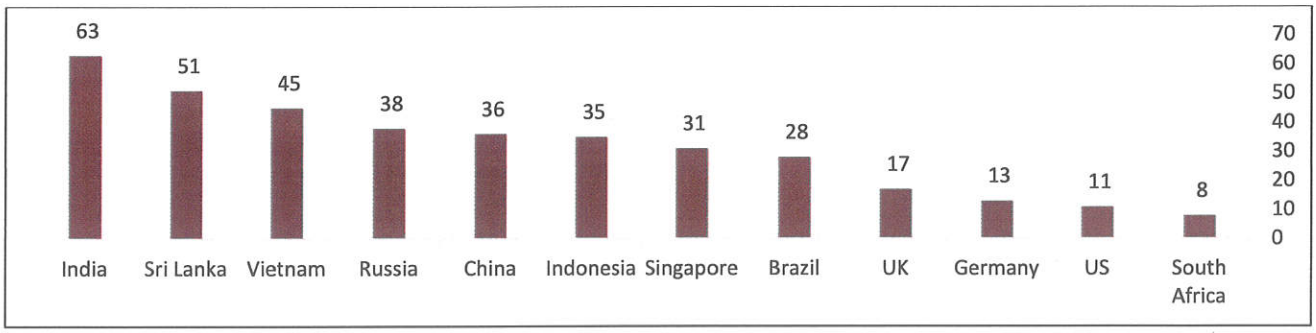
In India, the out of pocket (OOP) expenditure is nearly at 63% of total health expenditure (global average is 20.5%). In India, insurance cover does not cover out-patient treatments (only recently an insurance company has started

covering OPD treatments under its health insurance), which makes OOP due to out-patient greater in comparison to in-patient treatments.

Nearly 25% of the rural population and 18% of the urban population are dependent on borrowings for funding their healthcare expenditure. And nearly 68% of the rural population and 75% of the urban population use their household savings on healthcare related expenditure

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 PMJAY, the affordability aspect of healthcare expenditure is expected to be taken care of to some degree, especially for the deprived population Government price capping of medical equipment.

OOP as a % of current health expenditure: India vs other countries



Source: World Health Organization Database

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.

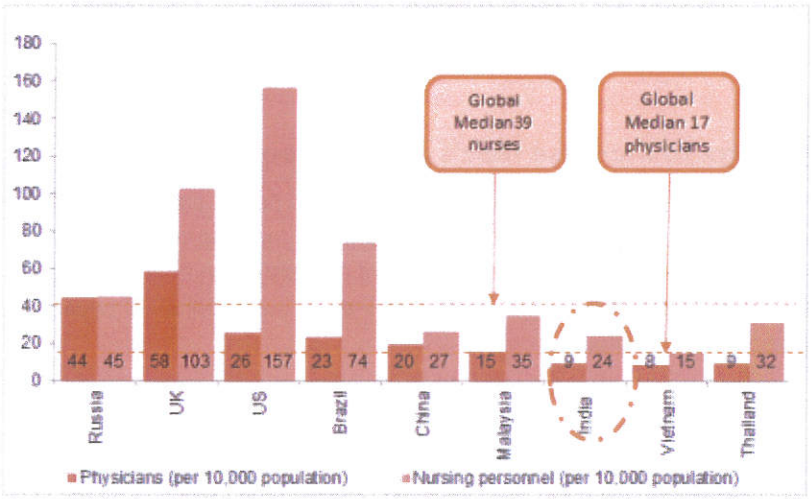
4. Outstanding receivables affecting fiscal profile of hospitals

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

3.5 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.

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).

Currently, 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 (18 nurses in India versus 38 globally) than in physicians (9 physicians in India versus 15 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.

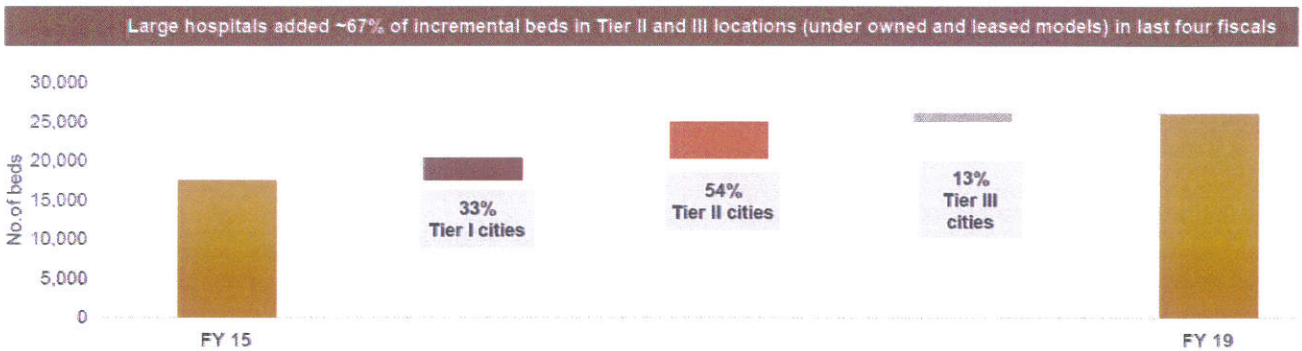
Home healthcare

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.

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-speciality and single-speciality hospitals, respectively.

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

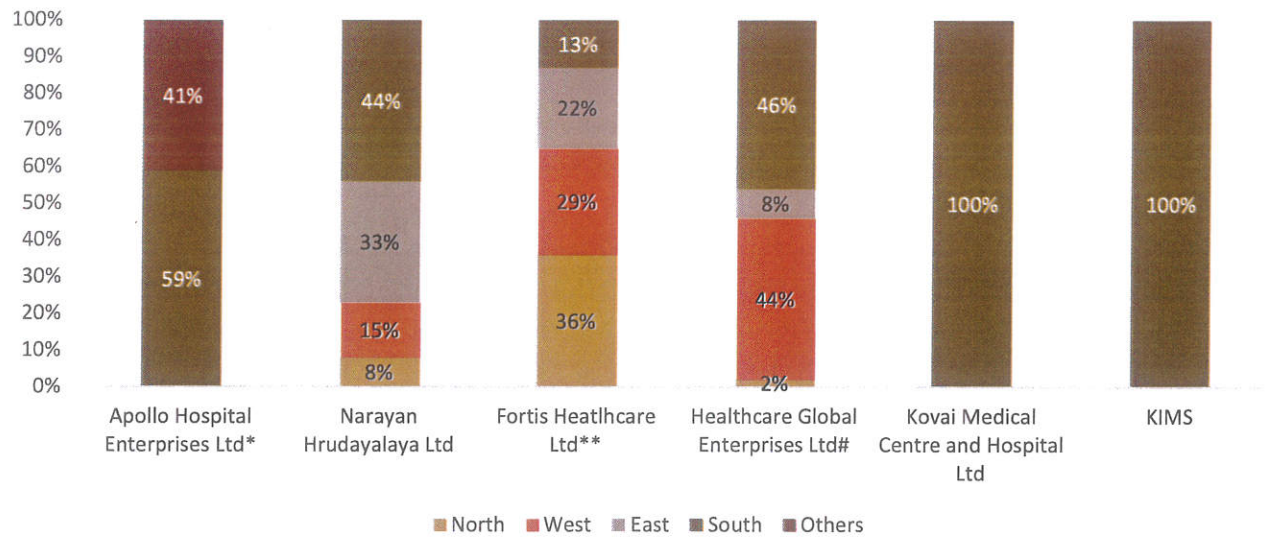
Key listed healthcare delivery players in India have established themselves in regions across the country. Those with regional presence have an added advantage over those that don't.

Regional presence for maternity players – no. of hospitals

Players	North	West	South	East
Cloud nine	6	4	8	-
Rainbow Hospitals	2	-	15	-
Motherhood	1	3	8	-
Surya	1	2	-	-

Note: Rainbow hospitals has 14 Hospitals, 3 OP clinics
Source: Company websites, CRISIL Research

Regional revenue mix of key listed players as of fiscal 2020



**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 Q4 FY20, 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).*

#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, 2020.

Source: Company annual reports/investor presentations, CRISIL Research

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

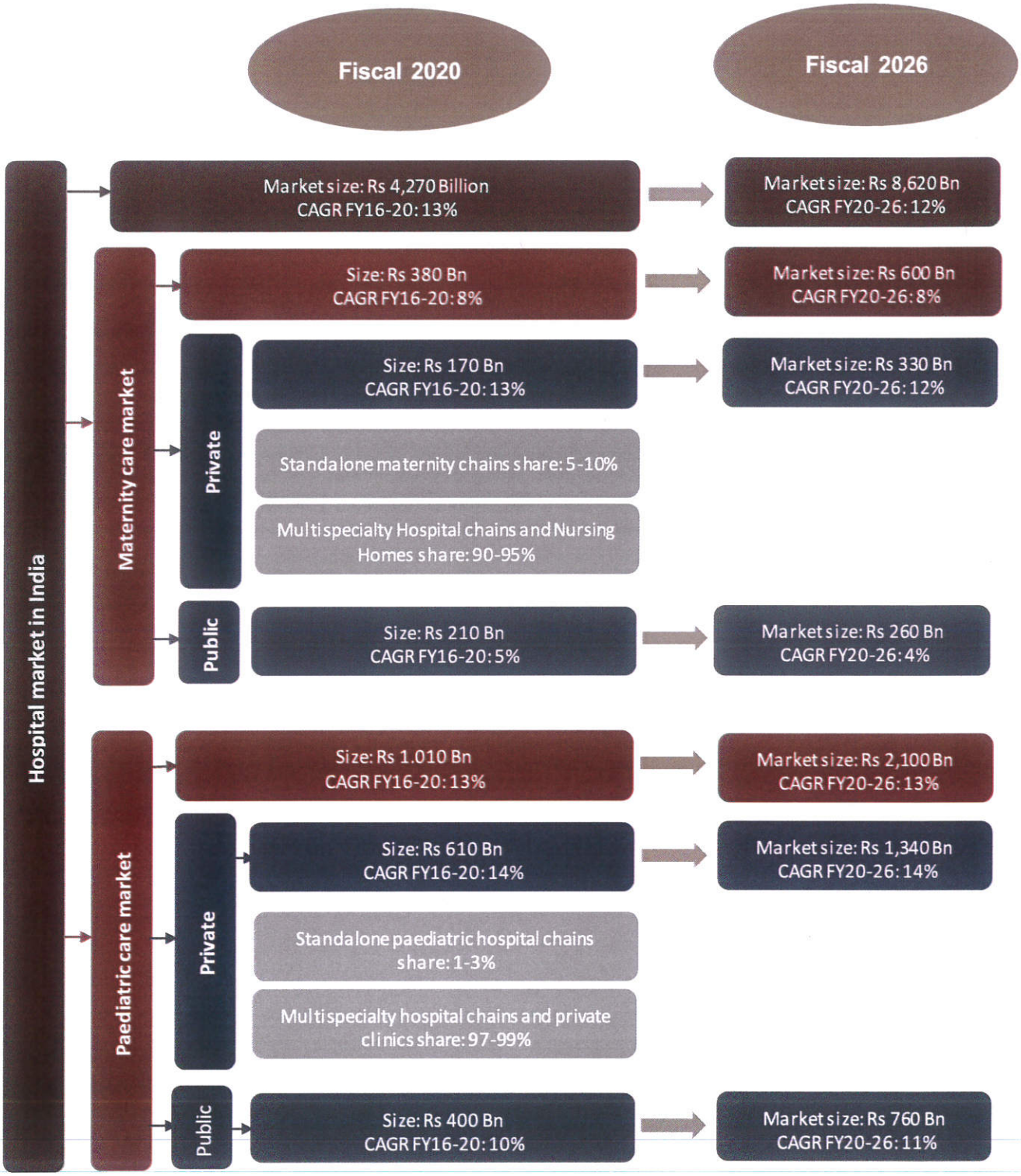
- **Understanding the mentality of people** (patients) in a particular region forms a crucial part of connecting and establishing long-term relationships for any hospital. Players with regional presence often have a strong grasp of the regional languages, food preferences, culture, and affordability, 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.

4 Assessment of Paediatric care industry in India

The Indian healthcare service market is further studied in detail to assess the paediatric and maternity healthcare market. The total hospital market size in India in fiscal 2020 was expected to be ~Rs 4,270 billion growing at CAGR 13% between fiscal 2016 and 2020.

The maternity market in India has seen a growth of 8% between fiscal 2016 and 2020 and is expected to grow at 7-8% between fiscal 2020 and 2026 supported by strong growth in private segment – 11-12% CAGR during the same period. Private sector is expected to grow faster on account of increased penetration of institutional deliveries, rising share of private hospitals in rural and urban areas, increase expenditure on maternity healthcare, and rise in treatment cost on account of delayed deliveries. Paediatric market which has grown at 14% CAGR between fiscal 2016 and 2020 is expected to grow at the same growth going forward supported by growth in both private and public sector healthcare units. Increasing awareness on childcare and early diagnosis is expected to augur growth for the industry.

Maternity and paediatric healthcare market in India



Source: CRISIL Research

4.1 Introduction to paediatrics healthcare services

Paediatric care is dedicated medical care for children for growth and development, nutrition, prevention of illnesses and treatment of illnesses in children

Paediatrics is the specialty of medical science concerned with the physical, mental, and social health of neonates, children, and adolescents. Paediatric care encompasses a broad spectrum of health services ranging from preventive health care to the diagnosis and treatment of acute and chronic diseases. Children differ from adults anatomically, physiologically, immunologically, psychologically, developmentally, and metabolically. Hence, different treatment is required to cure ailments in children. A paediatrician is a physician who is concerned primarily with the health, welfare, and development of children and is uniquely qualified for these endeavours.

Neonatology is a subspecialty of paediatrics that consists of the medical care of new-born infants (0-28 days), especially the ill or premature new-born. It is a hospital-based specialty, and is usually practised in neonatal intensive care units (NICUs). The principal patients of neonatologists are new-born infants who are ill or require special medical care due to prematurity, low birth weight, intrauterine growth restriction, congenital malformations (birth defects), sepsis, pulmonary hypoplasia or birth asphyxia.

From birth till the adolescent growth spurt, children's physical, intellectual, and emotional capabilities expand tremendously. Children progress from barely tottering to running, jumping, and playing organized sports. Continuous monitoring is required at each stage using established milestones to keep a check on overall development of the child. Apart from regular surveillance on child's intellectual, physical and emotional development, children in this age group are vulnerable to infectious diseases like malaria, pneumonia, diarrhoea, HIV and tuberculosis. Paediatrician's expertise is required for overall wellbeing of the child.

Adolescence begins with the onset of physiologically normal puberty, and ends when an adult identity and behaviour are accepted. Medical practitioners involved in the care of adolescents must often deal with an arbitrarily set, chronological threshold between adolescence and adulthood, which varies from province to province and even between jurisdictions within a province. However, while adolescence is a recognizable phase of life, its end is not always easily demarcated. This poses problems for practitioners when adolescent patients require care in facilities with restrictive age limits.

4.2 Overview of childhood disease profile in India

Number of reported Diarrhoea cases contributed over 60% of overall disease reported cases

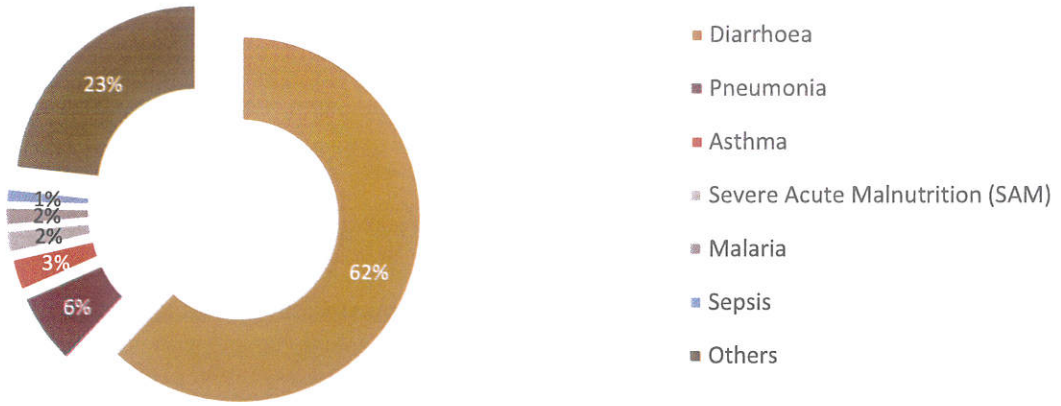
Diarrhoea

Diarrhoea is characterized by abnormally loose or watery stools and according to WHO, it is second leading cause of death in children under five years old. The most severe threat posed by diarrhoea is dehydration. During an episode of diarrhoea, water and electrolytes including sodium, chloride, potassium and bicarbonate are lost through liquid stools, vomit, sweat, urine and breathing.

A person with diarrhoea becomes dehydrated when these losses are not replaced. In addition, diarrhoea is a major cause of malnutrition, making the person more susceptible to future bouts of diarrhoea and to other diseases.

Diarrhoea is usually caused by a virus, or sometimes, contaminated food. Less frequently, it can be a sign of another disorder, such as inflammatory bowel disease or irritable bowel syndrome.

Overview of childhood disease profile in India*



**Share is average of cases reported for children in age bracket 0-5 years between FY18-21*

Source: Health Management Information System (HMIS), CRISIL Research

Pneumonia

Pneumonia is a form of acute respiratory infection that affects the lungs. The lungs are made up of small sacs called alveoli, which fill with air when a healthy person breathes. When an individual has pneumonia, the alveoli are filled with pus and fluid, which makes breathing painful and limits oxygen intake.

Pneumonia can be spread in a number of ways. The viruses and bacteria that are commonly found in a child's nose or throat, can infect the lungs if they are inhaled. They may also spread via air-borne droplets from a cough or sneeze. In addition, pneumonia may spread through blood, especially during and shortly after birth.

Pneumonia can range in seriousness from mild to life-threatening. It is most serious for infants and young children, people older than age 65, and people with health problems or weakened immune systems.

Asthma

Asthma is a major non-communicable disease (NCD), affecting both children and adults. It is a condition in which airways narrow and swell and may produce extra mucus. This can make breathing difficult and trigger coughing, a whistling sound (wheezing) when the person breathes out.

For some people, asthma is a minor nuisance. For others, it can be a major problem that interferes with daily activities and may lead to a life-threatening asthma attack. Inhaled medication can control asthma symptoms and allow people with asthma to lead a normal, active life.

Sepsis

Sepsis is a potentially life-threatening condition that occurs when the body's response to an infection damages its own tissues. When the infection-fighting processes turn on the body, they cause organs to function poorly and abnormally. Sepsis may progress to septic shock. This is a dramatic drop in blood pressure that can lead to severe organ problems and death. Early treatment with antibiotics and intravenous fluids improves chances for survival.

Sepsis is frequently a final common pathway to death from many infectious diseases worldwide. In the community setting, sepsis often presents as the clinical deterioration of common and preventable infections. Sepsis also

frequently results from infections acquired in health care settings, which are one of the most frequent adverse events during care delivery and affect hundreds of millions of patients worldwide every year.

Tuberculosis (TB)

Tuberculosis is caused by bacteria (Mycobacterium tuberculosis) that most often affect the lungs. Tuberculosis is curable and preventable. Tuberculosis is spread from person to person through the air. When people with lung TB cough, sneeze or spit, they propel the TB germs into the air. A person needs to inhale only a few of these germs to become infected.

People infected with TB bacteria have a 5–10% lifetime risk of falling ill with TB. Those with compromised immune systems, such as people living with HIV, malnutrition or diabetes, or people who use tobacco, have a higher risk of falling ill. When a person develops active TB disease, the symptoms (such as cough, fever, night sweats, or weight loss) may be mild for many months. This can lead to delays in seeking care, and results in transmission of the bacteria to others.

Measles

Measles is a childhood infection caused by a morbillivirus, which is mostly seen in the winter and spring. It's spread from one child to another through direct contact with discharge from the nose and throat. Sometimes, it is spread through airborne droplets (from a cough or sneeze) from an infected child. Once quite common, measles can now almost always be prevented with a vaccine. Also called Rubeola, measles can be serious and even fatal for small children.

Measles symptoms don't appear until 10 to 14 days after exposure. They include cough, runny nose, inflamed eyes, sore throat, fever and a red, blotchy skin rash.

Malaria

Malaria is a disease caused by a parasite. The parasite is spread to humans through the bites of infected mosquitoes. People who have malaria usually feel very sick with a high fever and shaking chills. While the disease is uncommon in temperate climates, malaria is still common in tropical and subtropical countries.

The first symptoms – fever, headache and chills – usually appear 10–15 days after the infective mosquito bite and may be mild and difficult to recognize as malaria. Left untreated, malaria can progress to severe illness and prove to be fatal in some cases.

Severe Acute Malnutrition (SAM)

Severe acute malnutrition is defined by a very low weight for height (below -3z scores of the median WHO growth standards), by visible severe wasting, or by the presence of nutritional oedema.

Severe Acute Malnutrition is both a medical and social disorder. Lack of exclusive breast feeding, late introduction of complementary feeds, feeding diluted feeds containing less amount of nutrients, repeated enteric and respiratory tract infections, ignorance, and poverty are some of the factors responsible for Severe Acute Malnutrition.

SAM significantly increases the risk of death in children under five years of age. It can be a direct or indirect cause of child death by increasing the case fatality rate in children suffering from such common illnesses as diarrhoea, acute respiratory infections, malaria and measles. Severe acute malnutrition is a life threatening condition requiring urgent treatment.

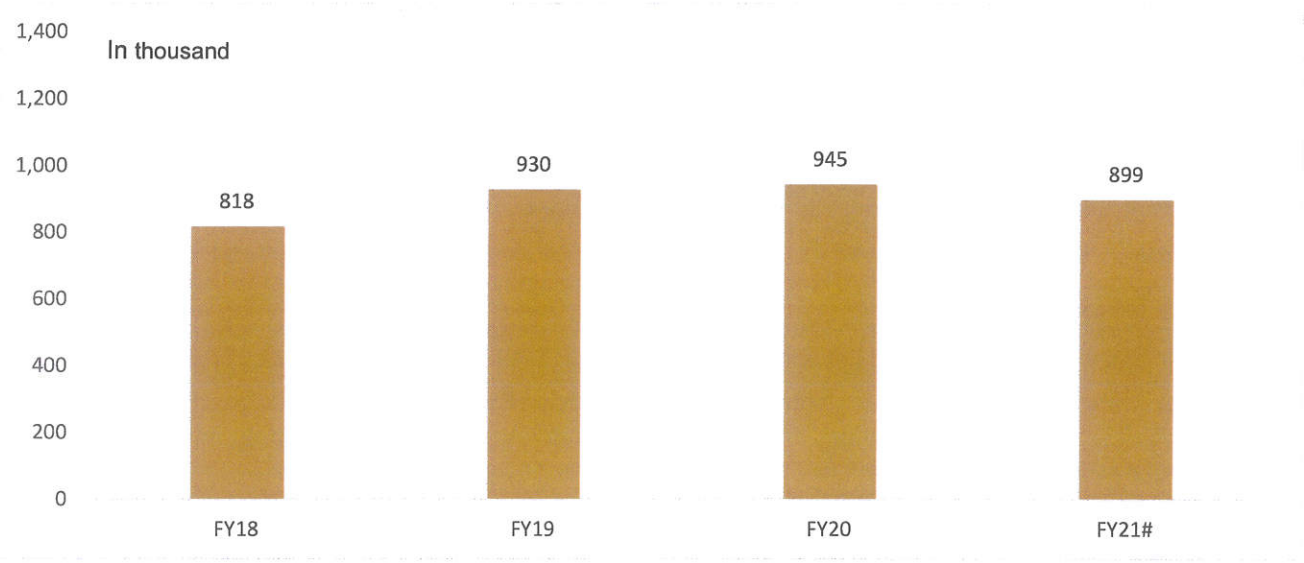
Pre-term birth lead to many complexities in child development

A birth that occurs before the 37th week of pregnancy is defined as pre-term birth. Preterm birth occurs for a variety of reasons. Most preterm births happen spontaneously, but some are due to early induction of labour or caesarean birth, whether for medical or non-medical reasons.

Common causes of preterm birth include multiple pregnancies, infections and chronic conditions such as diabetes and high blood pressure; however, often no cause is identified. There could also be a genetic influence.

Complications associated with a premature birth include immature lungs, difficulty regulating body temperature, poor feeding and slow weight gain. Premature babies may need longer or more intense nursery care, medication and sometimes surgery. Pre-term birth cases observed in India, aaccording to WHO, are the highest globally.

Number of pre term new-borns* (< 37 weeks of pregnancy)



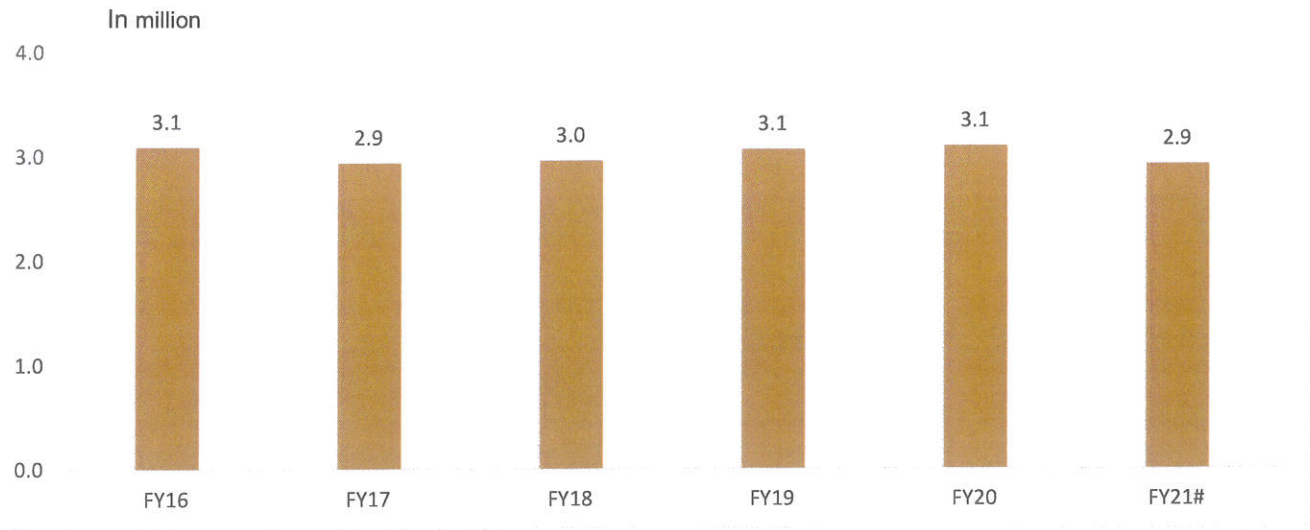
**Calculated using estimated live birth through HMIS*

#Provisional data

Source: HMIS, CRISIL Research

Prematurity is the most common reason for a baby weighing less than 2.5kg at birth. The earlier the baby is born, the smaller they are likely to be. This is because the baby will have had less time in the womb to grow. A baby gains much of its weight in the last weeks of the pregnancy. Weighing less than 2.5 kilos at birth is closely linked to high rates of neonatal mortality and ill health later in life.

Number of new-born having weight less than 2.5kg*



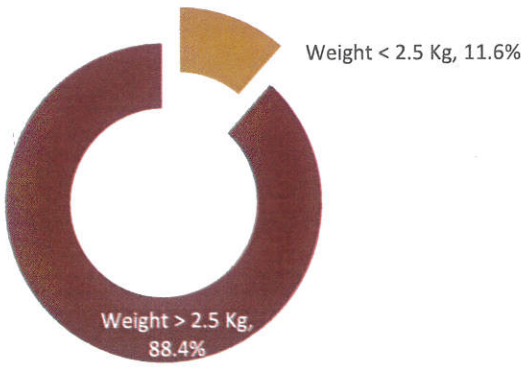
**Calculated using estimated live birth through HMIS*

#Provisional data

Source: HMIS, CRISIL Research

Underweight new-borns who survive also have a greater risk of stunting. Stunting is the impaired growth and development that children experience from poor nutrition, repeated infection, and inadequate psychosocial stimulation. Children are defined as stunted if their height-for-age is more than two standard deviations below the WHO Child Growth Standards median.

Share of new-borns having weight less than 2.5 kg



Note: Share of weight < 2.5 kg is average of cases reported between FY16 and FY21

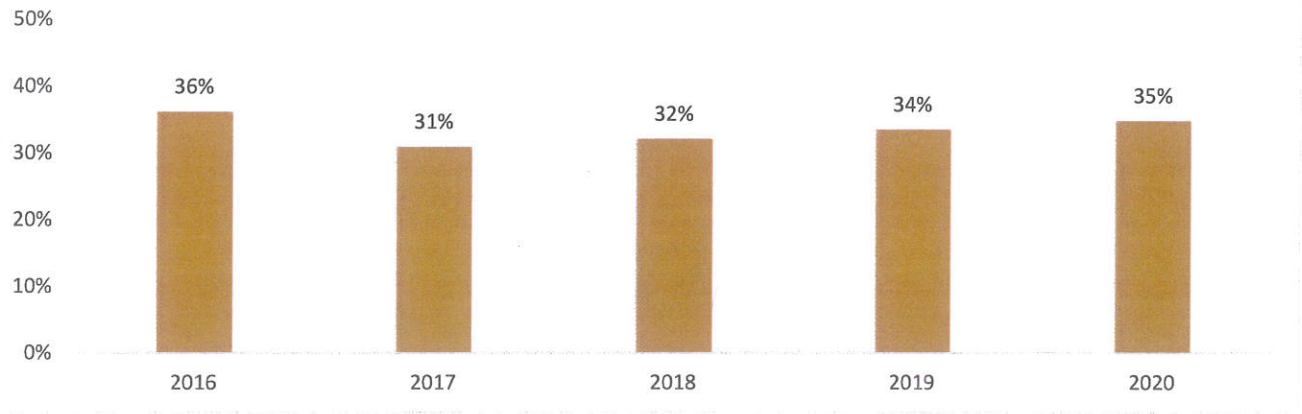
Source: HMIS, CRISIL Research

Stunting in early life, particularly in the first 1000 days from conception until the age of two, impaired growth has adverse functional consequences on the child. Some of those consequences include poor cognition and

educational performance, low adult wages, lost productivity and, when accompanied by excessive weight gain later in childhood, an increased risk of nutrition-related chronic diseases in adult life.

Linear growth in early childhood is a strong marker of healthy growth given its association with morbidity and mortality risk, non-communicable diseases in later life, and learning capacity and productivity. It is also closely linked with child development in several domains including cognitive, language and sensory-motor capacities.

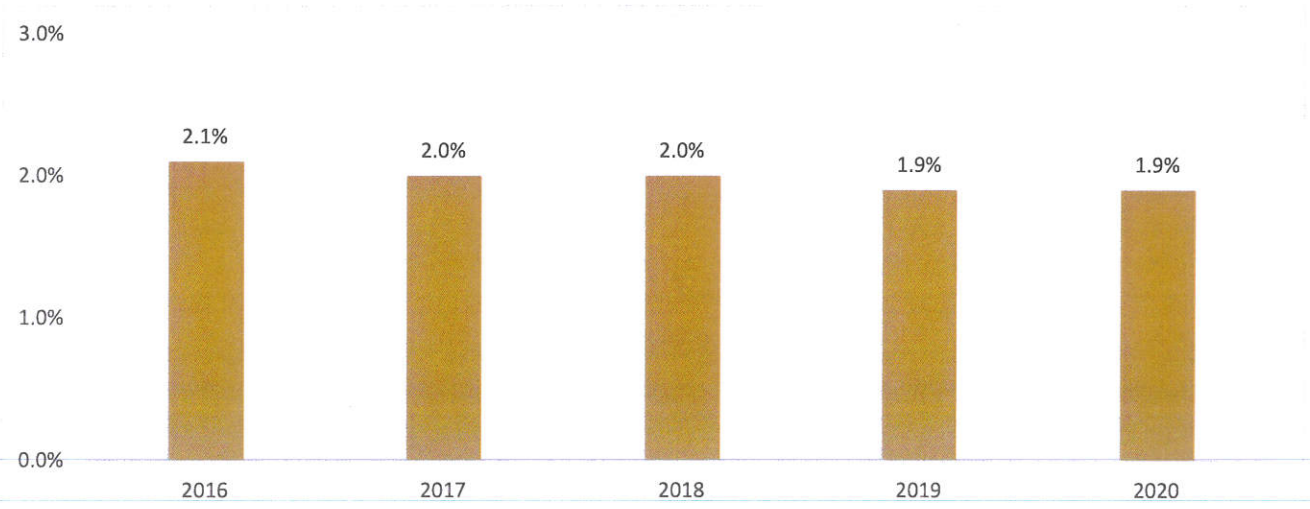
Stunting prevalence among children under 5 years of age (%)



Source: World Health Organization (WHO)

Childhood growth is an important factor that influences health outcomes across the life course, including obesity. Emerging evidence indicates that a large proportion of children who have obesity before puberty can develop obesity in early adulthood, with early-life fat deposition associated with later risk of adult obesity. Although the relationship between childhood obesity and poor health outcomes is highly complex and there are individual variations influenced by genetic, maturational, and socioeconomic factors, it is a major public health priority.

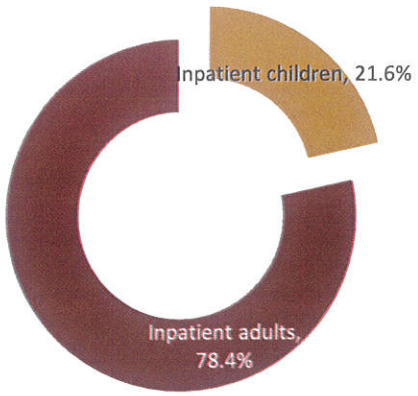
Overweight prevalence among children under 5 years of age (%)



Source: World Health Organization (WHO)

To overcome diseases discussed above and for overall development of the individual, children are admitted to various available public and private facilities. Below is the share of inpatient children admission to the total inpatient cases observed in the country.

Share of inpatient children



Note: Share of inpatient children is average of cases reported between FY16 and FY21

Source: HMIS, CRISIL Research

4.3 Initiatives taken by government to fight against diseases in new-borns

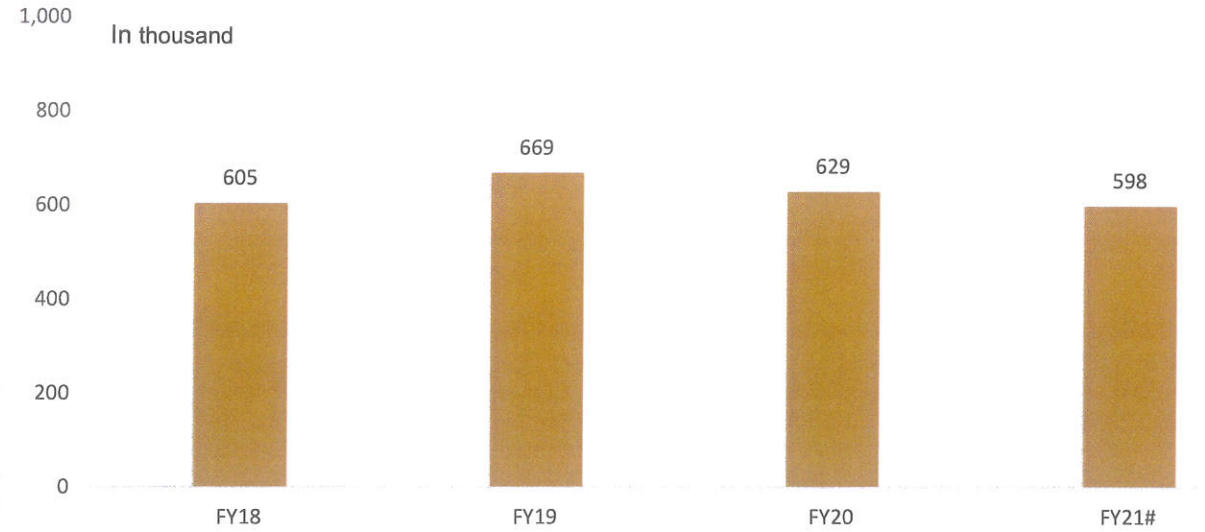
NBSU, SNCU, and NRC are few of the interventions made by GoI to

To improve the status of new-born health in the country, Facility Based New-born Care (FBNC) programme is one of the key initiatives launched by the Government of India under the National Rural Health Mission and RMNCH+A Strategic programme. Under the programme, efforts are being made to provide different level of new-born care at the health facilities. While New-born Care Corners (NBCCs) have been established at all delivery points to provide essential new-born care, New-born Stabilization Units (NBSUs) have being established at all Community Health Centres/First Referral Units for management of selected new-born conditions and to stabilize serious and sick new-borns before referral to higher centres.

Special New-born Care Units (SNCUs) have been established at district hospitals and sub district hospitals with annual delivery load more than 3,000 to provide care for sick new-borns, that is, all type of neonatal care except assisted ventilation and major surgeries. It is a separate unit in close proximity to the labour room with 12 or more beds, and managed by adequately trained doctors, staff nurses and support staff to provide 24x7 services.

Children with Severe Acute Malnutrition (SAM) are admitted and managed in Nutrition Rehabilitation Centre (NRC). NRCs are health facilities essentially set up in district hospital campus and Community Health Centres with NRC ward of bed strength of 20 or 10, a kitchen with proper cooking and feed demonstration space and attached toilets/bathrooms. The objective of NRC is to provide institutional care for children with acute malnutrition and to promote physical, mental & social growth of such children.

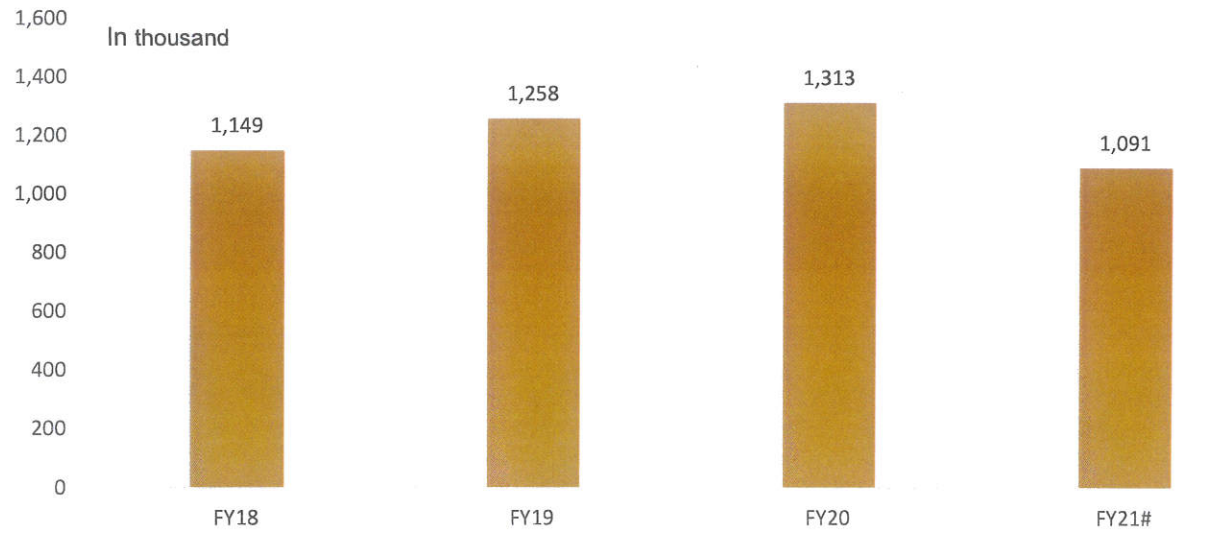
Number of Admission in NBSU (New Born Stabilisation Unit)



#Provisional data

Source: HMIS, CRISIL Research

Number of Admission in SNCU (Special New-born Care Unit)

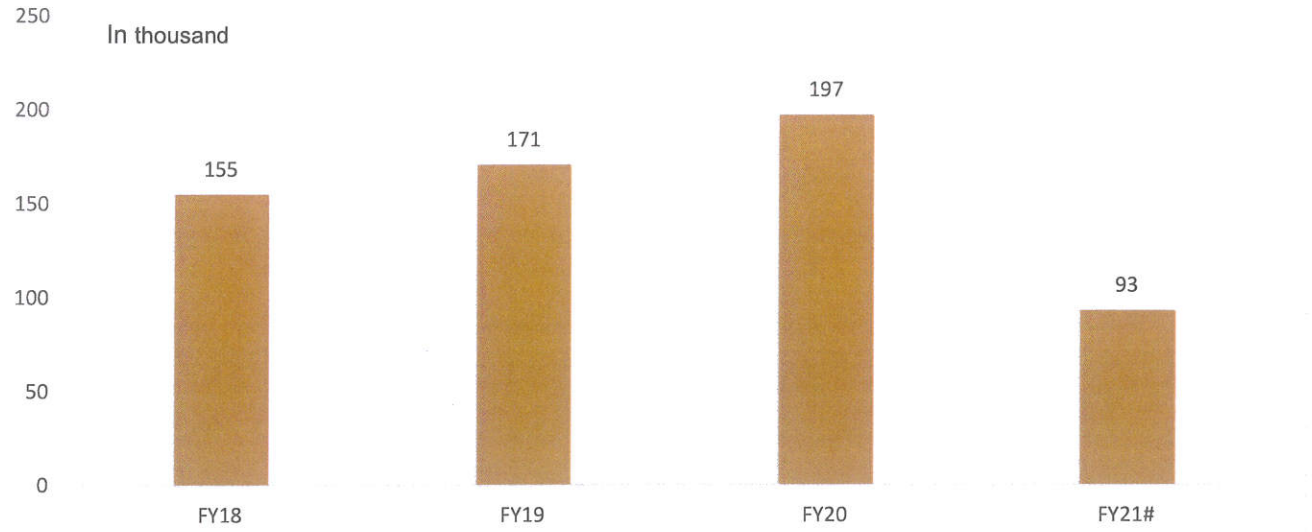


Note: The number of admissions includes both inborn and out-born children

#Provisional data

Source: HMIS, CRISIL Research

Number of children admitted in NRC (Nutrition Rehabilitation Centre)



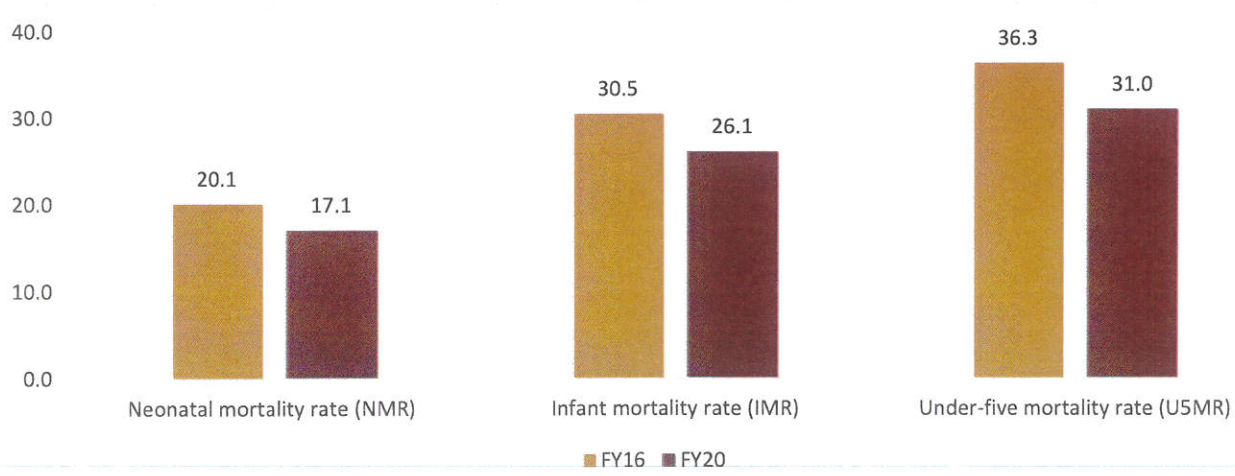
#Provisional data

Source: HMIS, CRISIL Research

Mortality rates showed a descending trend

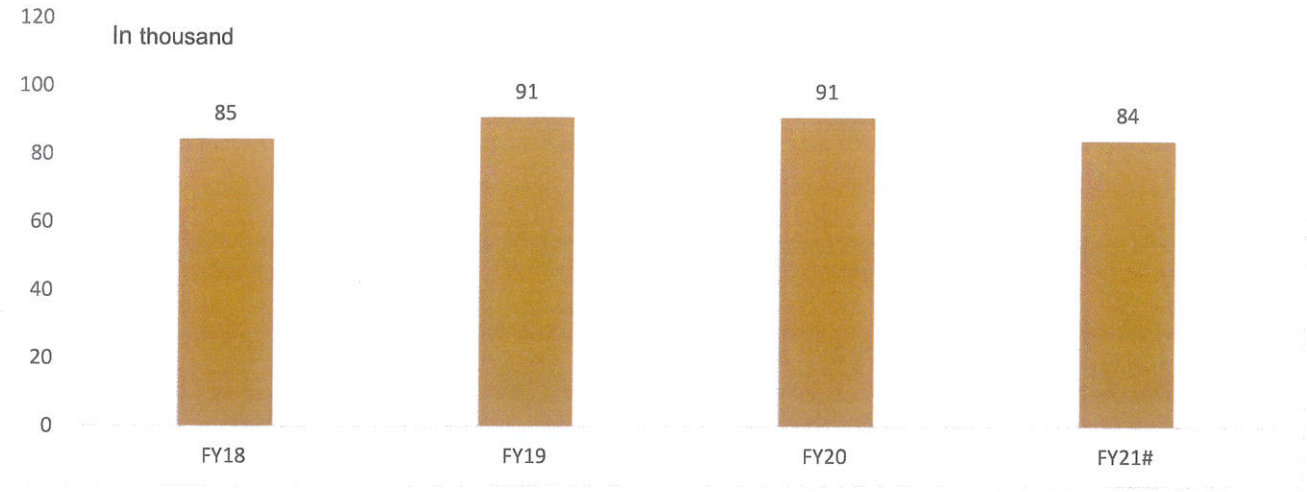
Prematurity is the major cause of death among neonates. According to WHO, around 40% of the neonatal deaths are because of prematurity. Other major causes for neonatal deaths are asphyxia, sepsis, and infections. Among infants and other children under 5 age, acute lower respiratory infections, diarrhoeal diseases, other communicable, perinatal and nutritional conditions are the major causes of deaths.

Mortality rates (per 1000 live births)



Source: National Family Health Survey (NFHS), CRISIL Research

Number of deaths occurring at SNCU (Special New-born Care Unit)



#Provisional data

Source: HMIS, CRISIL Research

4.4 Overview of paediatric market in India

Paediatric care is dedicated medical care for children with serious disease. Paediatric care focuses on growth and development, nutrition, prevention of illnesses and treatment of illnesses in children. Paediatric care is facilitated by a panel of doctors, nurses and other expert caretakers who work together to provide medical care to children below 18 year of age. In our assessment, we have considered paediatric market as the health care delivery to children in the age bracket 0-18 years.

In India, paediatric healthcare services are offered by public hospitals through district level hospitals and other government healthcare facilities, private multispecialty hospitals through established PICU and NICU wards, standalone paediatric chains, children multi-speciality hospitals, standalone children hospitals, and mother & child hospitals.

The specialties offered by established players in Paediatric healthcare market in India are as follows:

Specialities offered by established Paediatric healthcare delivery facilities with perinatal services

Neonatology & Neonatal intensive Care(NICU)	**Hematology /Oncology & Bone marrow transplant**
Pediatric Intensive Care (PICU)	Neurology & Rehabilitation service
Pediatric Emergency	Gastroenterology, Nutrition and Liver disease
General Paediatrics	Pulmonology
Pediatric Surgery & Urology	Nephrology

Infectious Disease	Orthopaedics
Dermatology	Endocrinology
Ophthalmology	Rheumatology
Dentistry	ENT & airway and cochlear
Plastic surgery	Neurosurgery
Obstetrics and Gynecology	Foetal medicine
Anesthesia	Infertility

Source: CRISIL Research

Therapeutic areas catered by Paediatric healthcare delivery facilities

Neonatology & NICU- Prematurity, Birth asphyxia, Respiratory Distress, Surgical Newborn, Sepsis	**Kidney Disorders- Acute Kidney injury, Chronic renal failure, Renal transplant, Hypertension**
Asthma	Vaccines
Hematology- Anemia, Bleeding disorders, BMT	**Pediatric Intensive Care Unit (PICU)**- ARDS, Dengue, COVID, Multi organ failure
Children Cancer- Acute Leukemia, Solid tumours, Neuroblastoma	**Neurology**- Cerebral Palsy, Seizure disorder, Genetic disorder, rehabilitation, Development delay
Gastroenterology- Chronic diarrhea, Inflammatory bowel disease, Acute and chronic liver failure, Liver transplant, Chronic Oral Food Refusal	**Pediatric Surgery**- Neonatal congenital surgery, Urology, Bronchoscopy, Minimally invasive surgery. Thoracoscopy
Endocrinology- Diabetes, Growth disorder, Ambiguous genitalia, Obesity,	Metabolic Syndrome
Pulmonology-Asthma, Cystic fibrosis, Chronic Cough	**Ortho**- CTEV, Development dysplasia of Hip, Fracture, Spine deformity, Gait
Neurosurgery- Hydrocephalus, head injury,	Plastic surgery- Cleft lip palate, Burns,
ENT- Airway disorder, Cochlear implant	Cardiac- Congenital heart disease, Cardiac failure, Kawasaki disease

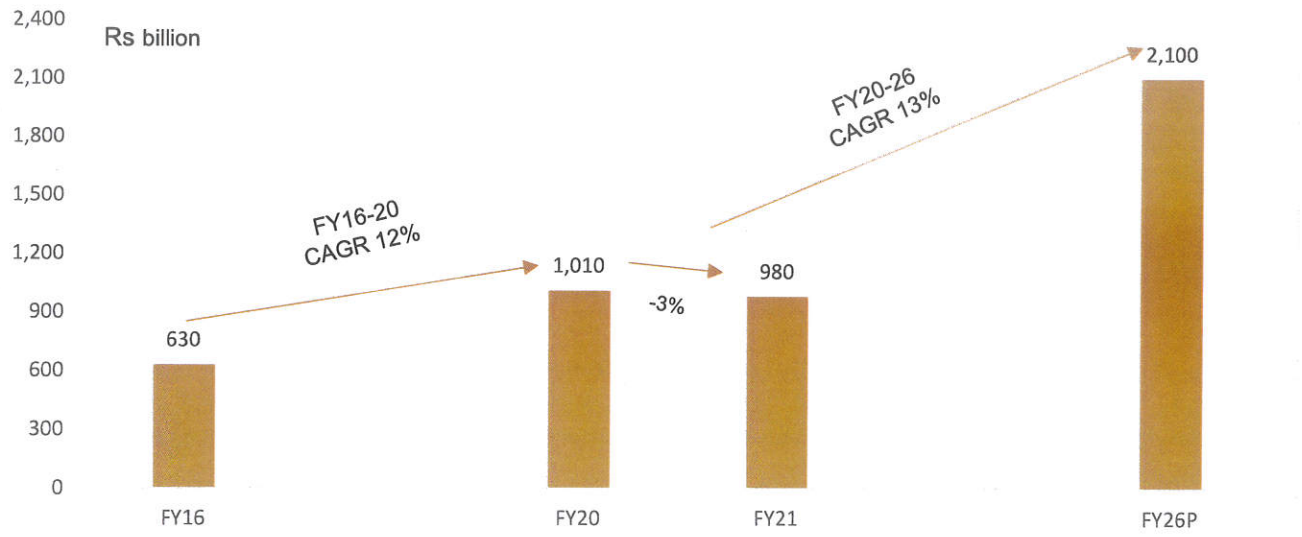
Source: CRISIL Research

Paediatric market size expected to grow by CAGR ~13% between fiscal 2020 and 2026

To arrive at the paediatric health care market size we have assumed patients in the age bracket of 0-18 years. In-patient cases at public and private hospitals, and out-patient cases at public and private hospitals and cases at private clinics have been considered to arrive at the market size.

The paediatric market grew by CAGR of 12% from fiscal 2016 till fiscal 2020. Efforts by government for spreading coverage of paediatric healthcare services, rising income level, betterment in health insurance coverage, and increasing general awareness on healthcare drove the market growth. Covid-19 put a halt to growth in paediatric market as many children avoided visiting the paediatric healthcare facilities. Over the next five fiscals, the paediatric market is expected to expand against the strong growth factors. CRISIL Research expects paediatric healthcare market to grow by CAGR 13% between fiscal 2020 and 2026.

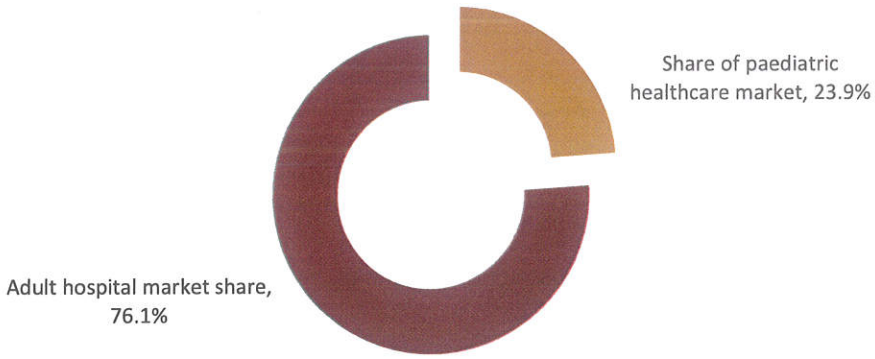
Market size of paediatric healthcare facilities in India



P: Projected

Source: CRISIL Research

Share of paediatric healthcare market in hospital market in India



Note: Share of paediatric healthcare market is average of share between FY16 and FY21

Source: CRISIL Research

4.5 Overview of neo-natal care market in India

A neonatal intensive care unit (NICU), also known as an intensive care nursery (ICN), is an intensive care unit (ICU) specializing in the care of ill or premature new-born infants. Neonatal refers to the first 28 days of life. NICU is typically directed by one or more neonatologists and staffed by resident physicians, nurses, nurse practitioners, pharmacists, physician assistants, respiratory therapists, and dietitians. Many other ancillary disciplines and specialists are available at larger units.

Several attempts to strengthen new-born care in India have been made. Under the National Rural Health Mission, new-born care has become central to the child survival strategy both in community and facility level interventions. Hospital-based neonatal units are being strengthened in India to provide specialized treatment services, which are classified into different levels.

India follows 4-level NICU system based on weight and gestational age of neonate:

Level I care

Neonates weighing more than 1,800 grams or having gestational maturity of 34 weeks or more are categorized under level I care. The care consists of basic care at birth, provision of warmth, maintaining asepsis and promotion of breastfeeding. This type of care can be given at home, sub-centre and primary health centre. Admissions in NBSUs would fall under level I care.

Level II care

Neonates weighing 1,200-1,800 grams or having gestational maturity of 30–34 weeks are categorized under level II care and are looked after by trained nurses and paediatricians. The equipment and facilities used for this level of care include equipment for resuscitation, maintenance of thermoneutral environment, intravenous infusion, gavage feeding, phototherapy and exchange blood transfusion. This type of care can be given at first referral units, district hospitals, teaching institutions and nursing homes. Admissions in SNCUs at district public and private hospitals would fall under level II care.

Level III care

Neonates weighing less than 1,200 grams or having gestational maturity of less than 30 weeks are categorized under level III care. The care is provided at apex institutions and regional perinatal centres equipped with

centralized oxygen and suction facilities, servo-controlled incubators, vital signs monitors, transcutaneous monitors, ventilators, infusion pumps etc. This type of care is provided by skilled nurses and neonatologists.

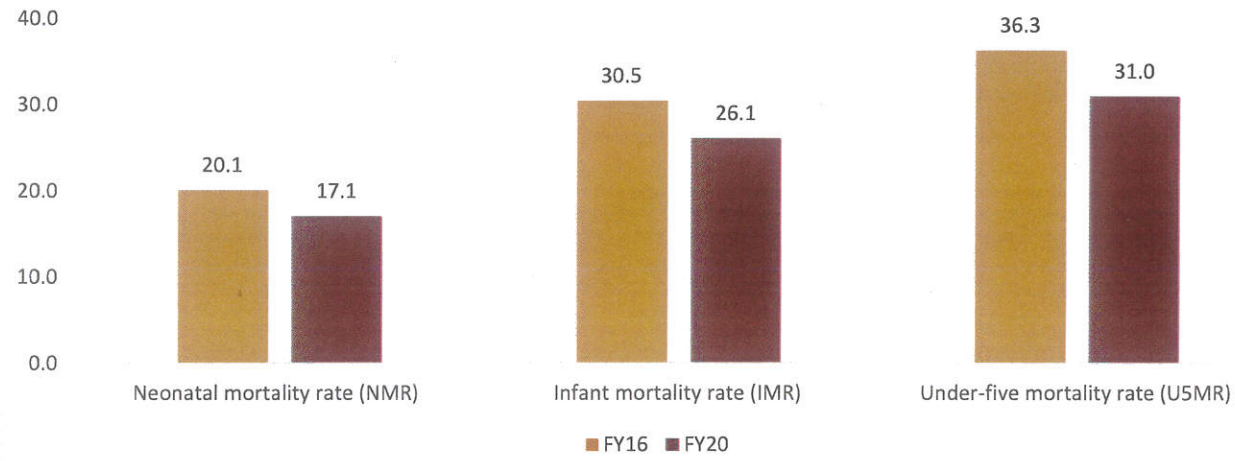
Level IV care

This is the highest standard of neonatal care, consisting of pediatric specialists, along with all the expert care providers and the specialised services of a Level III NICU. It also offers facilities like extra corporeal membrane oxygenation and transport services from hospital to home. Usually, a level IV NICU is a part of a large hospital with expertise in surgical repair of serious congenital or acquired conditions.

India still the biggest contributor in neonatal deaths globally

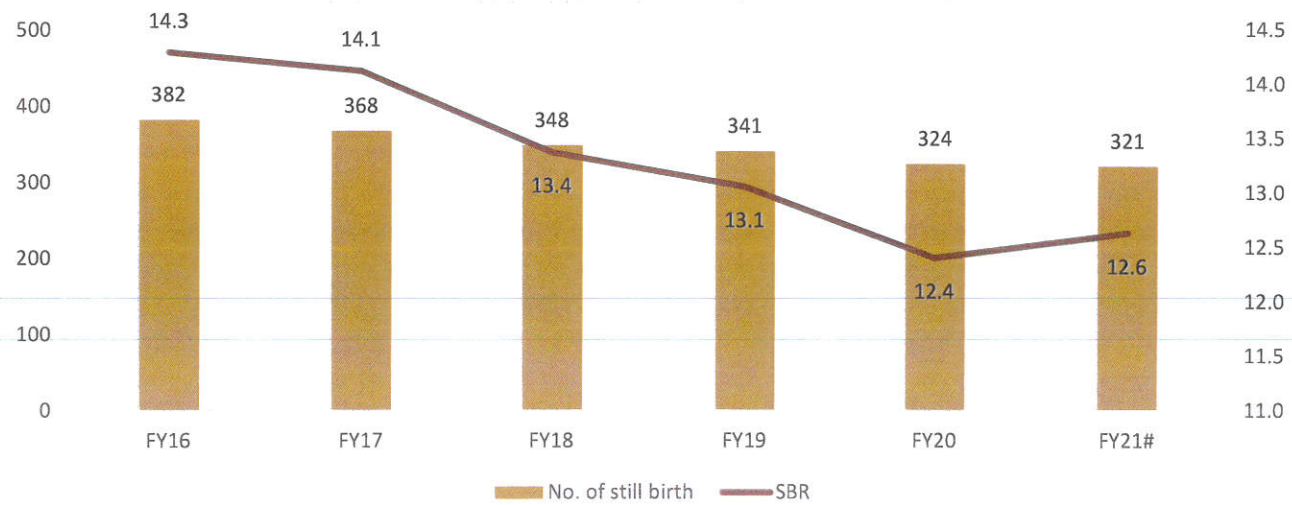
According to UNICEF, the share of India in the global neonatal deaths is over ~20%. To control the NMR and IMR, Indian government launched India New-born Action Plan (INAP) in fiscal 2015 with the objective of work towards attainment of the goals of "Single Digit NMR by 2030" and "Single Digit SBR (Still Birth Rate per 1000) by 2030."

Mortality rates (per 1000 live births)



Source: National Family Health Survey (NFHS), CRISIL Research

Number of still birth* (in '000) and SBR (per 1000 live births)



*Calculated using estimated live birth through HMIS; #Provisional data

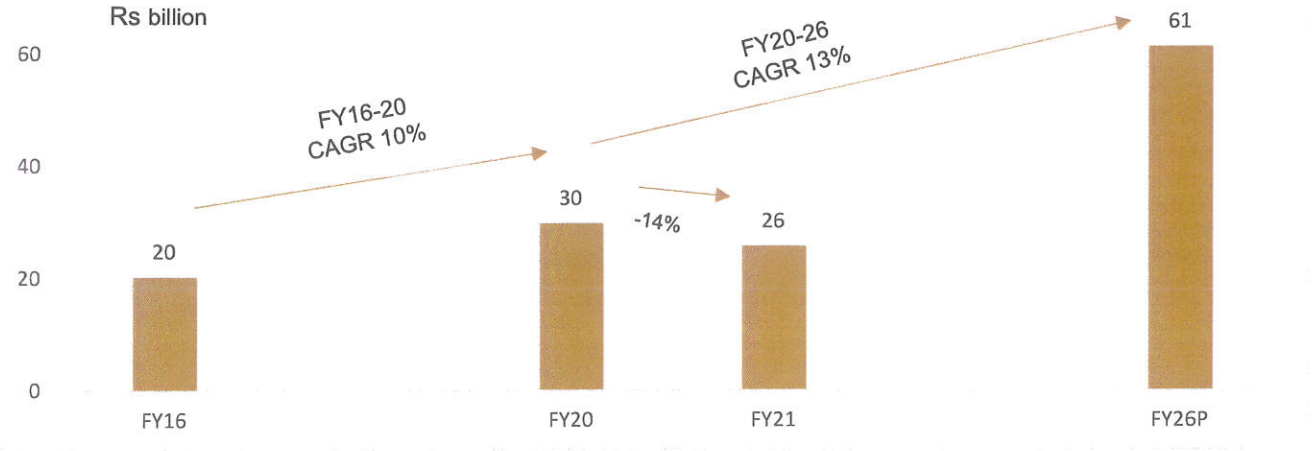
Source: HMIS, CRISIL Research

NICU market expected to pose growth of CAGR 13% between fiscal 2020 and 2026

To arrive at NICU market size we have taken into consideration number of NBSU & level I admissions, number of SNCU at public & private facilities & level II admissions, and level III admissions at public & private facilities.

NICU market showed a similar trend as observed for paediatric healthcare market size except for the decline in fiscal 2021 due to Covid-19. The lower number of admissions in level II and level III NICUs led to the downfall of 13.7% in the NICU market. Continuous efforts by the government and emergence of private players in the tertiary care expected to drive the growth of the NICU market. CRISIL Research expects CAGR 13% NICU market growth between fiscal 2020 and 2026.

Market size of neonatal care (NICU) market in India



P: Projected

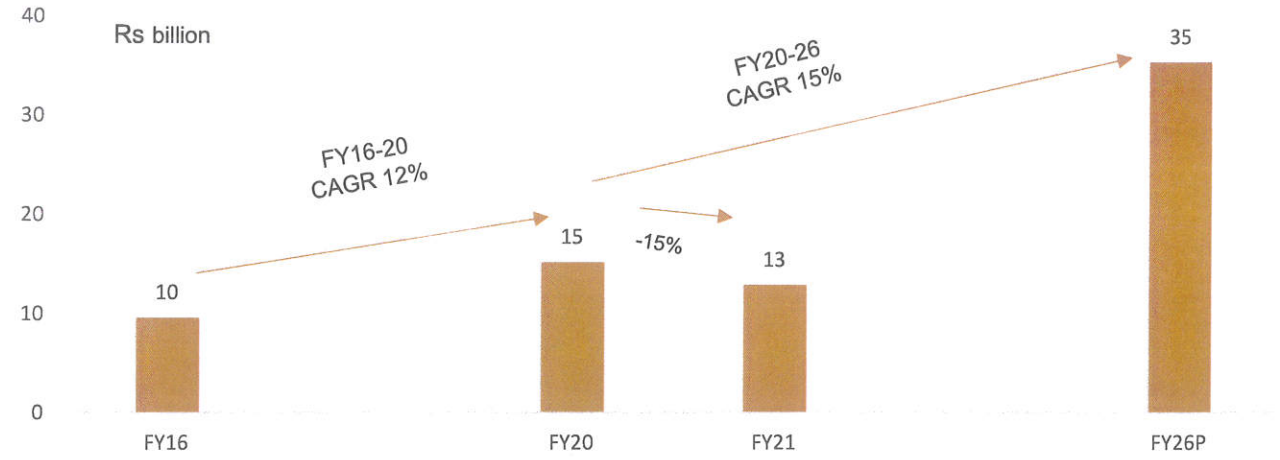
Source: CRISIL Research

CRISIL Research estimates that the number of NICU beds available in key cities – Bangalore, Mumbai, Delhi – NCR, Chennai, and Hyderabad would range from 3,500-4,500 inclusive of private and public facilities. With increasing disease complexity, it becomes difficult to treat the child with primary and sometimes secondary care, in such cases the patient is immediately referred to tertiary care. Key cities mentioned above account for a large share of overall NICU beds in the country.

NICU private market expected to show relatively stronger growth

Private NICU market size is around half of the total NICU market size in fiscal 2021. The share of private NICU market is expected to increase in the upcoming fiscals as the segment is anticipated to show a higher growth. Technical advancements to cater to niche areas and emergence of new private players in the NICU market expected to boost the growth. CRISIL Research projects CAGR 15% between fiscal 2020 and 2026 in private NICU market.

Market size of private neonatal care (NICU) market in India



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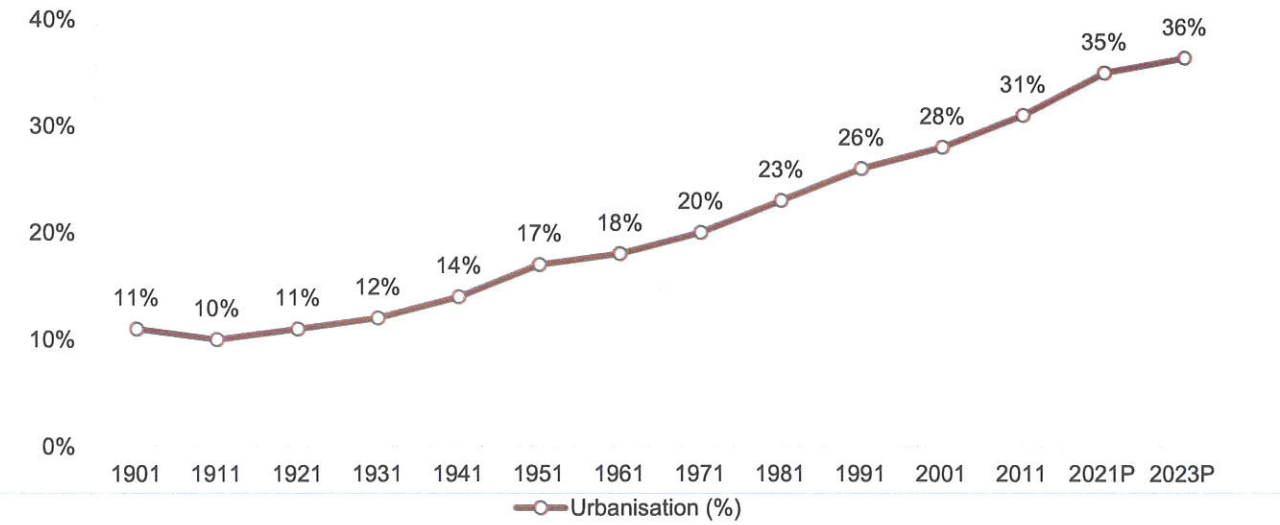
Source: CRISIL Research

4.6 Factors leading to rise in demand for paediatric healthcare services and neo-natal care units

Increasing health awareness to boost hospitalisation rate

The majority of healthcare enterprises in India is 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.

Urban population in India as a percentage of total population



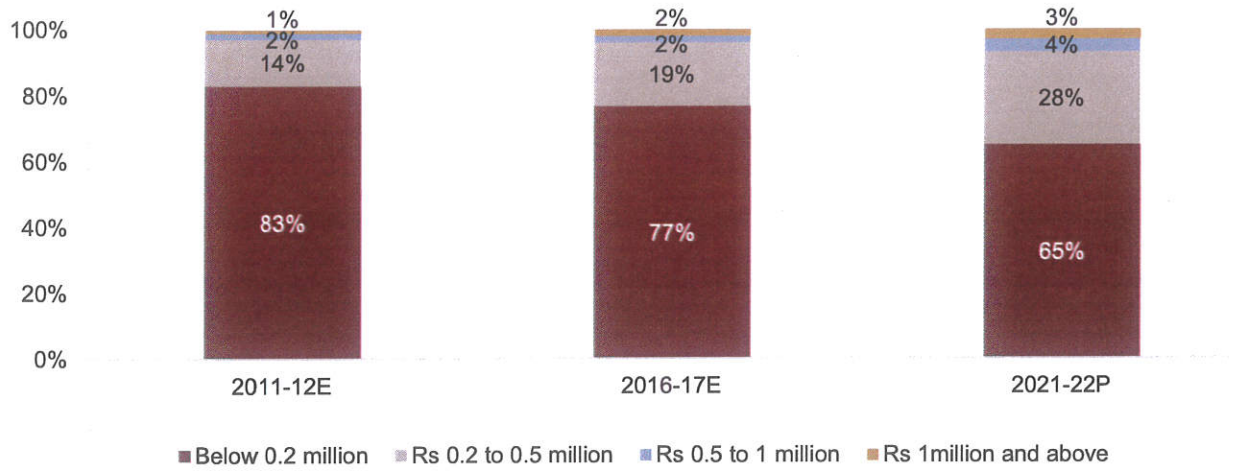
Source: UN World Urbanisation Prospects: The 2018 revisions

Rising income to make quality paediatric healthcare more affordable

Even though paediatric healthcare is considered a non-discretionary expense, considering that an estimated 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 income and, consequently, disposable income 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

Income demographics

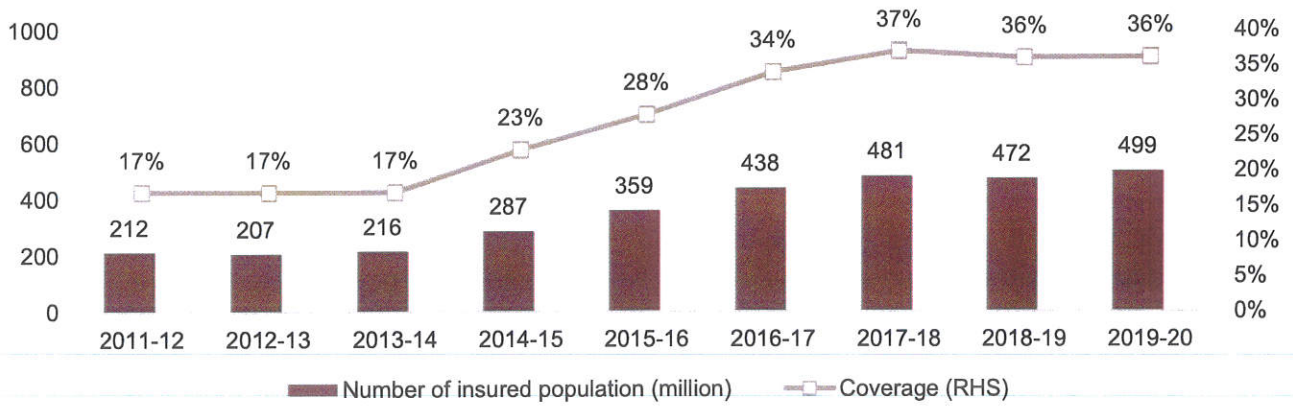


Source: CRISIL Research

Growing health insurance penetration to propel demand for the healthcare market, including paediatrics and neonatal care

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 remains an issue. 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%. CRISIL Research believes that while low penetration is a key concern, it also presents a huge opportunity for the growth of healthcare industry in India. With the PMJAY, the country's insurance coverage is expected to increase substantially over the next five fiscals. Furthermore, with health insurance coverage in India set to increase, hospitalisation rates are likely to go up.

Health insurance coverage in India in numbers (million) and penetration

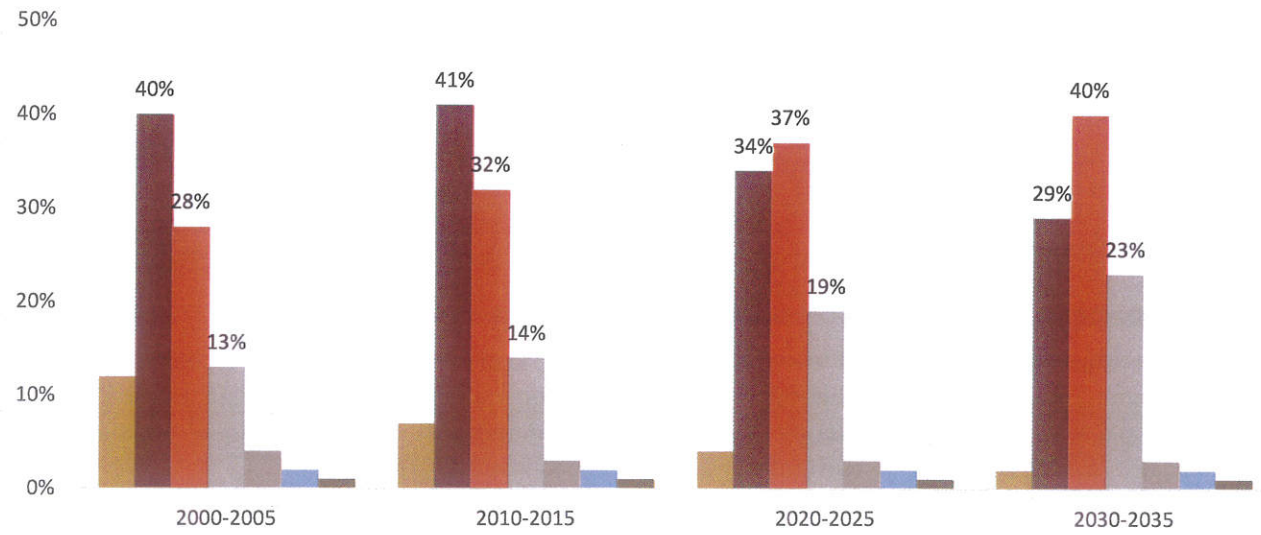


Source: IRDA Annual Report

Rise in maternity age

25-29 age group women contributed to 32% of the births in 2010-2015 period up from 28% in 2000-2005 period. The average age of women delivering a baby is increasing. The age group 25-29years and 30-34years is expected to contributed to higher share in live births going forward, contributing to 37% and 19% of the live births respectively in 2020-2025 period and 40% and 23% of the live births respectively in 2025-2030. With the increase in pregnancy age the demand for neonatal care is expected to increase an upsurge as number of complications arising from pregnancies may witness a rise.

Age-group wise pregnancy

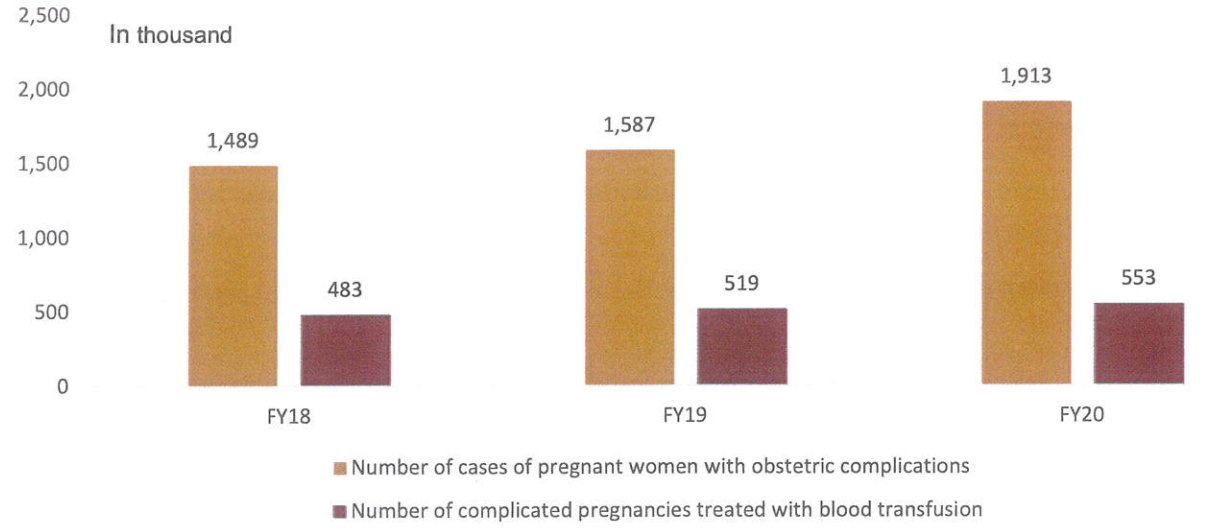


Source: United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019, custom data acquired via website, CRISIL Research

Rise in pregnancy complication

Complications of pregnancy are health problems that occur during pregnancy. They can involve the mother's health, the baby's health, or both. Some women have health problems that arise during pregnancy, and other women have health problems before they become pregnant that could lead to complications. The number of such cases saw an uptrend between fiscals 2018 and 2020. With further increase in cases with complications during pregnancy, demand for paediatric and neonatal care service can see an escalation.

Cases with complications during pregnancy



Source: HMIS, CRISIL Research

Rise in awareness and penetration of healthcare service in India

Currently, the Indian healthcare market is less penetrated compared to the developed nations. Government is continuously talking measures to deliver healthcare services to the masses. Launch of Ayushman Bharat Yojana, also known as the Pradhan Mantri Jan Arogya Yojana (PMJAY), was one such intervention through which the government aims to help economically vulnerable Indians who need healthcare facilities.

With the launch of PMJAY and 500 million beneficiaries, there will be requirement of ~0.64 million additional beds over the next 10 years. In FY20, the country had 14,379 hospitals with 6.34 lakhs beds. The requirement would mainly arise from tiers 2 and 3 cities. Private players have started tapping to these regions with adjusted business models. 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.

With favourable socio- economic demographics for the healthcare market, the rising internet penetration in the country is also expected to increase awareness about the healthcare services being offered in the vicinity.

5 Assessment of Obstetrics / Maternity care industry in India

Super-specialty obstetrics healthcare services are becoming more prevalent

Obstetrics is a medical specialty dealing with the fields of birth and related issues. Obstetrics involves care provided during pre-conception, pregnancy, childbirth, and immediately after delivery. Whereas Gynecology involves care of all other women's health issues.

An obstetrician is a physician who specializes in the surgical care of women and their children during pregnancy, childbirth, postpartum and post-natal care. They also perform regular ultrasounds during pregnancy to determine the health of the foetus, identify any complications and know the gestational period of the foetus. Identify if there are any high-risk factors in women during pregnancy, delivery and later.

Antenatal care is the routine health control of presumed healthy pregnant women without symptoms (screening), in order to diagnose diseases or complicating obstetric conditions without symptoms, and to provide information about lifestyle, pregnancy and delivery.

Antenatal care is a form of preventive health care which promotes monitoring of the mother and child throughout the pregnancy to minimize delivery risk by identifying risks such as hypertension, gestational diabetes etc providing care at the right time. Focus on antenatal care has proven to increase the chance of outcomes for a safe delivery and also reduces morbidity and mortality rates of the both the mother and the child. Antenatal care also provides the mother an opportunity to receive counselling on healthy behaviours, emotional and psychological support from a skilled health practitioner. Antenatal care access in India varies with socio-economic status and geographic location. Various centre and state government programmes and initiatives are designed to promote mother get regular antenatal check-ups.

Urban Tier I and II cities are seeing rise in number of super-specialty obstetrics and child care offerings in country

Cities	Maternity and childcare hospitals	Maternity and childcare chains	Multi-specialty hospitals with maternity offerings
Mumbai and Navi Mumbai	Nowrosjee Wadia Maternity Hospital, Currae Gynaec IVF Birthing Hospital	Cloudnine, Motherhood hospitals	Fortis Hospital, Sevenhills, Lilavati Hospital, Tata Memorial Hospital, Breach Candy, Kokilaben Dhirubai Ambani hospital, L Raheja Hospital, Hinduja Healthcare, Jaslok Hospital,
Bangalore	Dr Rao's maternity clinic, Offspring Maternity & Childcare	Cloudnine, Motherhood hospitals, Rainbow Children's Hospital, Ovum hospitals, Kangaroo care	Fortis Hospital (The Nest), Apollo (Cradle) , Manipal Hospital, Mallya Hospitals, Aster- Women and Children
Chennai	Kanchi Kamakoti child's trust hospital, Metha children's hospital, Neolife hospital	Cloudnine, Rainbow children's hospital, Motherhood	Apollo (Cradle), Soorya hospital, Fortis hospitals, Billroth hospitals, St.Thomas hospital, Prashanth

			Hospital, Gleaneagles Global health city hospital
Delhi and NCR	Mother's Nest at Moolchand, SCI Hospital, Rose walk luxury hospital for women	Cloudnine, Motherhood hospitals, Rainbow children's hospital, Mother's Nest - Moolchand Hospital	Fortis (La Femme), Artemis Women & Child Center, Columbia Asia, Adiva Super-specialty, Apollo hospitals, BLK Super Specialty Hospital, AIIMS, Indraprastha, Medantha Hospital, Max Healthcare, Columbia Asia, Sri Ganga Ram Hospital
Hyderabad	Ankura hospitals, Fernandez hospitals, HOPE children's hospital, Safe children's hospital, Sai Shiva children's hospital, Shine children's hospital, Krishna women and children's hospital, Suraksha women and child care	Rainbow children's hospital, Motherhood hospital, Lotus hospitals	Apollo hospitals, KIMS hospitals, Sunshine hospitals, Yashoda hospitals, Ozone hospitals, Virinchi hospitals, Vijay Mariee Hospital, Medicover hospitals
Pune	Gupte Hospitals,	Cloudnine, Motherhood hospitals	ONP Hospitals, Columbia Asia Hospital, Sahyadri Hospital, Ruby Hall Clinic, Deenanath Mangeshkar Hospitalsand Research Center, Aditya Birla Memorial Hospital
Indore	Verma Nursing Home, Pranshu surgical & maternity center, Angel women's hospital	Cloudnine, Motherhood hospitals	Chothiram Hospital & Research Center, Arihant Hospital & Research Center, Jyoti Multi Speciality Hospital
Vijayawada	Mother and child family hospital, Vennela mother and child hospital, Blossom's mother and child hospital	Rainbow children's hospital	Manipal hospitals, Latha super specialities hospital, Sentini hospital, Kamineni hospital
Chandigarh	Dr Jagit Singh (Chandigarh Children & Maternity Hospital), Bedi Hospital, Chaitanya Hospital	Motherhood hospitals	Ivy Hospital
Visakhapatnam	Krishna Children's Hospital, Padmavathi Nursing Home	Rainbow children's hospital, Lotus Hospitals	Medicover Hospitals (Woman & Child)

Note: The list of hospitals is not exhaustive
Source: CRISIL Research

New-age offering for obstetrics care is gaining prominence in urban areas

Some of the new age offerings for expectant mothers includes personalized diet and nutrition consultancy, yoga classes, professional photography for mother and child to capture initial moments. The new age offering for expected mother revolves not only around ante-natal care and check-ups but also on experiential care and offerings to make the journey of being a mother comfortable, memorable and luxurious.

Overview of obstetrics offering

	Regular Offerings – Urban and Rural Areas – private hospitals	New-age Offerings – Urban areas – Private and specialized maternity chains
PRE-NATAL / ANTE-NATAL		
Check-ups / Examinations	✓	
Supplements Advice	✓	
Immunization (TT & TD	✓	
Personalized diet & nutrition		✓
Antenatal Classes		✓
Yoga Classes		✓
Physiotherapy		✓
Labour and delivery classes		✓
Lamaze		✓
professional photography – capturing moments		✓
POST NATAL		
Breastfeeding & lactation classes		✓
Lactation consultation		✓
Baby foetal brain development classes		✓
Baby childcare sessions		✓
CHILD CARE POST-NATAL		
Intensive care	✓	✓✓
Stem cell banking		✓

Lamaze involves psychological and physical preparation by the mother in order to reduce pain and facilitate delivery without unnecessary medical intervention

There are new maternity chains such as Apollo Cradle, Cloud nine, Motherhood, Ovum, Rainbow, Fortis La Femme, Cocoon – Jaipur, etc. are specialized maternity care hospitals catering to mother and childcare. These hospitals are largely located in Tier I and Tier II cities, where the demographics includes working women, higher per capita income, propensity to spend on add-on care and comfortable healthcare facilities. The target audience of such hospitals are not just mothers who have complication and needs attention and care during pregnancy but healthy aspirational to-be-parents who wants better facilities and treatments and want to experience a journey for becoming parents

Preference for specialty private maternity hospitals have increased

Increasingly working women are preferring standalone maternity hospitals and antenatal care services rather than traditional nursing homes for obstetrics healthcare services. The number of institutional deliveries in private hospitals have also increased from 29% in fiscal 2016 to 32% in fiscal 2020 as per HMIS database. Institutional births in urban areas prefer private hospitals more as compared to institutional births in rural areas. In 2020, among institutional childbirths, in rural areas, about 69% cases were in government hospitals and about 21% in private

hospitals and, in urban areas, about 48% cases were in government hospitals and 52% were in private hospitals, thus urban areas have higher preference for private hospitals.

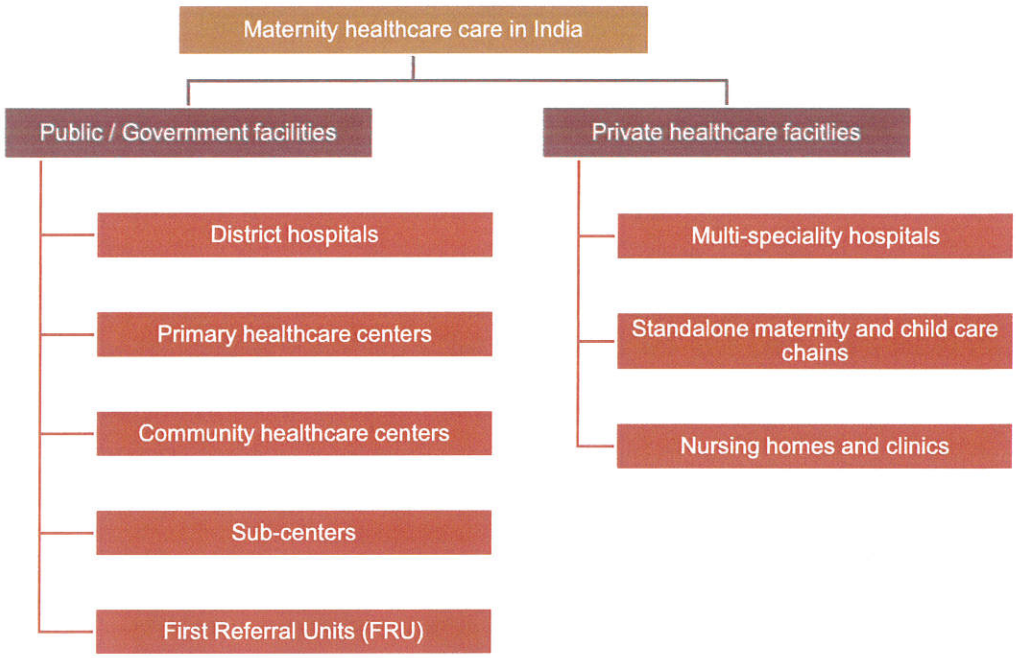
India is also witnessing rise in antenatal care awareness with government awareness programs and supportive healthcare policies. Share of pregnant women received 4 ANC checkups have gone up from 51.2% in fiscal 2016 to 79.4% in fiscal 2020

Mothers who had at least 4 antenatal care visits (%)

Pan-India	FY16	FY18	FY19	FY20
% Pregnant Woman received 4 ANC check ups	51.2%	63.5%	73.3%	79.4%

Source: CRISIL Research

Type of healthcare units in India offerings obstetrics and antenatal care



Source: CRISIL Research

The population Norms for setting up of public health facilities are as under:

- Sub Centre: 1 per 5,000 population in general areas and 1 per 3,000 population in difficult/tribal and hilly areas
- Primary Health Centre: 1 per 30,000 population in general areas and 1 per 20,000 population in difficult/tribal and hilly areas
- Community Health Centre: 1 per 1,20,000 population in general areas and 1 per 80,000 population in difficult/tribal and hilly areas.
- First Referral Units (FRU) provides comprehensive obstetric care services including like cesarean section, newborn care, emergency care of sick children, full range of family planning services, safe abortion services treatment of STI/RTI availability of blood storage unit and referral transport services. Number of FRUs has increased significantly from 940 in 2005 to 2996 in 2020

A Sub-centre provides interface with the community at the grass-root level, providing all the primary health care services. It is the lowest rung of a referral pyramid of health facilities consisting of the Sub-centres, Primary Health Centers, Community Health Centres, Sub-Divisional/Sub-District Hospitals and District Hospitals.

Urban health facilities have more advanced technologies and experienced professionals to cater the demand in cities as well as adjoining areas of the cities

- Multi-specialty hospitals: Private and public hospitals catering to obstetrics and gynecology requirements while covering other healthcare therapeutics areas

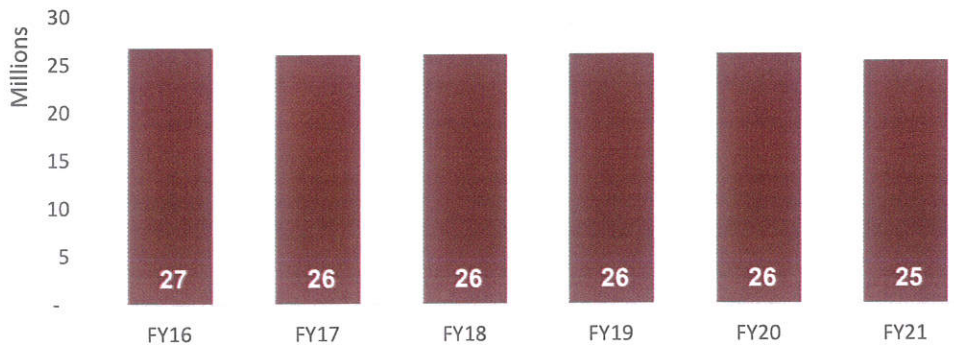
- Standalone maternity and childcare chains : Private entities operating super-specialty maternity and childcare hospitals and other gamut of antenatal and postnatal offerings
- Nursing homes, maternity homes, clinics: Local government and private clinics catering to obstetrics and gynecology demand in the city

Demand for obstetrics services remains high in India on account of size of population

India registers nearly 25-27 million childbirth every year

India is the second most populous country after China with population of 1,380 million in 2020. India registers nearly 25-27 million births every year. India reports the highest number of pregnancies in the world with 36.7 million pregnancies in 2020.

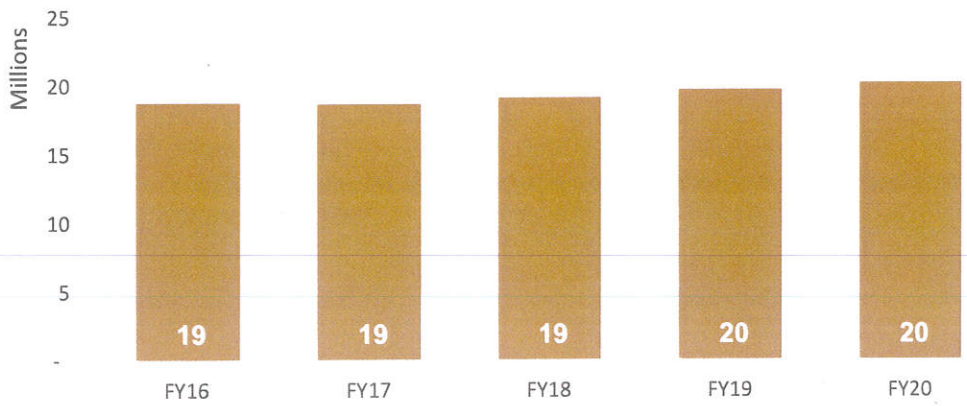
Child-birth in India



Source: HMIS, CRISIL Research

Share of institutional deliveries have increased from increased from 66.6% in fiscal 2016 to 69.7% in fiscal 2020. This has resulted in rise in number of institutional deliveries from 18-19 million in fiscal 2016 to 19-20 million in fiscal 2020

Number of institutional deliveries conducted in India has seen rise from fiscal 2016 onwards



Source: HMIS, CRISIL Research

Share of C -Section deliveries performed in India as % of institutional deliveries increased from 18.7% in fiscal 2018 to 20.5% in fiscal 2020. This has been driven by rise in complication of pregnancies due lifestyle changes such as rise in sedentary lifestyle, rise in age of women for first-time pregnancies, etc. Gynecology- Hysterectomy surgeries contributes to 11-13% of total major surgeries performed in India, indicating potential demand for gynecology surgeries in India for maternity hospitals.

Share of total C -Section deliveries performed in India as % of institutional deliveries

Parameter	FY18	FY19	FY20
Share of c-section deliveries to reported institutional deliveries	18.7%	20%	20.5%

Source: CRISIL Research

Share of gynecology and hysterectomy surgeries in major operations in India

Parameter	FY18	FY19	FY20
Gynecology- Hysterectomy surgeries in total major surgeries reported	13%	12.6%	11.2%

Source: CRISIL Research

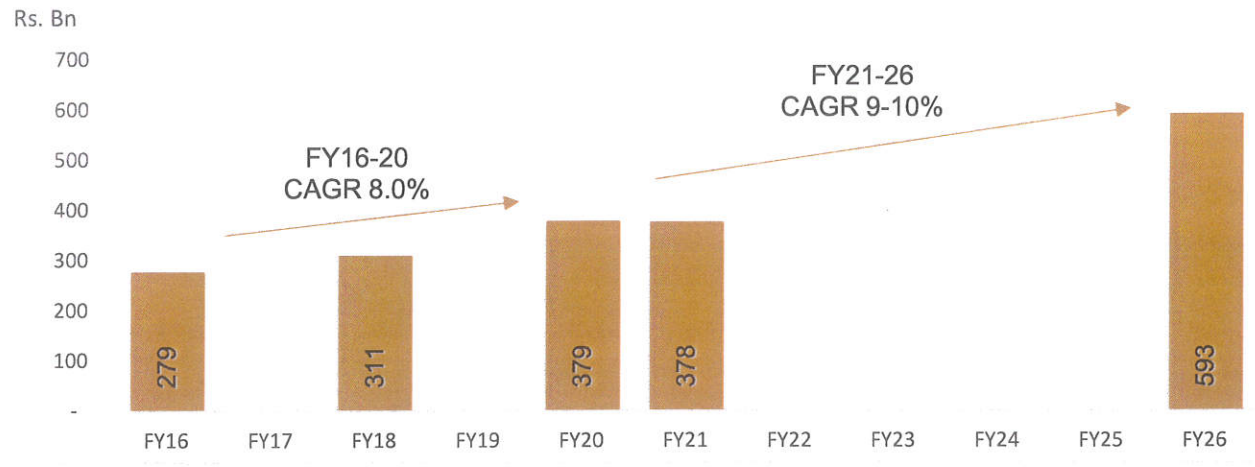
Maternity care contributes to 9% of overall healthcare delivery market in India

CRISIL Research estimates the maternity healthcare market at Rs. 380 billion in fiscal 2020. The overall maternity delivery market registered a growth of 8% from fiscal 2016 to fiscal 2020. Maternity care (obstetrics) is estimated to contribute to 9% of overall healthcare delivery market. Going forward CRISIL Research expected the maternity healthcare market to reach Rs. 593 billion in fiscal 2026.

The growth in the market is largely driven by urban market with increase in average health expenditure on childbirth and related antenatal care and increased penetration of institutional pregnancies. This growth is driven by India's increasing aspirational middle-class population, increase in per capita income of urban India with considerable amount disposable income, increasing participation of women in the workforce which in turn has given rise to the count of dual income household and availability of multiple financing options increasing spending on insurance plans and medical services related to birthing. The rural market is driven by increased penetration of healthcare services and moderate increase in expenditure supported by growth in per capita income.

Birthing is an important moment in a couple's life, with increasing workload and sedentary activities, couples want to ensure the birthing experience is smooth, hassle-free, comfortable as well as memorable. New-age couples want to experience the birthing journey by having the best that is available in terms of treatment, hospital facilities, doctor consultancy, antenatal and post-natal physical well-being, etc. These factors are expected to drive the demand of comprehensive high risk obstetrics units where the couples can avail quality services such as high risk pregnancy care with maternal intensive care with 24x7 coverage, full-fledged foetal medicine department with capabilities of foetal interventions, along with blood bank facilities within the hospital care. Drift towards demand of such higher quality services is also expected to add to the maternity care market growth

Maternity healthcare delivery services in India

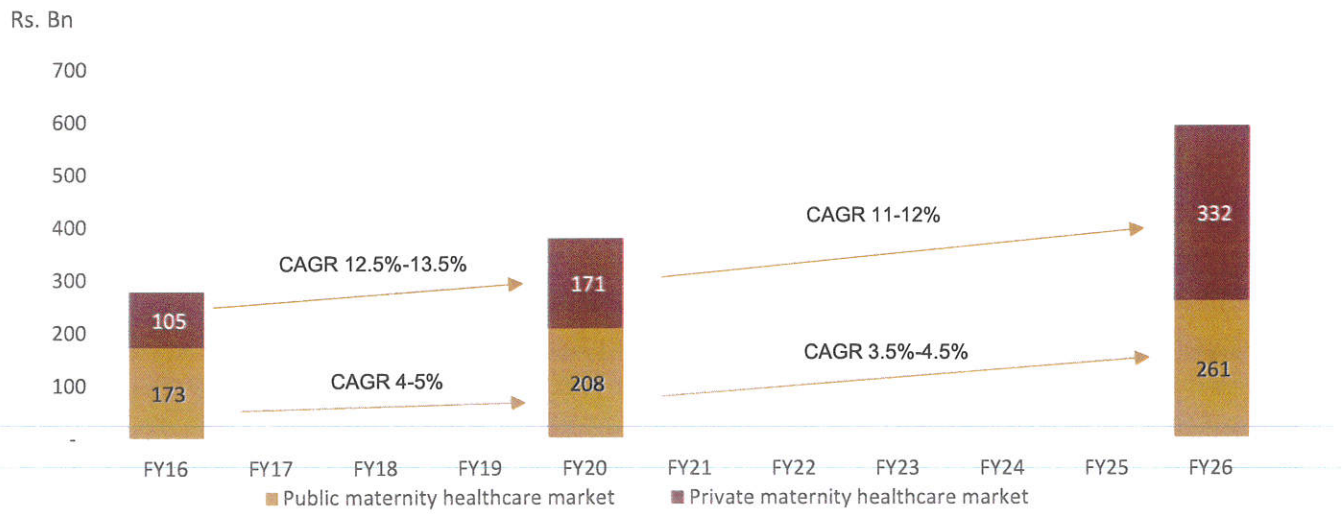


Source: CRISIL Research

Private maternity care market is expected to grow at CAGR of 11-12% from fiscal 2021 to fiscal 2026

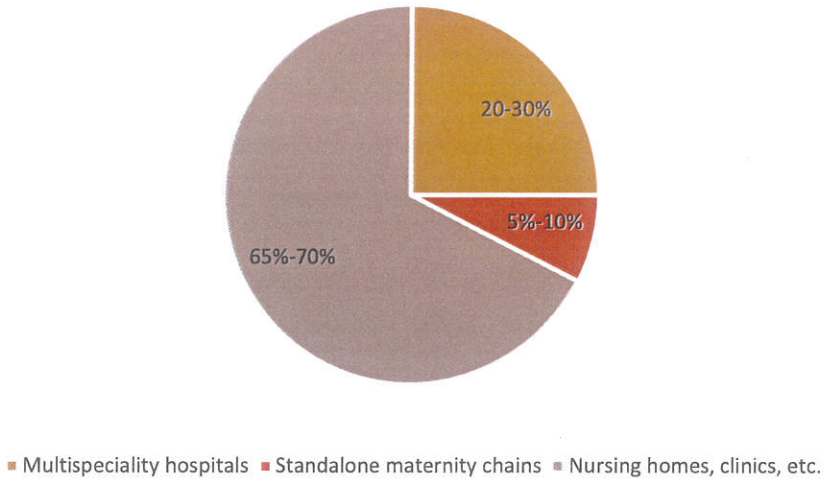
Private maternity healthcare market grew at 4-5% CAGR between fiscal 2016 and 2020 from Rs. 173 billion to Rs. 208 billion. The private maternity care market is expected to grow at CAGR of 11-12% from fiscal 2021 to fiscal 2026 to reach value of Rs. 261 billion in fiscal 2026. The growth in private hospitals is driven by increase in C-section delivers driving up average revenue per patient, increased complication in pregnancies due to late pregnancies, and rise in demand for value added services. CRISIL Research estimates that standalone maternity chains have a share of 5-10% in overall maternity healthcare market, while local nursing homes and maternity clinics contributes to 20-30% of the maternity market in fiscal 2020.

Market size of private maternity hospital industry in India



Source: CRISIL Research

Segmentation within private segmentation within private maternity hospitals



Source: CRISIL Research

Overview of type of healthcare professional experts on panel with Multispecialty Children's hospitals and perinatal centre

Doctor specialty	Description
Obstetrician	An obstetrician is a doctor who specializes in pregnancy, childbirth, and a woman's reproductive system to ensure health birthing and determine the health of the foetus, identify any complications and know the gestational period of the foetus.
Foetal Medicine specialist	An obstetrician/radiologist specialized in imaging of the foetus with 3D and 4D high-definition ultra-sound machines to assess the foetal well-being, foetal-growth, foetal-anomalies and foetal cardiac anomalies and also capabilities to perform foetal diagnostic and therapeutic procedures
Gynaecologist	A gynaecologist is a physician who specializes in the medical care of women and in health of the female reproductive system. They diagnose and treat issues related to the female reproductive tract. This includes the uterus, fallopian tubes, and ovaries and breast
Lactation Consultant	Lactation consultants or lactation specialists are nursing professionals who help new moms in their efforts to breastfeed
Paediatric intensivist	A paediatric intensivist, also called a paediatric critical (or intensive) care physician to treat children up to the age of 18. Critically ill infants and children who need high-level of monitoring are addressed by paediatric intensivist.
Neonatologist	A doctor who specialize in the care of new-born, premature births. Diagnosing and treating new-born with illness such as infections, birth defects, breathing conditions etc.
Paediatrician	A doctor who specializes in children up to the age of 18 years. They diagnose and treat broad range of illnesses from minor to major health problems They advise parents on not only physical ailments but also behavioural and mental problem of their minor wards.
Paediatric Gastroenterologist, Hepatologist and Nutrition	A doctor who specializes in diagnosis and treatment of ailments related to digestion, liver and nutritional of children up to the age of 18 years. Gastroenterology refers to diagnosis and treatment of ailments related to the digestive system of children. Endoscopic procedures on the colon, oesophagus and stomach to identify related chronic ailments. Hepatology refers to the diagnosis and treatment of ailments related the liver,

	gallbladder, bile ducts and pancreas. Paediatric Nutritionists or dieticians refers to diagnosis and treatment of weight, growth and development related disorders.
Paediatric Dentist	A doctor who specializes in diagnosis and treatment of ailments related to dental problem and the overall oral health of children up to the age of 18 years.
Paediatric Ophthalmologist	A doctor who specializes in diagnosis and treatment of eyes conditions, vision problems of children up to the age of 18 years. They are also trained to perform eye surgeries.
Paediatrics Cardiologists	A doctor who specializes in diagnosis, prevention and treatment of ailments related to the heart of children up to the age of 18 years. They are trained to treat congenital heart disorders, defects, arrhythmias and other diseases and complications. However not all paediatric cardiologist are heart surgeons, although some are trained to perform invasive procedures.
Paediatric Orthopaedic Surgeon	A doctor who specializes in diagnosis and treatment of musculoskeletal ailments related to bone, joint and muscle of children up to the age of 18 years. Infections, broken bones, bone related diseases, sports injuries, trauma, bone development delays and birth defects are some problem addressed by an orthopaedic surgeon
Paediatric Neurologist	A doctor who specializes in diagnosis and treatment of ailments related to the spinal cord, the brain, the nervous system and the blood vessels of children up to the age of 18 years.
Paediatric Nephrologist	A doctor who specializes in diagnosis and treatment of ailments related to the kidney, urinary tract of children up to the age of 18 years. Conditions such as kidney stones, high blood pressure, congenital diseases and defects are addressed by an paediatric nephrologists
Paediatric Surgeon	A doctor who specializes in diagnosis, operative and post-operative surgical treatment of ailments related children up to the age of 18 years. Condition such as congenital, acquired anomalies and diseases are addressed by paediatric surgeons. They are trained to perform surgeries on foetuses, infants, children, adolescents and young adults.
Adolescent Endocrinologist	A doctor who specializes in diagnosis and treatment of endocrine ailments related to hormones and glands of children up to ages of 18. Conditions such as growth disorders, puberty, and diabetes are addressed by an adolescent endocrinologist.
Pediatric Pulmonologist	A doctor who specializes in diagnosis and treatment of children lung disorder up to ages of 18. Conditions such as Asthma, recurrent respiratory infection, cystic fibrosis
Pediatric Metabolic and Geneticist	A doctor who specializes in diagnosis and treatment of children Metabolic disorder and diagnosis of genetic disorders such as downs syndrome, organic academia.

Source: CRISIL Research

Specialties offered by established Maternity healthcare chain facilities

Obstetrics	Gynecology
Pediatrics	Fetal medicine
Anesthesia	Fertility
Neonatology and NICU	Stem cell banking
Nutrition and dietics	Menopause
	Cosmetic care

Source: CRISIL Research

Overview of children vaccination offering of antenatal private hospitals as extension of post-natal care

Maternity hospitals also provide post-natal care for new-born child. This includes check-ups at regular intervals to monitor healthy growth and development of the new-born and vaccination against communicable diseases. Immunization and vaccination for new-born and children are very vital for their health and prevention of communicable diseases. Vaccination helps to developed induced immunity against myriad of diseases and infections which may not have been developed naturally. Vaccinations helps the child's body to develop antibodies against infections.

Immunization programme of government of India

- Expanded Programme on Immunization was launched in 1978. It was renamed as Universal Immunization Programme in 1985 when its reach was expanded beyond urban areas. In 1992, it became part of Child Survival and Safe Motherhood Programme and in 1997 it was included in the ambit of National Reproductive and Child Health Programme. Since the launch of National Rural Health Mission in 2005, Universal Immunization Programme has always been an integral part of it.
- Universal Immunization Programme (UIP) is one of the largest public health programmes targeting close of 26-27 million new-borns and 28-29 million pregnant women annually.
- It is one of the most cost-effective public health interventions and largely responsible for reduction of vaccine preventable under-5 mortality rate.
- Under UIP, immunization is providing free of cost against 12 vaccine preventable diseases: Nationally against 9 diseases - Diphtheria, Pertussis, Tetanus, Polio, Measles, Rubella, severe form of Childhood Tuberculosis, Hepatitis B and Meningitis & Pneumonia caused by Hemophilus Influenza type B and Sub-nationally against 3 diseases - Rotavirus diarrhoea, Pneumococcal Pneumonia and Japanese Encephalitis; of which Rotavirus vaccine and Pneumococcal Conjugate vaccine are in process of expansion while JE vaccine is provided only in endemic districts.
- A child is said to be fully immunized if child receives all due vaccine as per national immunization schedule within 1st year age of child.
- The two major milestones of UIP have been the elimination of polio in 2014 and maternal and neonatal tetanus elimination in 2015.

New vaccines

- Inactivated Polio Vaccine (IPV): IPV has been introduced in UIP as part of Global Polio end-game strategy, to mitigate the risk associated with tOPV to bOPV switch. IPV was introduced in November 2015 initially in 6 states, which was expanded across the country by April 2016.
- Rotavirus vaccine (RVV): RVV has been introduced to reduce mortality and morbidity caused by Rotavirus diarrhoea in March 2016. It has been introduced in 11 states (Andhra Pradesh, Haryana, Himachal Pradesh, Jharkhand, Odisha, Assam, Tripura, Rajasthan, Tamil Nadu, Madhya Pradesh and Uttar Pradesh). The vaccine will be expanded across the country in 2019-20.
- Measles Rubella (MR) vaccine: India is committed to the goal of measles elimination and rubella control and to achieve the goal MR vaccine was introduced in the country through a campaign mode in a phased manner in 2017. MR campaign target around 41 crore children in the age group of 9 months to 15 years (covering ⅓ of the total population of the country) followed by 2 doses in routine immunization at 9-12 months and 16-24 months. Rubella component is now under routine immunization as MR vaccine.

- Pneumococcal Conjugate Vaccine (PCV): PCV has been launched in May 2017 for reducing Infant mortality and morbidity caused by pneumococcal pneumonia. It has been introduced in Bihar, Himachal Pradesh, Madhya Pradesh, 19 districts of Uttar Pradesh and 18 districts of Rajasthan.
- Tetanus and adult diphtheria (Td) vaccine: TT vaccine has been replaced with Td vaccine in UIP to limit the waning immunity against diphtheria in older age groups. Td vaccine to be administered to adolescents at 10 and 16 years of age and to pregnant women.

Mission Indradhanush

- Mission Indradhanush (MI) was launched in December 2014 and aims at increasing the full immunization coverage to children to 90%.
- Under this drive focus is given on pockets of low immunization coverage and hard to reach areas where the proportion of unvaccinated and partially vaccinated children is highest.
- A total of six phases of Mission Indradhanush have been completed covering 554 districts across the country.
- It was also identified as one of the flagship schemes under Gram Swaraj Abhiyan (16,850 villages across 541 districts) and Extended Gram Swaraj Abhiyan (48,929 villages across 117 aspirational districts).
- While the first two phases of Mission Indradhanush resulted in 6.7% increase in full immunization coverage in a year, a recent survey carried out in 190 districts covered in Intensified Mission Indradhanush (5th phase of Mission Indradhanush) shows 18.5% points increase in full immunization coverage as compared to NFHS-4 survey carried out in 2015-16.

New Initiatives in Vaccine Logistics & Cold Chain Management

Capacity building

National Cold Chain Training Centre (NCCTE), Pune and National Cold Chain & Vaccine Management Resource Centre (NCCVMRC) -NIHFW, New Delhi have been established to provide technical training to cold chain technicians in repair & maintenance of cold chain equipment

System strengthening

Electronic Vaccine Intelligence Network (eVIN) rollout:

The Government of India has rolled out an Electronic Vaccine Intelligence Network (eVIN) system that digitizes the entire vaccine stock management, their logistics and temperature tracking at all levels of vaccine storage – from national to the sub-district.

This enables program managers to have real time view of the vaccine stock position and their storage temperature across all the cold chain points providing a detailed overview of the vaccine cold chain logistics system across the entire country.

eVIN system has been completed in 12 states in the first phase – Assam, Bihar, Chhattisgarh, Himachal Pradesh Gujarat, Jharkhand, Madhya Pradesh, Manipur, Nagaland, Odisha, Rajasthan, and Uttar Pradesh.

Second phase is ongoing in 9 states – Andhra Pradesh, Daman & Diu, Dadra & Nagar Haveli, Goa, Karnataka, Maharashtra, Telangana, Tripura and Uttarakhand.

eVIN is to be scaled up to entire country.

National Cold Chain Management Information System (NCCMIS) to track the cold chain equipment inventory, availability and functionality.

Vaccination schedule

Vaccine	Schedule for vaccination
For Pregnant Women	
TT-1	Early in pregnancy
TT-2	4 weeks after TT-1*
TT- Booster	If received 2 TT doses in a pregnancy within the last 3 yrs*
For Infants	
BCG	At birth or as early as possible till one year of age
Hepatitis B - Birth dose	At birth or as early as possible within 24 hours
OPV-0	At birth or as early as possible within the first 15 days
OPV 1, 2 & 3	At 6 weeks, 10 weeks & 14 weeks (OPV can be given till 5 years of age)
Pentavalent 1, 2 & 3	At 6 weeks, 10 weeks & 14 weeks (can be given till one year of age)
Rotavirus#	At 6 weeks, 10 weeks & 14 weeks (can be given till one year of age)
IPV	Two fractional dose at 6 and 14 weeks of age
Measles /MR 1st Dose$	9 completed months-12 months. (can be given till 5 years of age)
JE - 1**	9 completed months-12 months.
Vitamin A (1st dose)	At 9 completed months with measles-Rubella
For Children	
DPT booster-1	16-24 months
Measles/ MR 2nd dose $	16-24 months
OPV Booster	16-24 months
JE-2	16-24 months
Vitamin A*** (2nd to 9th dose)	16-18 months. Then one dose every 6 months up to the age of 5 years.
DPT Booster-2	5-6 years
TT	10 years & 16 years

Source: Ministry of Health and Family Welfare, Government of India, CRISIL Research

Fertility segment as additional offering for maternity care has potential for growth

Assisted reproductive technology (ART) has witnessed strong grown in the last few years. Incidence of infertility in India is between 10 and 15% resulting in approximately 25 to 30 million couples are likely to be infertile in the country at any given time. As per industry sources India reports roughly 0.2- 0.25 million IVF cycles in a year in 2020.

ART treatment is now being increasingly available to infertile couples. Furthermore, as the economy has expanded, many infertile couples can now afford and the sophisticated ART treatment. This has led to an enormous increase in the number of ART clinics providing care to these couples. India has recorded the high growth in ART centers and the number of ART cycles being performed in our country has steadily risen over the last decade.

As per the provision of ART (Regulation) Bill, a National Registry has been created to ensure optimal functioning of all the ART clinics and banks in the Country as a Central Database and helping them to take care of Infertility problem through practice of ART. Under National Registry around 1814 ART clinics and Banks have been identified of these 580 ART clinics have been registered. The number of ART clinics have increased from nearly 500 in 2010 to 1,800 in 2020, a rise of 260% over the last decade indicating rise in demand for fertility treatments. On Insurance front, India offers no insurance coverage on ART treatments under national health plan or private insurance plans.

Type of ART treatments:

There are a number of treatments being provided under ART but IVF is the most common treatment being availed. The list of treatments is as below:

1. Artificial Insemination with Husband's Semen (AIH)
2. Artificial Insemination with Donor Semen (AID)
3. Intra-uterine Insemination using Husband Semen (IUI-H)
4. Intra-uterine Insemination using Donor Semen (IUI-D)
5. In vitro Fertilization-Embryo Transfer (IVF-ET)
6. Commercial Surrogacy
7. Altruistic Surrogacy
8. Gamete Intrafallopian Tube Transfer (GIFT)
9. Tubal Embryo Transfer (TET)
10. Intra-cytoplasmic Sperm Injection (ICSI)
11. Intra-cytoplasmic Morphologically Selected Sperm Injection (IMSI)
12. Round Spermatid Nucleus Injection (ROSNI)
13. Elongated Spermatid Injection (ELSI)
14. Percutaneous Epididymal Sperm Aspiration (PESA)
15. Microsurgical Epididymal Sperm Aspiration (MESA)
16. Testicular Sperm Aspiration (TESA)
17. Testicular Sperm Extraction (TESE)
18. Pre-implantation Genetic Diagnosis (PGD)
19. Pre-implantation Genetic Screening (PGS)
20. Blastocyst Separation Technique
21. Endometrial Receptivity Array
22. Time Lapes Imaging
23. Processing or storage of gametes (sperm and oocyte) and or embryos of infertile patient

The IVF market has witnessed strong growth in past few years due to:

- Improvement in technology and success rates
- Availability of ART clinics in smaller cities
- With increasing income levels treatment being more affordable
- Delayed pregnancies increasing rate of infertility
- Rapid lifestyle changes that can potentially affect fertility

Emerging trends in the healthcare care service model

Health-tech marking its presence across the healthcare value chain. Companies are exploring possibilities of inculcating technologies like Big Data, AI, Predictive analytics, cloud etc. to improve access, availability, affordability & awareness of healthcare. Healthcare services such as telemedicine, home healthcare, wellness startups, e-pharmacy are emerging trends. The healthcare delivery space is on the path of technological evolution and is expected to induce efficiencies in the system.

The healthcare industry, like other industries, is constantly evolving in terms of technology. Developments in information technology have helped create systems which ensure faster and reliable services. While on one hand these systems help increase the reach and quality of healthcare delivery systems across the country, on the other, they also enable healthcare delivery providers to improve efficiency by helping them in resource planning, maintaining patient records, etc.

With the onset of the covid pandemic warranting social distancing, conventional means of doctor-patient connect had to pave way to digital modes like tele-consults, speedier adoption of fitness and wellness applications etc

Some of these systems are as described below:

Demand for Health tech - Telemedicine

On account of the lockdown owing to Covid-19 pandemic in India during the last week of March 2020, there has been higher dependence on the internet in order to serve basic healthcare needs of individuals. Convenient, affordable and personalised treatments have been preferred as opposed to traditional hospital based treatments. E-consultation/tele-medicine also gained impetus as they omitted the need to visit hospitals. Number of multi speciality hospitals and large chains of maternity/ paediatric hospitals started telemedicine services post March 2020. This has helped them increase their reach and cater to higher number of patients.

The advent of 5G, artificial intelligence and machine learning is expected to accelerate online spending towards healthcare further

Telemedicine is a technology designed to increase accessibility of healthcare services from remote locations. Telemedicine makes extensive use of information technology to create a connection between doctors at the main hospital and patient at the remote centre or the telemedicine centre. The doctor analyses the patient through telephonic conversation or video conferencing. She/he is assisted by a junior doctor or health worker who is physically present at the telemedicine centre. The junior doctors physically examine the patient and convey information to the doctor. The doctor communicates diagnosis and medication based on the inputs provided by the junior doctors. If the ailment is complex, then the patient is advised to get admitted at the main hospitals to avail of intensive care. However, this model is useful in healthcare service provision at a time when there is a dearth of healthcare professionals in the country.

Mobile-based application

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

Even the government is looking into 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 upon registration.

Remote neo natal services

A advantage of telehealth is that it enables specialists to connect with patients remotely. Remote monitoring can be beneficial for the neonatal population, as it allows neonatal specialists to remotely monitor patients and communicate with families. It increases access to care by facilitating specialist care remotely specially in smaller cities where these services are not available.

Radiology information system (RIS)

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.

Robotic surgery

Robotic surgery or robot-assisted surgeries (RAS) is surgery conducted using a robotic arm that is controlled electronically using a control pad which may be located at a local or remote location and is also equipped with high-definition cameras allowing surgeons to take a closer look at the areas being operated. Since RAS can be performed from remote locations, it allows patients to avail of treatment from the desired specialist surgeons across the world without having to travel. Robot assisted surgeries have been used to conduct general surgeries, bypass surgeries, colorectal surgeries, gastrointestinal surgery, neurosurgery, orthopaedic surgeries, etc.

Technological initiatives in healthcare

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 has started vying for growth in this space.

The revenue from ICU beds wanes 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 relief from associated hospital acquired infections.

The services currently offered are post-intensive care, rehabilitative 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.

Growth drivers for maternity hospitals in India

- Rise in working women population in urban areas

  With the increase in working women population in urban areas the awareness and affordability increases. Women are more aware of the pre-natal and post-natal healthcare services and tend to spend higher for better lifestyle experiences. This has resulted in demand for private hospitals increasing and chained hospital brands

- Changing consumer behaviour away from traditional maternity practices

  Consumer behavioral changes has resulted in increase in institutionalised deliveries over the past decade. In the last 5 years the percentage of institutionalised deliveries has increased from 66.6% in FY16 to 71% in FY21. This is due to younger population preferring better healthcare facilities compared to the traditional at home delivery techniques. Even though the institutionalised delivery percentage has increased yet 29% of the deliveries are not in hospitals as yet. This trend is expected to continue resulting in increase in institutionalised deliveries and growth for hospitals.

  Experiential Value-added services: The occasion of child birth is a time for celebration and private hospitals look at this as a market need by offering value added service that will increase the overall perceived care. Hospitals offer service like virtual baby showers during covid times, photography session across pregnancy trimester as way for the new mothers to express their joy on the arrival of the new-born and care availed at the institution.

- Rise in demand for healthcare chains

  Single speciality maternity and paediatric chains are being preferred compared to nursing homes due to availability of specialized doctors and wide array of services. The maternity and paediatric chains have witnessed a strong growth of higher than 30% CAGR over the FY16 to FY20 period due to increase in demand and higher penetration. The preference of chained hospitals is expected to increase with higher penetration of larger brands.

Revenue of paediatric/maternity private chain

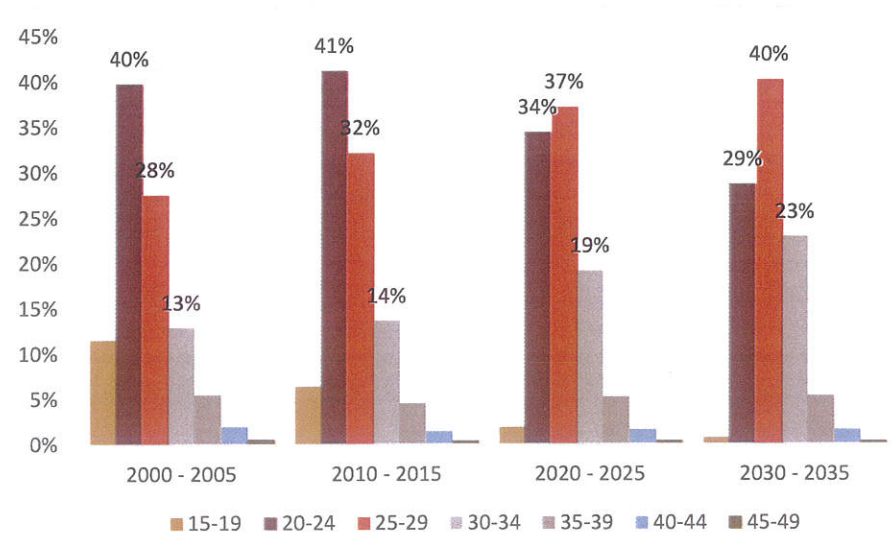
Players (Rs. Mn)	FY16	FY17	FY18	FY19	FY20	FY21	FY16-20
Motherhood	541	561	734	1,838	2,849	2,901	51.5%
Rainbow	2,330	3,213	4,018	5,428	7,194	6,501	32.5%
Cloudnine	1,861	2,552	3,502	4,219	5,143	5,546	28.9%
Neonatal care and research (Ovum)	165	241	297	373	456		28.9%
Cocoon - lineage (Jaipur)	119	142	147	98	136		3.4%

Source: Company reports, CRISIL Research

- Rise in pregnancy age

The average age of women delivering a baby is increasing. 25-29 age group women contributed to 32% of the births in 2010-2015 period up from 28% in 2000-2005 period. The age group 25-29years and 30-34years is expected to contribute to higher share in live births going forward, contributing to 37% and 19% of the live births respectively in 2020-2025 period and 40% and 23% of the live births respectively in 2025-2030. The increase in pregnancy age is expected to increase the demand for maternity healthcare service and number of complications arising from pregnancies may witness a rise. All this will augur growth for maternity health providers.

Age-wise pregnancy share



Source: United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019, custom data acquired via website, CRISIL Research

6 Competition analysis in maternity and antenatal care in India

6.1 Comparative analysis of players in the maternity and pediatric healthcare delivery sector

In this section, CRISIL Research has compared the key players in the maternity and pediatric healthcare delivery sector. We have obtained data in this section 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:

Rainbow Children's Medicare Ltd (Rainbow Hospitals), Neonatal care & Research Institute Pvt Ltd (Ovum Woman & Child Speciality Hospital), Surya Hospitals Pvt Ltd, Rhea Healthcare Private Limited (Motherhood Hospital), Apollo Health & Lifestyle Ltd (Apollo Cradle), Kids Clinic India Ltd (Cloudnine Hospital), and Lineage Healthcare Limited (Cocoon Hospital)

Key operational parameters of major players

Operational parameters, FY21

Parameter	Rainbow Children's Medicare Ltd	Surya Hospitals Pvt Ltd	Kids Clinic India Ltd	Rhea Healthcare Pvt Ltd	Apollo Health & Lifestyle Ltd (Apollo Cradle)	Lineage Healthcare Ltd	Neonatal care & Research Institute Pvt Ltd
Number of hospitals	14 hospitals, 3 clinics	3 hospitals	20+ hospitals	11 hospitals, 3 clinics	14 hospitals, 8 clinics	1 hospital	3 hospital, 1 clinic
Number of beds	Total: 1475 NICU: 311 PICU: 162	Total: 322 NICU: 141 PICU: 41	Total: 900 NICU: 76 PICU: 8	Total: 353 NICU: 78 PICU: 27	Total: 471 NICU: 81 PICU: 11	NICU: 14	Total: 90 NICU: 20
Geographical presence	Hyderabad, Bengaluru, New Delhi, Vijayawada, Visakhapatnam and Chennai	Mumbai, Jaipur, and Pune	Bengaluru, Chennai, Mumbai, Gurugram, Pune, Chandigarh, Noida, Panchkula, and New Delhi	Bengaluru, Chennai, Coimbatore, Indore, Mumbai, Noida, Pune, Trichy, and Chandigarh	Bengaluru, Delhi-NCR, Hyderabad, Pune, Chennai, and Amritsar	Jaipur	Bengaluru
Specialty mix	Pediatric surgery, Neonatology, Pediatric ICU,	High Risk Pregnancy, Gynecology, Endoscopy,	Maternity, Gynecology, Pediatric Care, Fertility,	Gynecology, Fertility, Pediatrics, Neonatology,	Maternity, Gynecology, Neonatology, Pediatrics,	Antenatal care, Neonatology, Stem cell	Maternal health, neonatal ICU, Pediatrics,

Parameter	Rainbow Children's Medicare Ltd	Surya Hospitals Pvt Ltd	Kids Clinic India Ltd	Rhea Healthcare Pvt Ltd	Apollo Health & Lifestyle Ltd (Apollo Cradle)	Lineage Healthcare Ltd	Neonatal care & Research Institute Pvt Ltd
	Paediatric neurology, Paediatric nephrology, Pediatric Hemato oncology and BMT, Gastroenterology, Neurosurgery, Pediatric rheumatology, Kidney and Liver transplant, Pediatric Allergy, Paediatric endocrinology, Pediatric pulmonology, Dermatology, Urology, Psychiatry Obstetrics, Gynecology, High Risk pregnancy, Fertility etc.	Laparoscopic Gynecology Surgeries, Neonatology, Pediatric Intensive Care, Fertility, etc.	Radiology, Physiotherapy, Stem cell bank, Intensive care, Neonatal care, cosmetology etc.	Cosmetology, Radiology, Physiotherapy, Pregnancy care etc.	Foetal medicine, Fertility, high Risk pregnancy etc.	preservation, Laparoscopic gynecology surgeries, Cosmetology & Cosmetic Surgeries etc.	fertility services, physiotherapy, Ultrasonography etc.
Accredited DNB, DrNB and FNB seats*	43	10	-	-	-	-	-

Note: The data given above is only indicative and not exhaustive

*Accredited DNB seats are of the specialties associated with Paediatrics and Neonatology

Source: Company annual reports/investor presentations/website, National Board of examinations, CRISIL Research

Among the peers considered, Kids Clinic India Ltd has the highest centres with more than 20+ hospitals. It is followed by Apollo Cradle and Rainbow Hospitals.

In terms of beds, Rainbow hospital ranks 1st, followed by Kids Clinic. Rainbow has highest number of NICU and PICU beds by a significant margin compared to the peers considered. The group has significant presence in the Southern region.

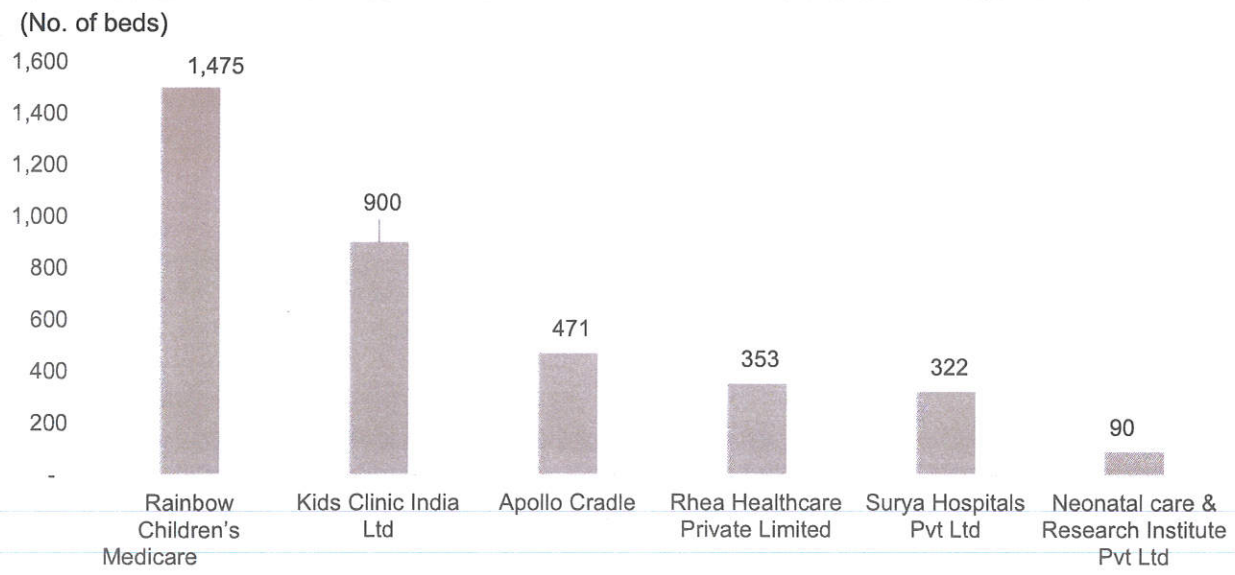
Majority of the peers considered have overlaps in the specialty mix. However, Rainbow's specialty mix focuses more on paediatric care across niche areas such as Neurology, Nephrology, Gastroenterology, Oncology and Cardiology etc. Rainbow Children's Hospital & Birthright, Banjara Hills, Hyderabad facility offers wide range of neurological services to the patients such as child epilepsy, autism spectrum disorders, vascular neurology and intellectual disability.

Given the wide range of speciality offering mix, Rainbow can be classified as a standalone paediatric multi-specialty hospital chain. ~90% of the beds offered by Rainbow are in Southern region with facilities such as Rainbow Children's Hospital & Birthright, Banjara Hills, Hyderabad; Rainbow Children's Hospital & Birthright – Marathahalli, Bengaluru; and Rainbow Children's Hospital & Birthright, Currency Nagar – Vijayawada making it one of the few pediatric focused hospital chain in the region.

Diplomat of National Board (DNB) is a post-graduate master's degree same as MD/MS degree awarded to the specialist doctors in India. DNB courses are run and the degrees are awarded by the National Board of Examinations (NBE). Doctorate of National Board (DrNB) is a post MD/MS/DNB super speciality degree awarded by NBE. The NBE also runs postdoctoral fellowship programme in select subspecialties. On successful completion of the course, the candidates are awarded Fellow of National Board (FNB).

Rainbow Hospitals offer 43 total number of seats in the specialities associated with Paediatrics and Neonatology which is highest among the peer set considered. These courses offer a key competitive advantage to the hospitals running the program since sourcing and holding onto quality paediatric doctor talent is challenging. Also the doctors who complete the may refer tertiary / quaternary cases to the hospital they got trained in. Apollo Hospitals Enterprise Limited, which is one of the largest multi-specialty hospital chain offer a total of 47 seats in the specialities associated with Paediatrics and Neonatology.

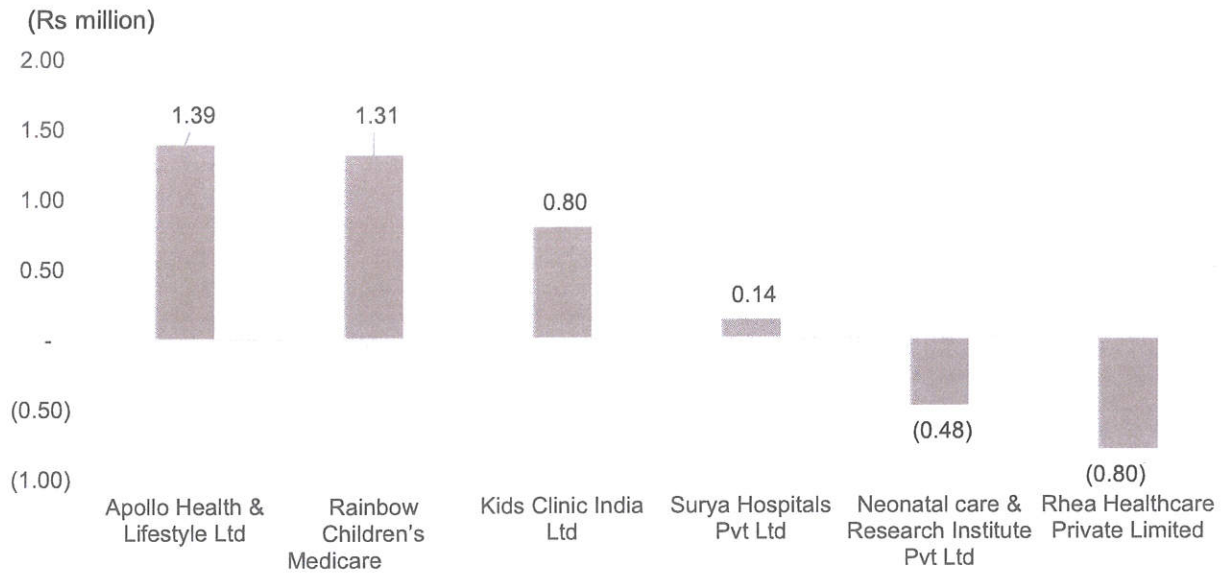
Rainbow hospitals has the highest number of beds as of FY21 among the peers considered



Note: The data given above is only indicative and not exhaustive

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

Rainbow hospitals and Apollo Health & Lifestyle have the highest OPBDIT (FY20) / Bed ratio among the peers considered



Note: The above financials (FY20) in the report for Surya Hospitals and Neonatal care & Research Institute are on standalone basis and the rest are on consolidated basis. Total beds data for Lineage Healthcare Limited was not available.

#The OPBDIT for Apollo Health & Lifestyle is used while the number of beds data is for Apollo Cradle. Apollo Health & Lifestyle has numerous other businesses

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

India's maternity and pediatric healthcare delivery sector is catching up to children hospitals in United States in terms of specialty offerings and hospital-clinic network

The healthcare model existing in the United States for children is a benchmark for medical care across the world. The country has more than 250 children hospital accounting for nearly 95% of the tertiary care with respect to children. Further, these hospitals also incorporate women care into their specialties given the instances such as high-risk pregnancies which make the need for integrated mother and child care imperative. Such dedicated children's hospital are limited in India. However, major players like Rainbow hospitals whose model corresponds to dedicated children care similar to children's hospitals in United States, are making headway in this space.

Major children's hospital in United States

Parameter (CY 2020)	Children's Hospital of Philadelphia, United States	Texas Children's Hospital	Boston Children's Hospital
Net patient service revenue ($ billion)	2.54	2.15	2.05
Total beds	567	650	395
Geographic presence	50+ locations including main campus, and a network of primary care centres, specialty care centres, urgent care centres and community hospital alliances.	10+ locations comprising of hospitals and specialty care centres	Over 750 affiliated Boston Children's physicians, and 7 community hospitals

Parameter (CY 2020)	Children's Hospital of Philadelphia, United States	Texas Children's Hospital	Boston Children's Hospital
Residents and Fellows	Total Residents: 155 Total Fellows: 298	Total Residents: 371 Total Fellows: 350	500 BCH-based residents and clinical fellows annually
Specialty mix	Pediatric specialties include: Cancer, Cardiac Care, Foetal Medicine, Orthopaedics, Neonatology, Diabetes, Gastroenterology, Urology etc Programs for special disorders: Hyperinsulinism, Thoracic Insufficiency Syndrome, Cornelia De Lange Syndrome, Eosinophilic Esophagitis And Biliary Atresia	More than 40 pediatric specialties: Oncology, Hematology, Urology, Otolaryngology, Foetal Care, Gastroenterology, Hepatology And Nutrition, Cardiology, Neuroscience, Orthopedics, Plastic Surgery etc	Pediatric specialties include: cardiology, gastroenterology, neurology, respiratory diseases, diabetes, orthopedic surgery, urology, behavioral health and other specialties

Source: Children's Hospital of Philadelphia, CRISIL Research

Key financial parameters of major players

Key financial parameters

Key financials (FY20)	Operating income		OPBDIT		PAT	
	Rs million	CAGR FY18 to FY20	Rs million	CAGR FY18 to FY20	Rs million	CAGR FY18 to FY20
Rainbow Children's Medicare Ltd	7,194	34%	1,970	71%	553	24%
Apollo Health & Lifestyle Ltd*	6,964	23%	656	n.m.	(770)	n.m.
Kids Clinic India Ltd	5,163	21%	719	n.m.	(331)	n.m.
Rhea Healthcare Private Limited	2,849	97%	(282)	n.m.	(539)	n.m.
Neonatal care & Research Institute Pvt Ltd	456	24%	(44)	n.m.	(74)	n.m.
Surya Hospitals Pvt Ltd	200	27%	44	33%	25	84%
Lineage Healthcare Limited	136	-4%	(11)	n.m.	(96)	n.m.

Key financials (FY21)**	Operating income		OPBDIT		PAT	
	Rs million	CAGR FY18 to FY21	Rs million	CAGR FY18 to FY21	Rs million	CAGR FY18 to FY21
Rainbow Children's Medicare Ltd	6,501	17%	1,629	34%	396	3%
Surya Hospitals Pvt Ltd	223	22%	54	30%	31	61%

Note: **Data for FY21 for the rest of the players is not available in public domain

The above financials in the report for Surya Hospitals and Neonatal care & Research Institute are on standalone basis and the rest are on consolidated basis;

*Apollo Health & Lifestyle Ltd has numerous businesses and one of them is Apollo cradle and children's hospital. Financials are for Apollo Health & Lifestyle Ltd

n.m.: Not meaningful; OPBDIT: Operating profit before depreciation, interest and tax; PAT: Profit after tax

Source: Company annual reports, CRISIL Research

Among the key players considered in the maternity and pediatric healthcare delivery sector, as of FY20, Rainbow hospitals had the highest operating income at Rs 7,194 million, followed by Apollo Health and Lifestyle Ltd at Rs 6,964 million. In terms of the CAGR for operating income from FY18-20, Rhea Healthcare Private Limited ranks 1st (97%), followed by Rainbow (34%) and Surya (27%).

In terms of the PAT, majority of the players considered are non-profitable. Rainbow hospitals ranks 1st with a large margin in OPBDIT and PAT against the peers considered. On account of losses, the CAGR for majority of the players considered is not meaningful. Rainbow Hospitals have logged a strong CAGR of 71% from FY18-20, in OPBDIT. It is followed by Surya Hospitals at 33% CAGR. In terms of CAGR for PAT, the situation reverses in the favour of Surya Hospitals.

Key financial ratios of major players

Key financial ratios (FY20)	OPBDIT margin (%)	Net profit margin (%)	RoCE (%)	Gearing (times)	Interest coverage (times)	Current ratio	Net cash accruals to debt	Working capital days	OPBDIT/CFO
Rainbow Children's Medicare Ltd	27.4	7.7	29.8	0.2	4.6	1.6	1.6	(128.6)	1.6
Apollo Health & Lifestyle Ltd*	9.4	(11.1)	(10.9)	n.m.	1.2	0.8	0.0	(394.2)	1.6
Kids Clinic India Ltd	13.9	(6.4)	3.1	0.2	1.7	0.4	0.8	(197.5)	1.9
Rhea Healthcare Private Limited	(9.9)	(18.9)	(28.8)	n.m.	(0.6)	0.3	(0.2)	(213.6)	0.8
Neonatal care & Research Institute Pvt Ltd	(9.6)	(16.3)	(34.1)	0.2	(23.3)	1.1	(1.3)	(240.5)	1.1
Surya Hospitals Pvt Ltd	21.9	12.4	24.8	1.2	10.8	0.6	0.3	(84.2)	0.8
Lineage Healthcare Limited	(8.0)	(70.7)	n.m.	n.m.	(0.1)	0.1	(0.2)	(2,374.3)	0.1

Key financial ratios (FY21)**	OPBDIT margin (%)	Net profit margin (%)	RoCE (%)	Gearing (times)	Interest coverage (times)	Current ratio	Net cash accruals to debt	Working capital days	OPBDIT/CFO
Rainbow Children's Medicare Ltd	25.1	6.1	21.0	0.1	3.9	1.6	2.0	(119)	1.7
Surya Hospitals Pvt Ltd	24.3	13.8	22.3	0.7	21.2	0.8	0.5	(243)	0.8

Note: **Data for FY21 for the rest of the players is not available in public domain

The above financials in the report for Surya Hospitals and Neonatal care & Research Institute are on standalone basis and the rest are on consolidated basis

*Apollo Health & Lifestyle Ltd has numerous businesses and one of them is Apollo cradle and children's hospital. Financials are for Apollo Health & Lifestyle Ltd

n.m.: Not meaningful; RoCE: Return on capital employed; NA: Not available due to insufficient data;

Ratios calculated as per CRISIL Research standards are described below:

- OPBDIT margin = OPBDIT / operating income
- Net profit margin = Profit after tax / operating income
- RoCE = Profit before interest and tax (PBIT) / [total debt + adjusted net worth (includes only goodwill as part of intangible net worth) + deferred tax liability]
- Gearing ratio = Adjusted Debt / Adjusted Networth
- Interest coverage ratio = Profit before depreciation, interest and tax / (interest + finance charges)
- Current ratio = Current assets / Current liabilities
- Net cash accruals to debt = Net Cash Accruals / Adjusted Debt
- Working capital days = Receivable days + inventory days - payable days

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

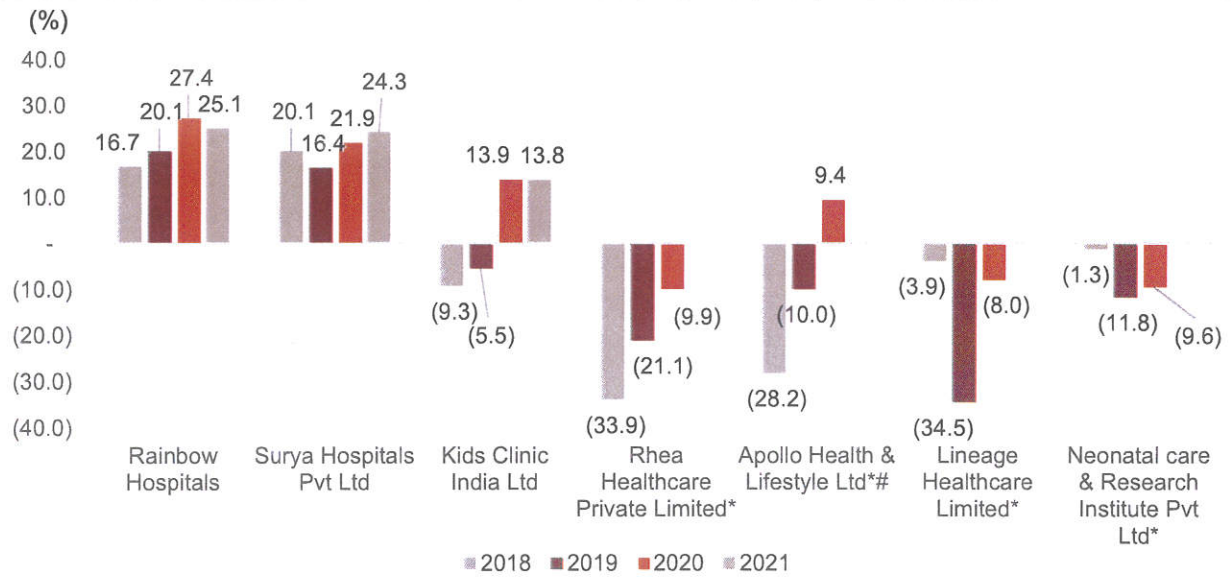
Source: Companies' annual reports, CRISIL Research

In terms of OPBDIT margin in FY20, Rainbow hospitals ranks 1st among the peers considered, followed by Surya hospital and Kids Clinic. Further, PAT margin is 7.7% and 12.4% for Rainbow and Surya, while for majority of the peers considered, PAT margin is negative.

As of FY20, Rainbow hospitals has the highest RoCE (29.8%) among the peers considered, followed by Surya at 24.8%. The rest of the peers compared have either negative or a low RoCE. In terms of the gearing ratio, Rainbow hospitals, Neonatal and Kids clinic are at par with each other ratio of 0.2. The gearing ratio saw an improvement for Rainbow in FY21 (0.1). With regards to the interest coverage ratio in FY20, Surya hospital comes in first with 10.8, followed by 4.6 of Rainbow Hospitals.

Rainbow hospitals leads the set of players considered and ranks 1st in terms of current ratio, net cash accrual to debt ratio and OPBDIT/CFO ratio in FY20. In terms of the working capital cycle, the peers considered are at par given the nature of the industry. Negative working capital cycle indicating that the players' receivables come in much faster than the payables cycle.

Rainbow hospitals have the highest OPBDIT margin as of FY21 and FY20 among the peers considered



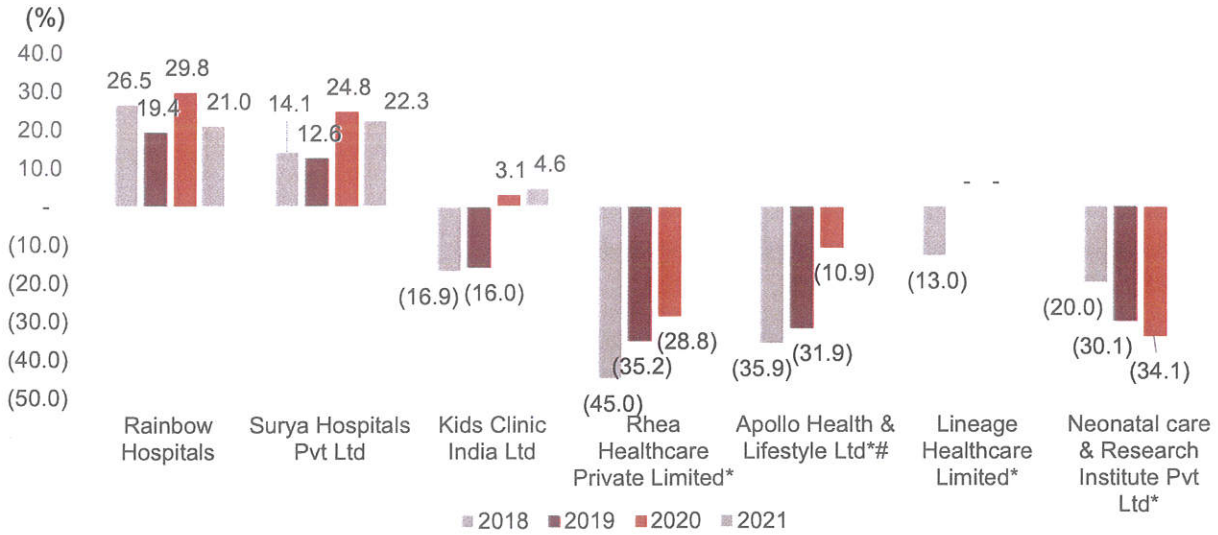
Note: The above financials in the report for Surya Hospitals and Neonatal care & Research Institute are on standalone basis and the rest are on consolidated basis

*The above financials in the report are available 3till FY20

#Apollo Health & Lifestyle Ltd has numerous businesses and one of them is Apollo cradle and children's hospital. Financials are for Apollo Health & Lifestyle Ltd

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

Rainbow hospitals rank 1st in terms of RoCE in FY20, among the peers considered



Note: The above financials in the report for Surya Hospitals and Neonatal care & Research Institute are on standalone basis and the rest are on consolidated basis

*The above financials in the report are available till FY20

#Apollo Health & Lifestyle Ltd has numerous businesses and one of them is Apollo cradle and children's hospital. Financials are for Apollo Health & Lifestyle Ltd

Note: For Lineage Healthcare, the RoCE is not meaningful for FY19-20

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

6.2 Comparative analysis of key single-speciality and multi-speciality hospital chains

In this section, CRISIL Research has compared the key single-speciality and multi-speciality hospital chains operating in India. We have obtained data in this section from publicly available sources, including annual reports and investor presentations of listed players, regulatory filings, rating rationales, and company websites, as relevant.

For this assessment, we have considered the following key players:

Rainbow Children's Medicare Ltd (Rainbow Hospitals), Apollo Hospitals Enterprise Ltd, Fortis Healthcare Ltd, Max Healthcare Institute Ltd, Narayana Hrudayalaya Ltd, Krishna Institute Of Medical Sciences Ltd, Shalby Ltd, and Healthcare Global Enterprises Ltd.

Key operational parameters of major players

Key operational parameters

Key operational parameters (FY21)	No of Hospitals	No of beds	ARPOB (Rs '000 per day)	ALOS
Rainbow Children's Medicare Ltd^	14	1,475	40.9	2.6
Apollo Hospitals Enterprise Ltd	71	10,209	40.2	4.2
Fortis Healthcare Ltd	26	5,310	43.3	3.6
Max Healthcare Group	16	3,400	50.1	5.2
Narayana Hrudayalaya Ltd	21	6,725	28.5	4.6
Krishna Institute Of Medical Sciences Ltd	9	3,064	20.6	5.5
Shalby Ltd	11	2,012	27.4	3.2
Healthcare Global Enterprises Ltd*	22	2,036	32.6	2.3

^Operational data for Rainbow Children's Medicare is based on the data provided by the company

** The data in the table is of Q1FY22*

Source: Company reports, CRISIL Research

Key financial parameters of major players

Key financial parameters

Key financials (FY21)	Operating income		OPBDIT		PAT	
	Rs million	CAGR FY19 to FY21	Rs million	CAGR FY19 to FY21	Rs million	CAGR FY19 to FY21
Rainbow Children's Medicare Ltd^	6,501	9.4%	1,629	22.3%	396	-17.4%
Apollo Hospitals Enterprise Ltd	1,05,607	4.8%	11,381	2.9%	1,368	-17.3%
Fortis Healthcare Ltd	39,796	-5.1%	3,471	26.5%	(562)	-50.3%
Max Healthcare Group	38,610	-0.8%	6,360	35.2%	(950)	25.8%
Narayana Hrudayalaya Ltd	25,910	-4.8%	1,908	-19.5%	(207)	n.m.
Krishna Institute Of Medical Sciences Ltd*	11,262	10.6%	2,543	22.8%	1,151	n.m.
Shalby Ltd	4,309	-3.4%	864	2.0%	406	13.2%

Key financials (FY21)	Operating income		OPBDIT		PAT	
	Rs million	CAGR FY19 to FY21	Rs million	CAGR FY19 to FY21	Rs million	CAGR FY19 to FY21
Healthcare Global Enterprises Ltd*	6,886	3.5%	1,244	11.4%	(545)	n.m.

^Financials for Rainbow Children's Medicare are based on financials provided by the company

** The financials in the table are of fiscal 2020*

n.m.: Not meaningful

Source: Company reports, CRISIL Research

Key financial ratios

Key financial ratios (FY21)	OPBDIT margin (%)	Net profit margin (%)	RoCE (%)	RoE (%)	Gearing (times)	Interest coverage (times)	Current ratio	Net cash accruals to debt	Working capital days	OPBDIT/ CFO
Rainbow Children's Medicare Ltd^	25.1	6.1	21.0	9.6	0.1	3.9	1.6	2.0	(119)	1.7
Apollo Hospitals Enterprise Ltd	10.8	1.3	9.5	3.7	0.7	2.8	1.3	0.2	(18)	1.2
Fortis Healthcare Ltd	8.7	(1.4)	4.8	(1.8)	0.4	3.0	0.8	0.2	(155)	2.8
Max Healthcare Institute Ltd#	16.5	(2.5)	4.5	(45.8)	1.3	1.5	1.5	0.0	(187)	(3.1)
Narayana Hrudayalaya Ltd	7.3	(0.8)	0.7	(2.1)	0.8	2.6	0.8	0.2	(174)	1.1
Krishna Institute Of Medical Sciences Ltd*	22.6	10.2	22.5	23.8	0.6	5.8	1.0	0.6	(119)	1.0
Shalby Ltd	20.1	9.4	6.5	5.1	0.1	25.9	3.1	1.6	(507)	1.1
Healthcare Global Enterprises Ltd*	18.1	(7.9)	1.6	(9.7)	1.0	1.2	0.5	0.1	(151)	0.9

^Financials for Rainbow Children's Medicare are based on financials provided by the company

** The financials in the table are of fiscal 2020*

#OPBDIT margin and Net profit margin are at Group level

Ratios calculated as per CRISIL Research standards are described below:

- OPBDIT margin = OPBDIT / operating income
- Net profit margin = Profit after tax / operating income
- RoCE = Profit before interest and tax (PBIT) / [total debt + adjusted net worth (includes only goodwill as part of intangible net worth) + deferred tax liability]
- RoE = PAT / Tangible Net Worth
- Gearing ratio = Adjusted Debt / Adjusted Net worth
- Interest coverage ratio = Profit before depreciation, interest and tax / (interest + finance charges)
- Current ratio = Current assets / Current liabilities
- Net cash accruals to debt = Net Cash Accruals / Adjusted Debt
- Working capital days = Receivable days + inventory days - payable days

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

Source: Company reports, CRISIL Research

7 Addendum I- 21st February 2022 to the report "Assessment of maternity and paediatric healthcare delivery sectors in India"

The following section is an addendum I to the report, "Assessment of maternity and paediatric healthcare delivery sectors in India", dated November 2021. CRISIL Research has provided this addendum to cover relevant macroeconomic update and competition analysis of key players in the domestic maternity and paediatric healthcare delivery market for the fiscal year ended March 2021 (FY 2021). All other sections of the original report remain unchanged.

Section 7.1 is hidden because the updated content in the section has been presented in section 8.1.

7.1 Review of India's GDP growth

GDP grew at 6.6% CAGR from 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 146 trillion in fiscal 2020 from Rs 87 trillion in fiscal 2012.

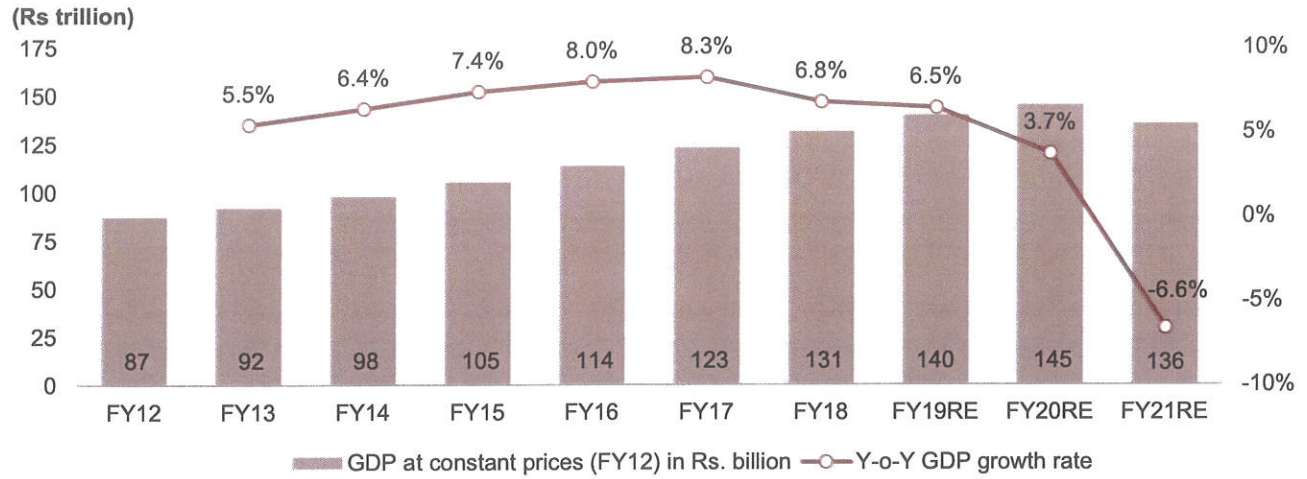
Fiscal 2021 has been a challenging year for the Indian economy, which was already experiencing a slowdown before the pandemic struck. GDP contracted 6.6% (in real terms) last fiscal, after growing 3.7% in fiscal 2020. At Rs 136 trillion in fiscal 2021, India's GDP (in absolute terms) went even below the fiscal 2019 level of Rs 140 trillion.

Economy re-bounded in second half of fiscal 2021 after shrinking in first half of the year, recovery continues in fiscal 2022

After contracting in the first half because of a virulent second wave of Covid-19, the economy rebounded in the second half, growing 0.5% and 1.6% on-year in the third and fourth quarters, respectively. While the economy shrank as a whole 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 labour-intensive sector – was also severely hit in the first half, but rebounded in the second half.

The economy is in recover mode, with GDP expanding 20.1% on-year in the first quarter of fiscal 2022 and 8.4% on-year in the second quarter of fiscal 2022. In absolute terms GDP for the second quarter of fiscal 2022 has just crossed the GDP value reported in first quarter of fiscal 2020 (pre-covid), reporting a rise of 0.2%. The economic rebound comes on the back of reduced pandemic restrictions and improving vaccination coverage.

Real GDP growth in India (new GDP series)



RE: Revised estimates

Source: Second advance estimates of national income 2020-21, Central Statistics Office (CSO), MoSPI, CRISIL Research

Gross value added (GVA) at basic prices (constant 2011-12 prices)

Rs trillion	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21PE	FY22AE	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	136.7	5.4%
Y-o-y growth (%)		5.4%	6.1%	7.1%	8.0%	8.0%	6.2%	5.8%	3.8%	-4.8%	8.6%	

PE: Provisional estimate

Note: CAGR is between fiscals 2012 and 2021

Source: CRISIL Research

Fiscal 2022 GDP growth expected to be 9.2%

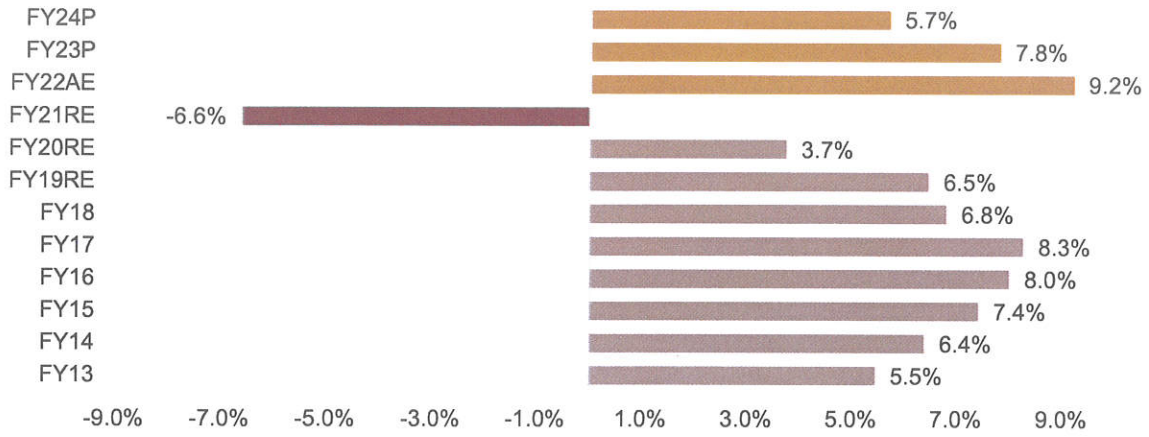
India is getting back on its feet slowly, with divergent growth trends. Though data suggests there has been some pick-up in recent months, recovery is weak and uneven. And indeed, the scars of the pandemic continue to run deep for small businesses, the urban poor and most of the services sector.

Fiscal 2022 is also seen emerging as a story of two halves. The first half will be characterised by a base effect-driven recovery amid the challenge associated with resurgence in Covid-19 infections. But the second half has see a more broad-based growth, as vaccine rollout and lesser nationwide restrictions 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.

Real GDP growth (% on-year)



AE: Advanced estimates; P: Projected by CRISIL Research; GDP calls updated as of Jan 2022;
Source: Advanced estimates of national income 2020-21, CSO, MoSPI, CRISIL Research

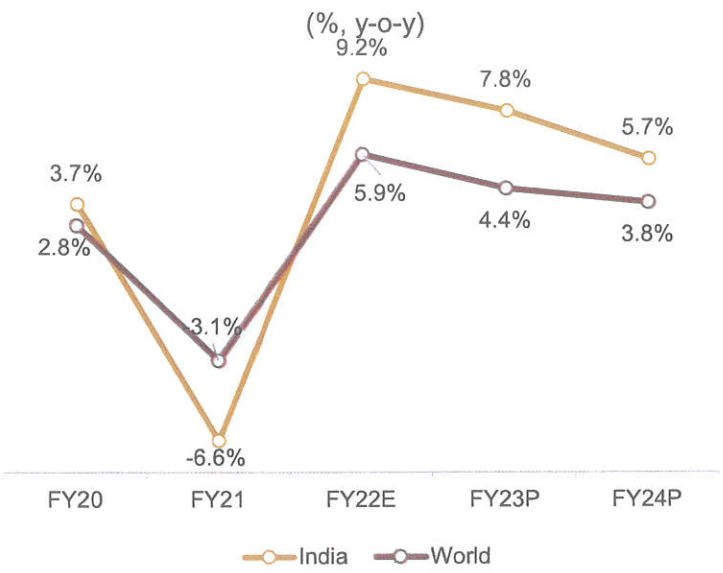
CRISIL forecasts India's GDP growth to rebound to 9.2% in fiscal 2022 as following drivers converge:

Weak base: A 6.6% contraction in GDP in fiscal 2021 will provide a statistical push to growth next fiscal.

Global upturns: Higher global growth in 2021, i.e., world GDP up by 5.9%, advanced economies 5.0%, emerging economies 6.5%, should lift exports.

Fiscal push: Stretch in the fiscal glide path and focus of the Union Budget 2021-22 on capex are expected to have a multiplier effect on growth.

India to surpass global GDP growth in next three fiscals



GDP growth to rebound to 9.2% this fiscal on the back of a very weak base and the rising-global-tide effect

CRISIL sees India's GDP growth rebounding to 9.2% 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. Yet, the economy is expected to reach pre-pandemic levels only by the second quarter of this fiscal. Services will take longer to recover than manufacturing. Beyond fiscal 2022, India is seen growing faster than the world. Over fiscals 2023-24, growth is seen averaging at ~6.7% annually.

Note: Forecasts for World are for calendar year; FY20 corresponds to 2019 and so on; P: Projected; India numbers for FY20,FY21 and FY22 are based on MoSPI's latest GDP estimates and FY23 onwards are CRISIL Research's forecast. World GDP growth rates are from IMF world economic outlook update as of January 2022.

Source: S&P Global Ratings, CRISIL

7.2 Competition analysis in maternity and antenatal care in India

Comparative analysis of players in the maternity and pediatric healthcare delivery sector

In this section, CRISIL Research has compared the key players in the maternity and pediatric healthcare delivery sector. We have obtained data in this section 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:

Rainbow Children's Medicare Ltd (Rainbow Hospitals), Neonatal care & Research Institute Pvt Ltd (Ovum Woman & Child Speciality Hospital), Surya Hospitals Pvt Ltd, Rhea Healthcare Private Limited (Motherhood Hospital), Apollo Health & Lifestyle Ltd (Apollo Cradle), Kids Clinic India Ltd (Cloudnine Hospital), and Lineage Healthcare Limited (Cocoon Hospital)

Key operational parameters of major players

Operational parameters, FY21

Parameter	Rainbow Children's Medicare Ltd	Surya Hospitals Pvt Ltd	Kids Clinic India Ltd	Rhea Healthcare Pvt Ltd	Apollo Health & Lifestyle Ltd (Apollo Cradle)	Lineage Healthcare Ltd	Neonatal care & Research Institute Pvt Ltd
Number of hospitals	14 hospitals, 3 clinics	3 hospitals	20+ hospitals	16 hospitals, 4 clinics	14 hospitals, 8 clinics	1 hospital	3 hospital, 1 clinic
Number of beds	Total: 1475 NICU: 311 PICU: 162	Total: 322 NICU: 141 PICU: 41	Total: 900 NICU: 76 PICU: 8	Total: 475 NICU: 78 PICU: 27	Total: 471 NICU: 81 PICU: 11	NICU: 14	Total: 90 NICU: 20
Geographical presence	Hyderabad, Bengaluru, New Delhi, Vijayawada, Visakhapatnam and Chennai	Mumbai, Jaipur, and Pune	Bengaluru, Chennai, Mumbai, Gurugram, Pune, Chandigarh, Noida, Panchkula, and New Delhi	Bengaluru, Chennai, Coimbatore, Indore, Mumbai, Noida, Pune, and Chandigarh	Bengaluru, Delhi-NCR, Hyderabad, Pune, Chennai, and Amritsar	Jaipur	Bengaluru
Specialty mix	Pediatric surgery, Neonatology, Pediatric ICU, Paediatric neurology, Paediatric nephrology, Pediatric	High Risk Pregnancy, Gynecology, Endoscopy, Laparoscopic Gynecology Surgeries, Neonatology, Pediatric	Maternity, Gynecology, Pediatric Care, Fertility, Radiology, Physiotherapy, Stem cell bank, Intensive care, Neonatal care,	Gynecology, Fertility, Pediatrics, Neonatology, Cosmetology, Radiology, Physiotherapy, Pregnancy care etc.	Maternity, Gynecology, Neonatology, Pediatrics, Foetal medicine, Fertility, high Risk	Antenatal care, Neonatology, Stem cell preservation, Laparoscopic gynecology surgeries, Cosmetology	Maternal health, neonatal ICU, Pediatrics, fertility services, physiotherapy, Ultrasonography etc.

Parameter	Rainbow Children's Medicare Ltd	Surya Hospitals Pvt Ltd	Kids Clinic India Ltd	Rhea Healthcare Pvt Ltd	Apollo Health & Lifestyle Ltd (Apollo Cradle)	Lineage Healthcare Ltd	Neonatal care & Research Institute Pvt Ltd
	Hemato oncology and BMT, Gastroenterology, Neurosurgery, Pediatric rheumatology, Kidney and Liver transplant, Pediatric Allergy, Paediatric endocrinology, Pediatric pulmonology, Dermatology, Urology, Psychiatry Obstetrics, Gynecology, High Risk pregnancy, Fertility etc.	Intensive Care, Fertility, etc.	cosmetology etc.		pregnancy etc.	& Cosmetic Surgeries etc.	
Accredited DNB, DrNB and FNB seats*	43	10	-	-	-	-	-

Note: The data given above is only indicative and not exhaustive

*Accredited DNB seats are of the specialties associated with Paediatrics and Neonatology

Source: Company annual reports/investor presentations/website, National Board of examinations, CRISIL Research

Among the peers considered, Kids Clinic India Ltd has the highest centres with more than 20+ hospitals. It is followed by Apollo Cradle and Rainbow Hospitals.

In terms of beds, Rainbow hospital ranks 1st, followed by Kids Clinic. Rainbow has highest number of NICU and PICU beds by a significant margin compared to the peers considered. The group has significant presence in the Southern region.

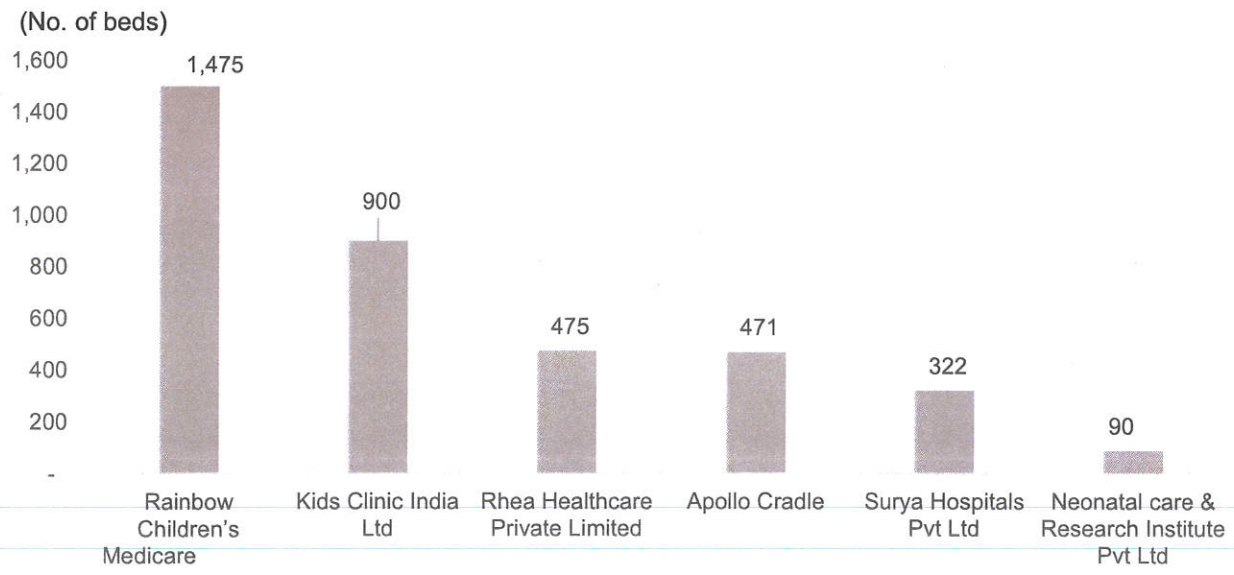
Majority of the peers considered have overlaps in the specialty mix. However, Rainbow's specialty mix focuses more on paediatric care across niche areas such as Neurology, Nephrology, Gastroenterology, Oncology and Cardiology etc. Rainbow Children's Hospital & Birthright, Banjara Hills, Hyderabad facility offers wide range of neurological services to the patients such as child epilepsy, autism spectrum disorders, vascular neurology and intellectual disability.

Given the wide range of speciality offering mix, Rainbow can be classified as a standalone paediatric multi-specialty hospital chain. ~90% of the beds offered by Rainbow are in Southern region with facilities such as Rainbow Children's Hospital & Birthright, Banjara Hills, Hyderabad; Rainbow Children's Hospital & Birthright – Marathahalli, Bengaluru; and Rainbow Children's Hospital & Birthright, Currency Nagar – Vijayawada making it one of the few pediatric focused hospital chain in the region.

Diplomat of National Board (DNB) is a post-graduate master's degree same as MD/MS degree awarded to the specialist doctors in India. DNB courses are run and the degrees are awarded by the National Board of Examinations (NBE). Doctorate of National Board (DrNB) is a post MD/MS/DNB super speciality degree awarded by NBE. The NBE also runs postdoctoral fellowship programme in select subspecialties. On successful completion of the course, the candidates are awarded Fellow of National Board (FNB).

Rainbow Hospitals offer 43 total number of seats in the specialities associated with Paediatrics and Neonatology which is highest among the peer set considered. These courses offer a key competitive advantage to the hospitals running the program since sourcing and holding onto quality paediatric doctor talent is challenging. Also the doctors who complete the may refer tertiary / quaternary cases to the hospital they got trained in. Apollo Hospitals Enterprise Limited, which is one of the largest multi-specialty hospital chain offer a total of 47 seats in the specialities associated with Paediatrics and Neonatology.

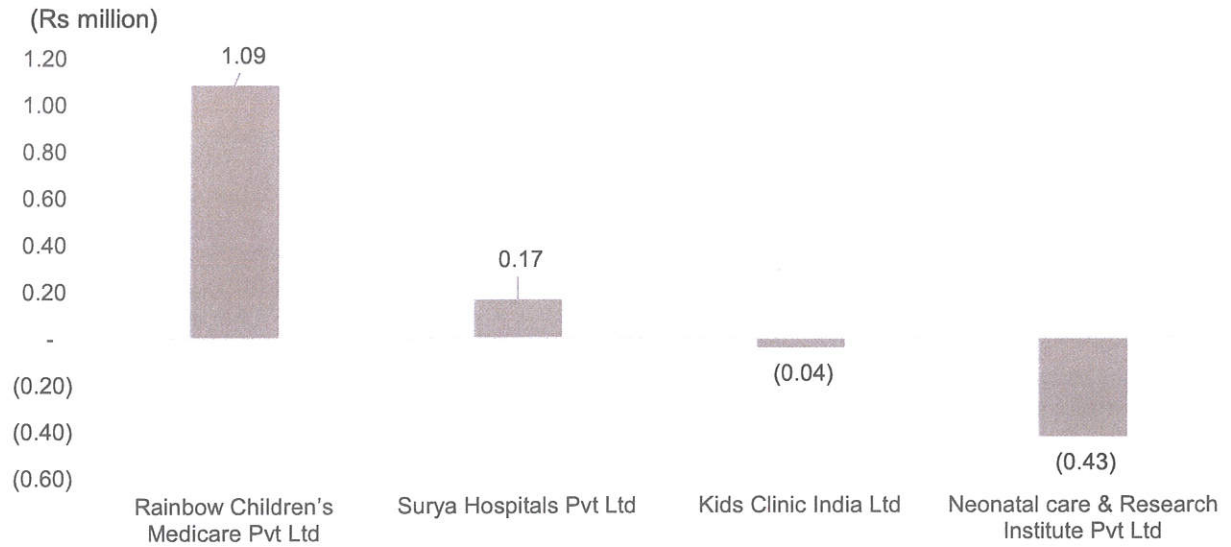
Rainbow hospitals has the highest number of beds as of FY21 among the peers considered



Note: The data given above is only indicative and not exhaustive

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

Rainbow hospital has the highest OPBDIT (FY21) / Bed ratio among the peers considered



Note: The above financials (FY21) in the report for Surya Hospitals and Neonatal care & Research Institute are on standalone basis and the rest are on consolidated basis. Total beds data for Lineage Healthcare Limited was not available. Financial data of FY21 for Apollo Health & Lifestyle, and Rhea Healthcare was not available in public domain.

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

India's maternity and pediatric healthcare delivery sector is catching up to children hospitals in United States in terms of specialty offerings and hospital-clinic network

The healthcare model existing in the United States for children is a benchmark for medical care across the world. The country has more than 250 children hospital accounting for nearly 95% of the tertiary care with respect to children. Further, these hospitals also incorporate women care into their specialties given the instances such as high-risk pregnancies which make the need for integrated mother and child care imperative. Such dedicated children's hospital are limited in India. However, major players like Rainbow hospitals whose model corresponds to dedicated children care similar to children's hospitals in United States, are making headway in this space.

Major children's hospital in United States

Parameter (CY 2020)	Children's Hospital of Philadelphia, United States	Texas Children's Hospital	Boston Children's Hospital
Net patient service revenue ($ billion)	2.54	2.15	2.05
Total beds	567	650	395
Geographic presence	50+ locations including main campus, and a network of primary care centres, specialty care centres, urgent care centres and community hospital alliances.	10+ locations comprising of hospitals and specialty care centres	Over 750 affiliated Boston Children's physicians, and 7 community hospitals

Parameter (CY 2020)	Children's Hospital of Philadelphia, United States	Texas Children's Hospital	Boston Children's Hospital
Residents and Fellows	Total Residents: 155 Total Fellows: 298	Total Residents: 371 Total Fellows: 350	500 BCH-based residents and clinical fellows annually
Specialty mix	Pediatric specialties include: Cancer, Cardiac Care, Foetal Medicine, Orthopaedics, Neonatology, Diabetes, Gastroenterology, Urology etc Programs for special disorders: Hyperinsulinism, Thoracic Insufficiency Syndrome, Cornelia De Lange Syndrome, Eosinophilic Esophagitis And Biliary Atresia	More than 40 pediatric specialties: Oncology, Hematology, Urology, Otolaryngology, Foetal Care, Gastroenterology, Hepatology And Nutrition, Cardiology, Neuroscience, Orthopedics, Plastic Surgery etc	Pediatric specialties include: cardiology, gastroenterology, neurology, respiratory diseases, diabetes, orthopedic surgery, urology, behavioral health and other specialties

Source: Children's Hospital of Philadelphia, CRISIL Research

Key financial parameters of major players

Key financial parameters

Key financials (FY21)	Operating income			OPBDIT			PAT		
	FY21 Rs mn	FY18 Rs mn	CAGR FY18 to FY21	FY21 Rs mn	FY18 Rs mn	CAGR FY18 to FY21	FY21 Rs mn	FY18 Rs mn	CAGR FY18 to FY21
Rainbow Children's Medicare Ltd	6,501	4,018	17%	1,629	673	34%	673	363	3%
Kids Clinic India Ltd	5,546	3,502	17%	765	(325)	n.m.	(385)	(495)	n.m.
Neonatal care & Research Institute Pvt Ltd	461	297	16%	(38)	(20)	n.m.	(61)	(32)	n.m.
Surya Hospitals Pvt Ltd	223	123	22%	54	25	30%	31	7	61%
Lineage Healthcare Limited	189	135	9%.	24	(18)	n.m.	(55)	(86)	n.m.

Key financials (FY20)	Operating income			OPBDIT			PAT		
	FY20 Rs mn	FY18 Rs mn	CAGR FY18 to FY20	FY20 Rs mn	FY18 Rs mn	CAGR FY18 to FY20	FY20 Rs mn	FY18 Rs mn	CAGR FY18 to FY20
Apollo Health & Lifestyle Ltd*	6,964	4,589	23%	656	(1,124)	n.m.	(770)	(260)	n.m.
Rhea Healthcare Private Limited	2,849	734	97%	(282)	(179)	n.m.	(539)	(1,657)	n.m.

Note: **Data for FY21 is not available in public domain

The above financials in the report for Surya Hospitals, Lineage Healthcare, and Neonatal care & Research Institute are on standalone basis and the rest are on consolidated basis;

*Apollo Health & Lifestyle Ltd has numerous businesses and one of them is Apollo cradle and children's hospital. Financials are for Apollo Health & Lifestyle Ltd

n.m.: Not meaningful; OPBDIT: Operating profit before depreciation, interest and tax; PAT: Profit after tax

Source: Company annual reports, CRISIL Research

Among the key players considered in the maternity and pediatric healthcare delivery sector, as of FY21, Rainbow hospitals had the highest operating income at Rs 6,501 million, followed by Kids Clinic India Ltd at Rs 5,546 million. In terms of the CAGR for operating income from FY18-21, Surya Hospitals ranks 1st (22%), followed by Rainbow and Kids Clinic each at 17%

In terms of the PAT, majority of the players considered are non-profitable. Rainbow hospitals ranks 1st with a PAT of Rs 396 million in fiscal 2021, higher than the peers considered. On account of losses, the CAGR for majority of the players considered is not meaningful. Rainbow Hospitals have logged a strong CAGR of 34% from FY18-21, in OPBDIT, followed by Surya Hospitals at 30% CAGR. In terms of CAGR for PAT, the situation reverses in the favour of Surya Hospitals, logging 61% CAGR from FY18-21, followed by Rainbow at 3%

Key financial ratios of major players

Key financial ratios (FY21)	OPBDIT margin (%)	Net profit margin (%)	RoCE (%)	Gearing (times)	Interest coverage (times)	Current ratio	Net cash accruals to debt	Working capital days	OPBDIT/CFO
Rainbow Children's Medicare Ltd	25.1	6.1	21.0	0.1	3.9	1.6	2.0	(119.0)	1.7
Kids Clinic India Ltd	13.8	(6.9)	4.6	0.2	1.8	0.3	0.9	(222.5)	1.2
Neonatal care & Research Institute Pvt Ltd	(8.3)	(13.2)	(28.8)	0.2	(27.5)	1.0	(1.0)	(184.7)	n.m.
Surya Hospitals Pvt Ltd	24.3	13.8	22.3	0.7	21.2	0.8	0.5	(243.0)	0.8
Lineage Healthcare Limited	12.7	(29.2)	28.7	n.m.	0.4	0.0	(0.1)	(709.9)	n.m.

Key financial ratios (FY20)**	OPBDIT margin (%)	Net profit margin (%)	RoCE (%)	Gearing (times)	Interest coverage (times)	Current ratio	Net cash accruals to debt	Working capital days	OPBDIT/CFO
Apollo Health & Lifestyle Ltd*	9.4	(11.1)	(10.9)	n.m.	1.2	0.8	0.0	(394.2)	1.6
Rhea Healthcare Private Limited	(9.9)	(18.9)	(28.8)	n.m.	(0.6)	0.3	(0.2)	(213.6)	0.8

Note: ** Data for FY21 is not available in public domain

The above financials in the report for Surya Hospitals, Lineage Healthcare, and Neonatal care & Research Institute are on standalone basis and the rest are on consolidated basis;

*Apollo Health & Lifestyle Ltd has numerous businesses and one of them is Apollo cradle and children's hospital. Financials are for Apollo Health & Lifestyle Ltd

n.m.: Not meaningful; RoCE: Return on capital employed; NA: Not available due to insufficient data;

Ratios calculated as per CRISIL Research standards are described below:

- OPBDIT margin = OPBDIT / operating income
- Net profit margin = Profit after tax / operating income
- RoCE = Profit before interest and tax (PBIT) / [total debt + adjusted net worth (includes only goodwill as part of intangible net worth) + deferred tax liability]
- Gearing ratio = Adjusted Debt / Adjusted Networth
- Interest coverage ratio = Profit before depreciation, interest and tax / (interest + finance charges)
- Current ratio = Current assets / Current liabilities
- Net cash accruals to debt = Net Cash Accruals / Adjusted Debt
- Working capital days = Receivable days + inventory days - payable days

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

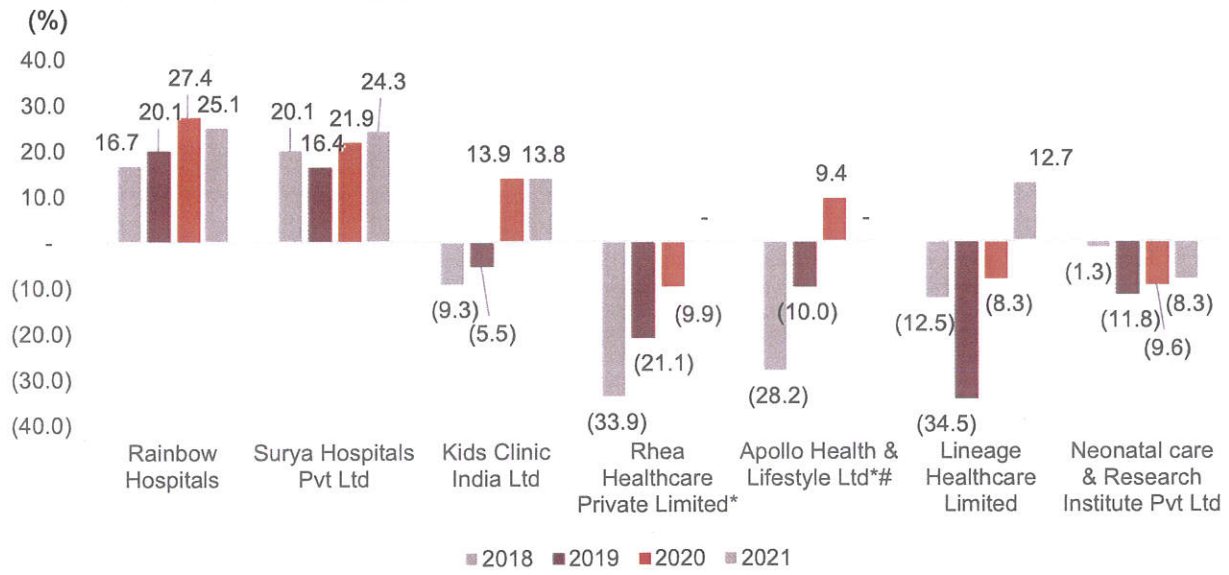
Source: Companies' annual reports, CRISIL Research

In terms of OPBDIT margin in FY21, Rainbow hospitals ranks 1st among the peers considered, followed by Surya hospital and Kids Clinic. Further, PAT margin for FY21 is 6.1% and 13.8% for Rainbow and Surya respectively, while for all other peers considered, PAT margin is negative for the fiscal.

As of FY21, Lineage Healthcare has the highest RoCE (28.7%) among the peers considered, followed by Surya at 22.3% and then by Rainbow at 21.0%. The rest of the peers compared have either negative or a low RoCE. In terms of the gearing ratio, Rainbow hospitals has the lowest ratio of 0.1 in FY21 amongst the peers considered. Neonatal and Kids clinic are at par with each other with a ratio of 0.2. With regards to the interest coverage ratio in FY21, Surya hospital comes in first with a ratio of 21.2, followed by Rainbow Hospitals with a ratio of 3.9.

Rainbow hospitals leads the set of players considered and ranks 1st in terms of current ratio, net cash accrual to debt ratio and OPBDIT/CFO ratio in FY21. In terms of the working capital cycle, the peers considered are at par given the nature of the industry. Negative working capital cycle indicating that the players' receivables come in much faster than the payables cycle.

Rainbow hospitals have the highest OPBDIT margin as of FY21 and FY20 among the peers considered



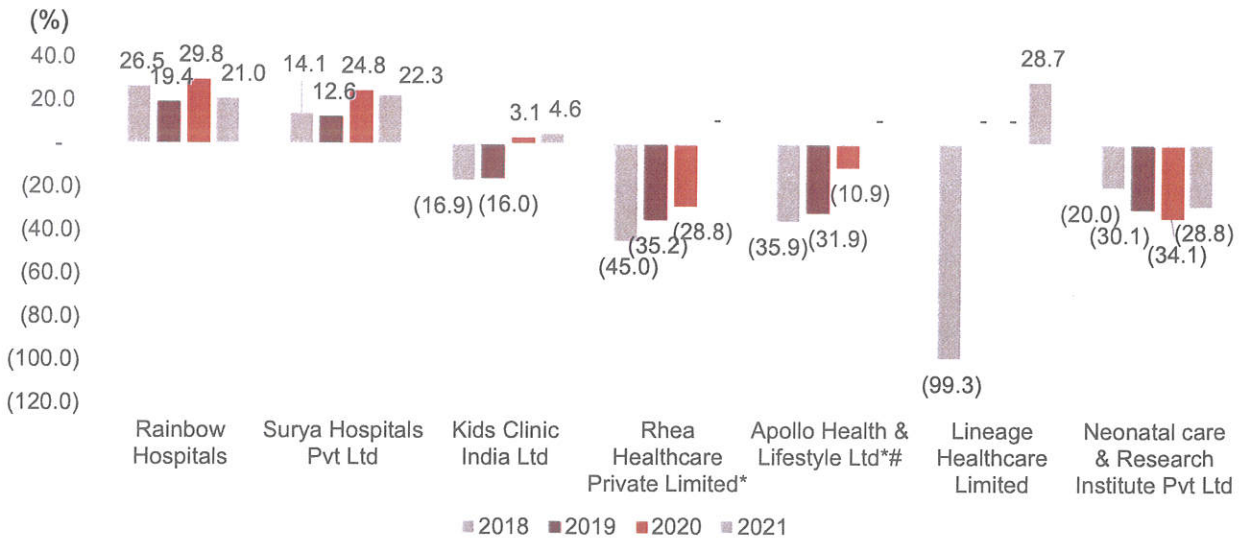
The above financials in the report for Surya Hospitals, Lineage Healthcare, and Neonatal care & Research Institute are on standalone basis and the rest are on consolidated basis;

*The above financials in the report are available till FY20

#Apollo Health & Lifestyle Ltd has numerous businesses and one of them is Apollo cradle and children's hospital. Financials are for Apollo Health & Lifestyle Ltd

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

Rainbow hospitals rank 3rd in terms of RoCE in FY21, among the peers considered



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*The above financials in the report are available till FY20

#Apollo Health & Lifestyle Ltd has numerous businesses and one of them is Apollo cradle and children's hospital. Financials are for Apollo Health & Lifestyle Ltd

Note: For Lineage Healthcare, the RoCE is not meaningful for FY19 and FY20

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

8 Addendum II- 11th April 2022 to the report "Assessment of maternity and paediatric healthcare delivery sectors in India"

The following section is an addendum II to the report, "Assessment of maternity and paediatric healthcare delivery sectors in India", dated November 2021. CRISIL Research has provided this addendum to cover relevant macroeconomic update and competition analysis of key single-speciality and multi-speciality hospital chains in the domestic healthcare delivery market for the fiscal year ended March 2021 (FY 2021). All other sections of the original report remain unchanged.

8.1 Review of India's GDP growth

GDP grew at 6.6% CAGR from 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 146 trillion in fiscal 2020 from Rs 87 trillion in fiscal 2012.

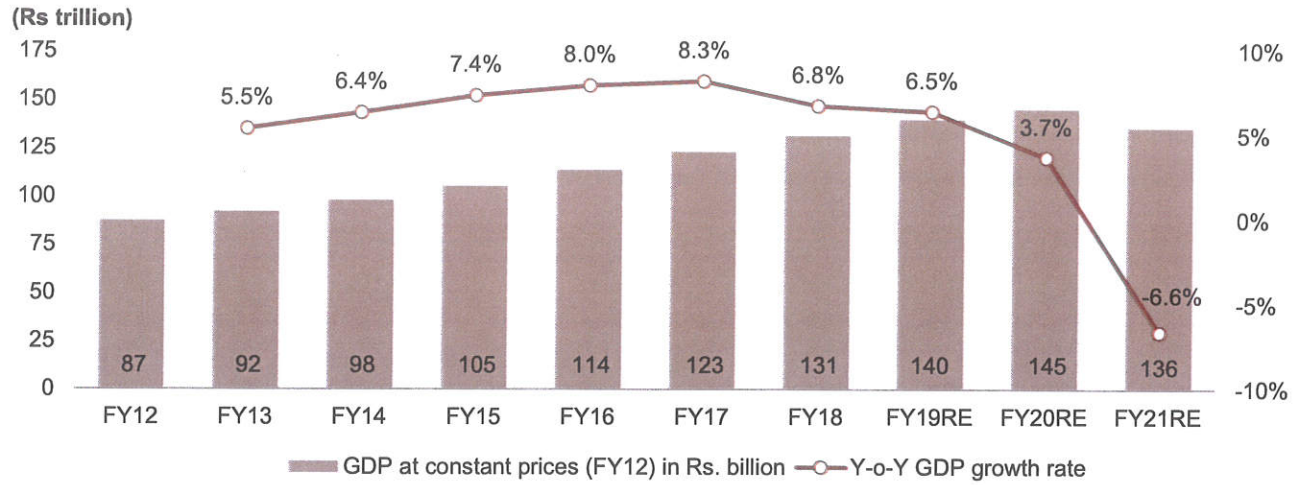
Fiscal 2021 has been a challenging year for the Indian economy, which was already experiencing a slowdown before the pandemic struck. GDP contracted 6.6% (in real terms) last fiscal, after growing 3.7% in fiscal 2020. At Rs 136 trillion in fiscal 2021, India's GDP (in absolute terms) went even below the fiscal 2019 level of Rs 140 trillion.

Economy re-bounded in second half of fiscal 2021 after shrinking in first half of the year, recovery continues in fiscal 2022

After contracting in the first half because of a virulent second wave of Covid-19, the economy rebounded in the second half of fiscal 2021, growing 0.5% and 1.6% on-year in the third and fourth quarters, respectively. While the economy shrank as a whole 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 contract in all the quarters. Construction – a labour-intensive sector – was also severely hit in the first half, but rebounded in the second half.

The economy is in recovery mode, with GDP expanding 20.1% on-year in the first quarter of fiscal 2022, 8.4% in the second quarter and 5.4% in the third quarter. Slower third quarter growth is partly due to the waning away of the low-base effect of the previous year, when the economy had begun expanding post the first pandemic wave. Third quarter growth also seems to have been impacted by lower government investment spend. In absolute terms, GDP for the second quarter only just crossed the value reported in the first quarter of fiscal 2020 (pre-Covid), representing a rise of 0.2%. The economic rebound comes on the back of reduced pandemic restrictions and improving vaccination coverage.

Real GDP growth in India (new GDP series)



RE: Revised estimates

Source: Second advance estimates of national income 2020-21, Central Statistics Office (CSO), MoSPI, CRISIL Research

Gross value added (GVA) at basic prices (constant 2011-12 prices)

Rs trillion	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21PE	FY22 2nd AE	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	136.2	5.4%
Y-o-y growth (%)		5.4%	6.1%	7.1%	8.0%	8.0%	6.2%	5.8%	3.8%	-4.8%	8.3%	

PE: Provisional estimate; AE: Advance Estimate

Note: CAGR is between fiscals 2012 and 2021

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.

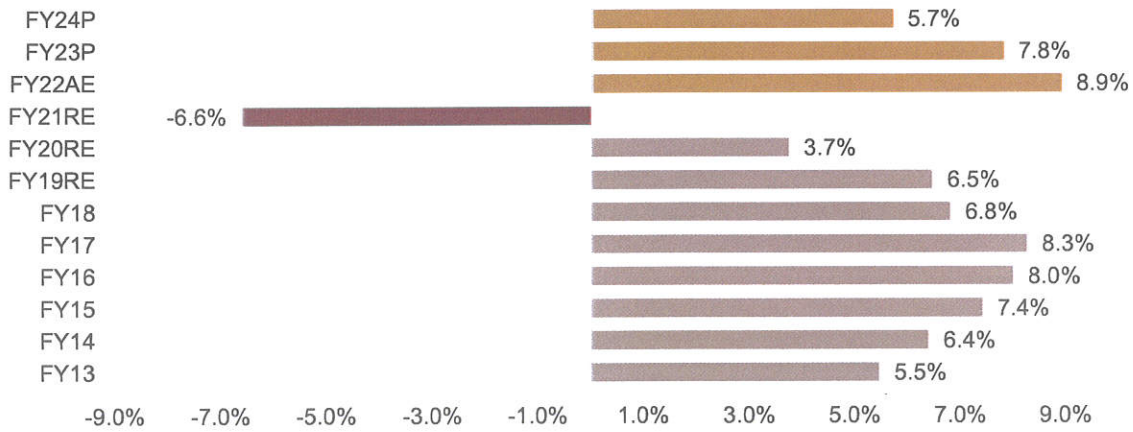
Fiscal 2022 is also seen as a story of two halves — the first half characterised by a base effect-driven recovery amid the challenges associated with resurgence in Covid-19 infections, and the second half seeing a more broad-based growth, as vaccine rollout and less stringent nationwide restrictions supporting lagging sectors. 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, leading to localised lockdowns in most states.

As per the second advance estimates released by the National Statistical Office, India's real gross domestic product (GDP) is set to grow 8.9% in fiscal 2022, compared with 9.2% estimated in January. This is largely a reflection of a higher base (as the economy had shrunk 6.6% in fiscal 2021). It is noteworthy that given the large output loss last fiscal, GDP is still only 1.8% above the pre-pandemic (fiscal 2020) level.

Private final consumption expenditure (PFCE), the largest demand-side driver, is expected to be1.2% above the fiscal 2020 level. But given that PFCE growth still trails overall GDP growth, its share in GDP is lower than in fiscal 2020, suggesting that consumption recovery is expected to be gradual because of headwinds such as high inflation and limited direct support from the government. The government consumption expenditure is expected to grow by 4.5% from fiscal 2021 level, pushing the overall GDP upwards.

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.

Real GDP growth (% on-year)



AE: Advanced estimates; P: Projected by CRISIL Research; GDP calls updated as of Jan 2022;
Source: Advanced estimates of national income 2020-21, CSO, MoSPI, CRISIL Research

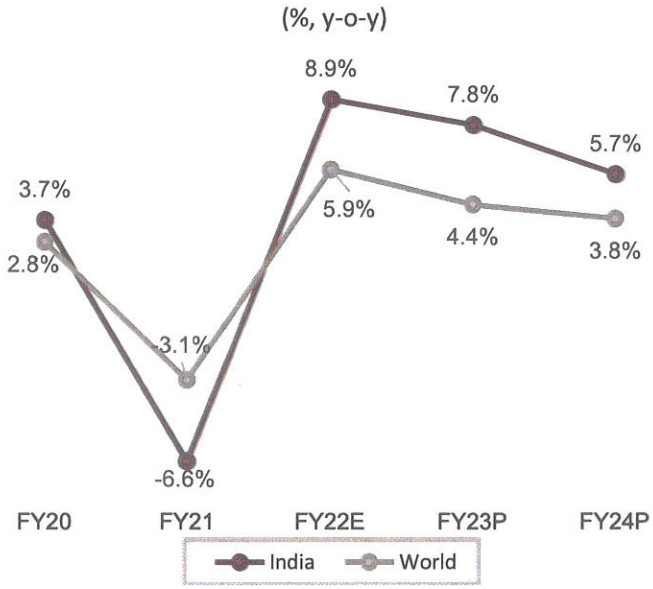
CRISIL forecasts India's GDP growth to rebound to 8.9% in fiscal 2022 as the following drivers converge:

Weak base: A 6.6% contraction in GDP in fiscal 2021 will provide a statistical push to growth next fiscal

Global upturns: Higher global growth in 2021, i.e., world GDP up by 5.9%, advanced economies 5.0%, emerging economies 6.5%, should lift exports

Fiscal push: Stretch in the fiscal glide path and focus of the Union Budget 2021-22 on capex are expected to have a multiplier effect on growth

India to surpass global GDP growth in next three fiscals



GDP growth 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. Yet, the economy is expected to reach pre-pandemic levels only by the second quarter of this fiscal. Services will take longer to recover than manufacturing. Beyond fiscal 2022, India is seen growing faster than the world. Over fiscals 2023-24, growth is seen averaging at ~6.7% annually.

Note: Forecasts for world are given for calendar year, so FY20 corresponds to 2019 and so on; P: Projected; India numbers for FY20,FY21 and FY22 are based on MoSPI's latest GDP estimates and FY23 onwards are CRISIL Research's forecast. World GDP growth rates are from IMF world economic outlook update as of January 2022.

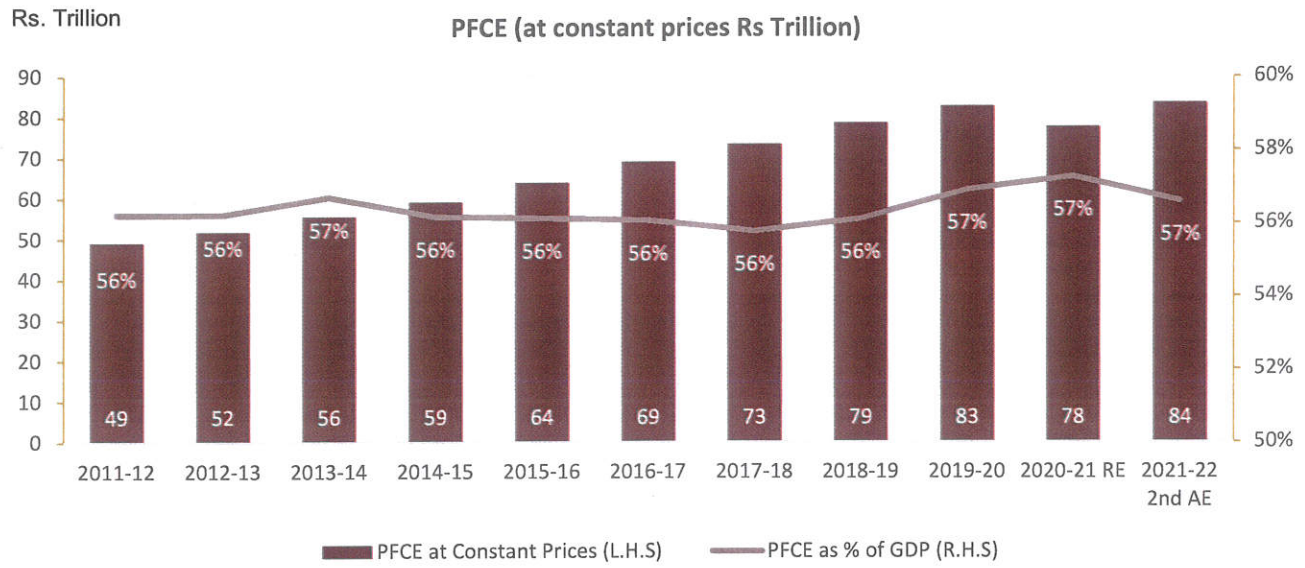
Source: S&P Global Ratings, CRISIL

8.2 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

AE: Advance estimates

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

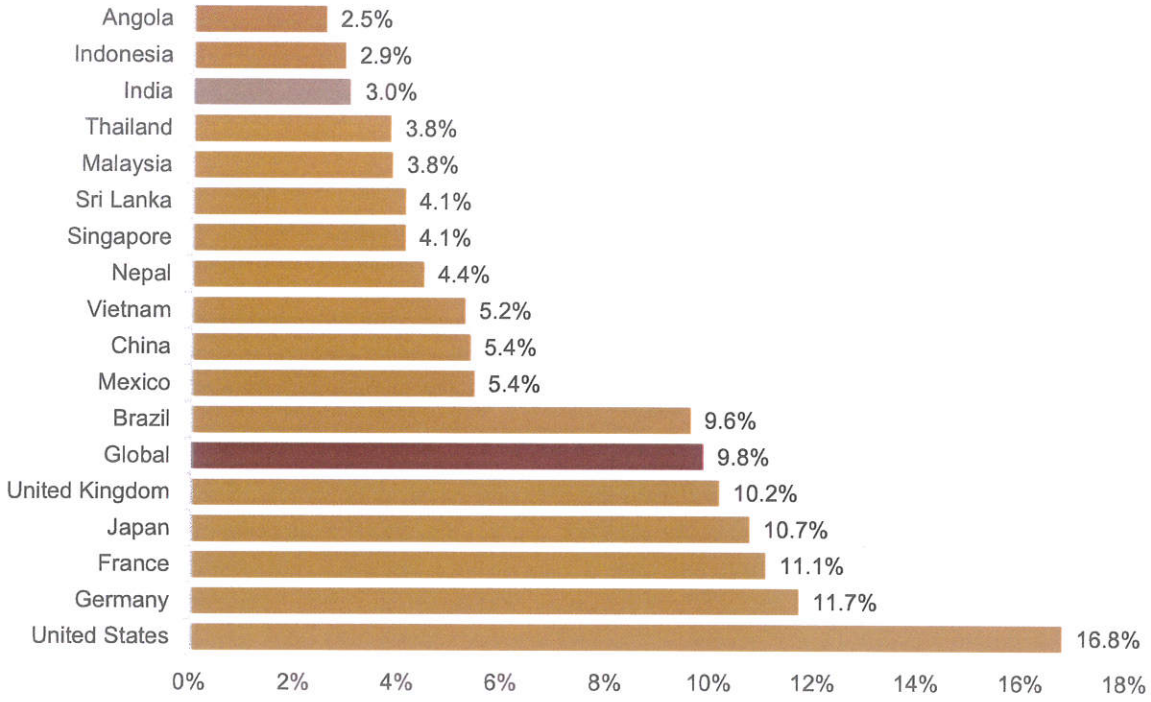
8.3 Social and healthcare related parameters

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

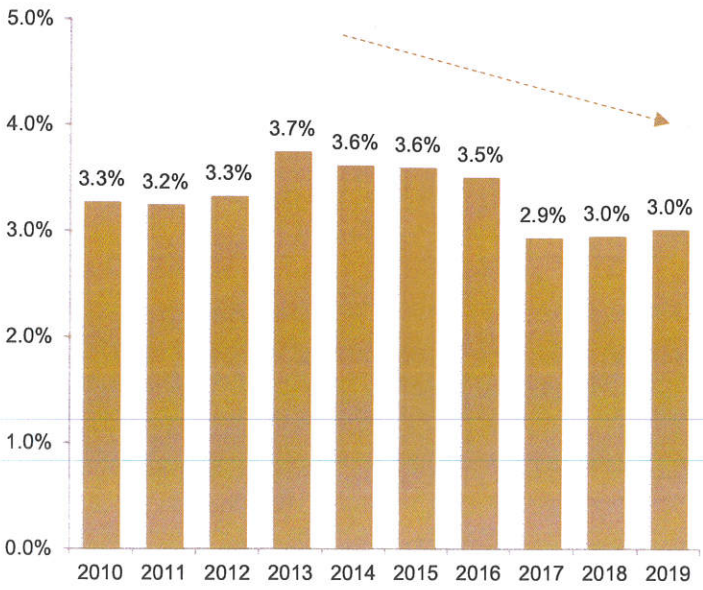
Total healthcare expenditure as % of GDP (2019)



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.

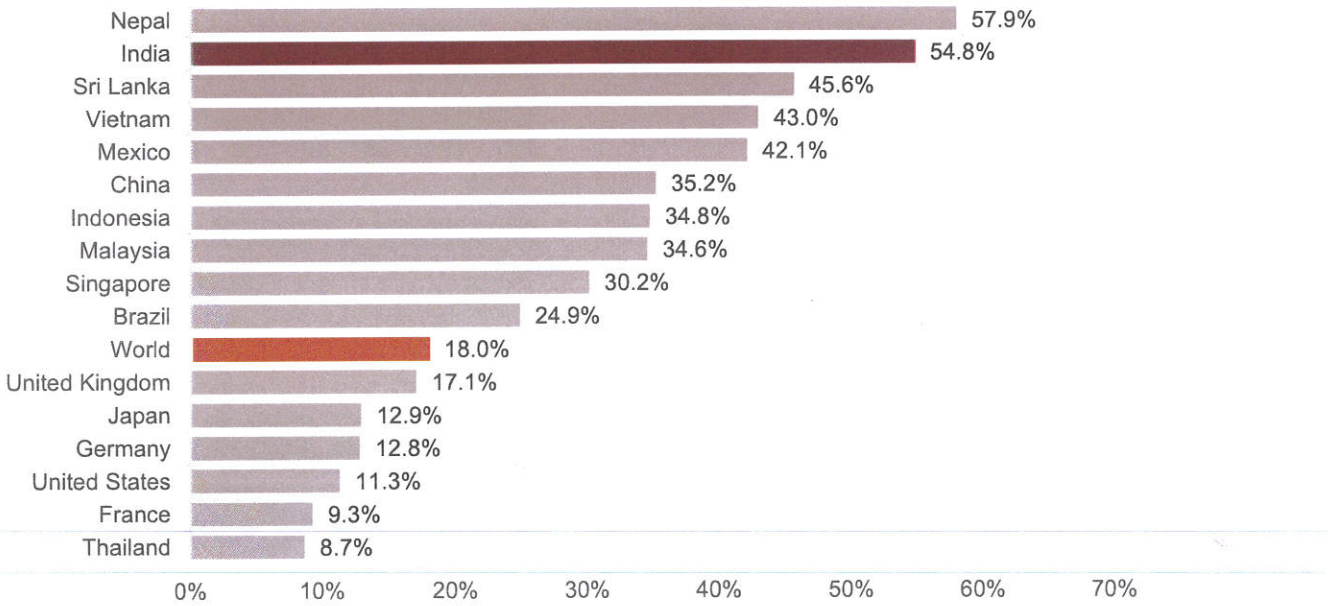
India's current healthcare expenditure has decreased over 2013-18. India spending on healthcare is very low and almost 55% is out-of-pocket expenditure by the public. The high OOPE healthcare expenditure is primarily due to under-penetration of healthcare and insurance services and lower public spending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

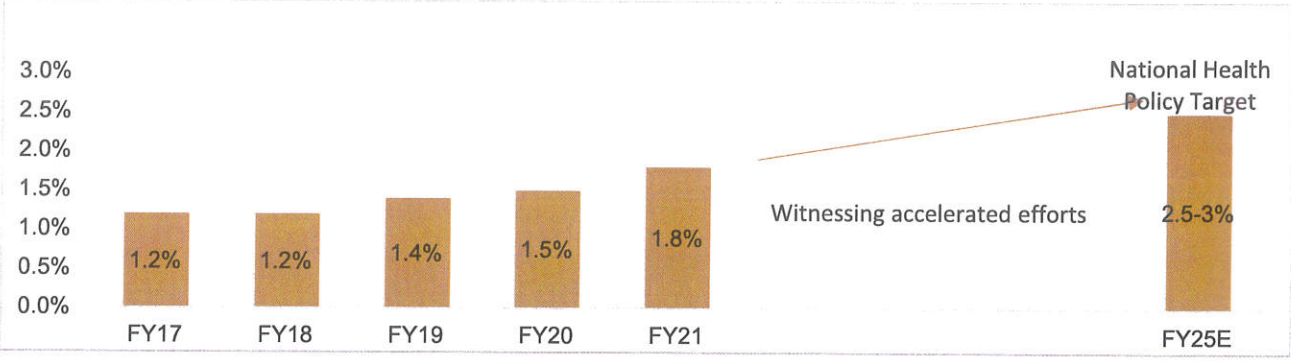
India has one of the highest share of out-of-pocket expenditure in healthcare

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)



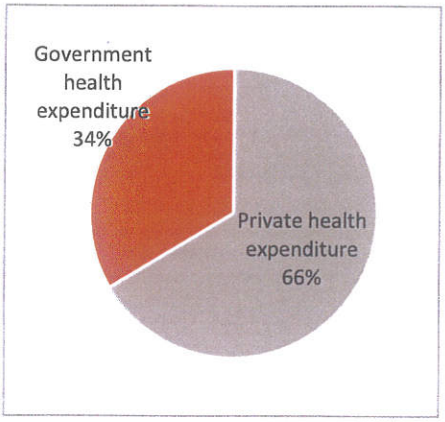
Expenditure on health by center and state government as % of GDP in India (2017 onwards)



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.

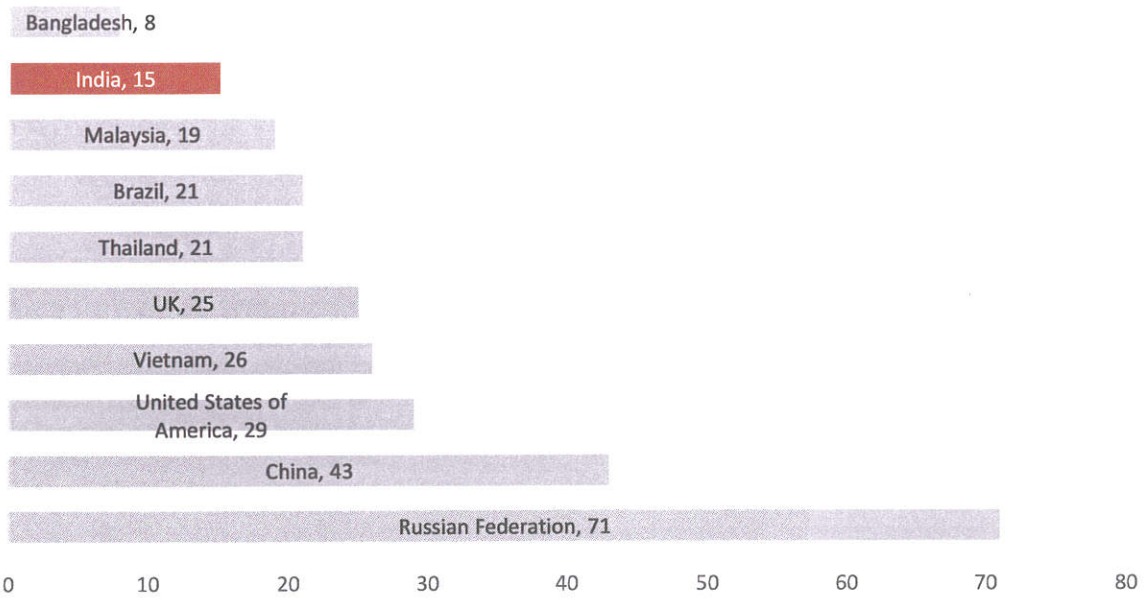
Nearly 17% of the rural population and 13% of the urban population are dependent on borrowings for funding their healthcare expenditure. And nearly 80% of the rural population and 84% of the urban population use their household savings on healthcare-related expenditure as per "Health in India – 2018, 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

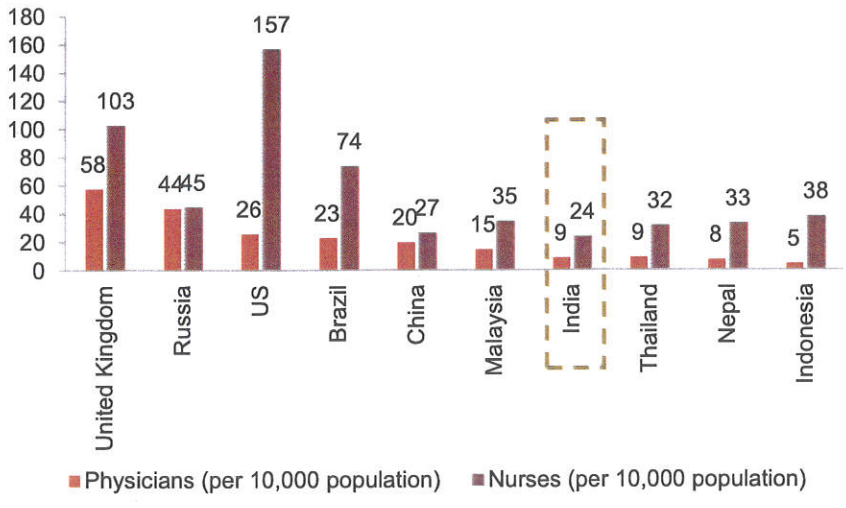
of 29 beds, it also lags that of other developing countries such as Brazil (21 beds), Malaysia (19 beds), and Vietnam (26 beds).

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 ~18 India 9

Nurses (per 10,000 population)

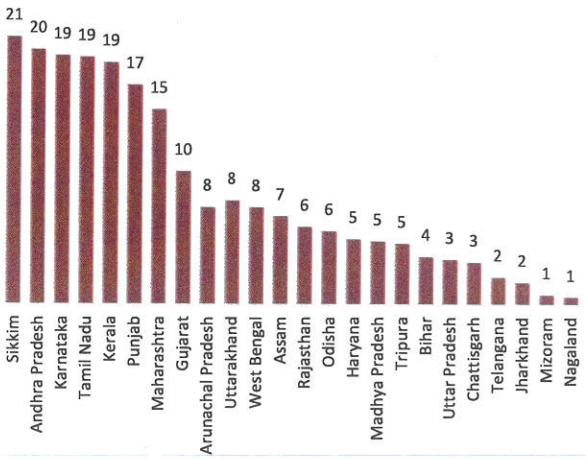
World average 39 India 24

Source: WHO World Health Statistics 2021

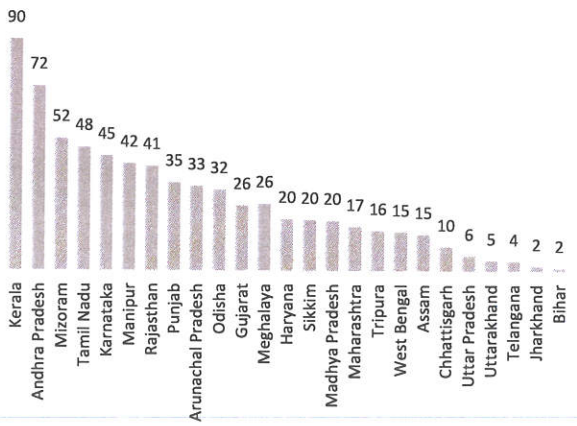
West Bengal leads in terms of absolute number of doctors as of CY 2019 for East India states, but lags behind in terms of doctor and nurse density per 10,000 population compared to states with more developed health infrastructure

Availability of allopathic medical practitioners, dental surgeons and nurses per lakh population has improved over the years. The number of doctors with recognised 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

In terms of health infrastructure, West Bengal is the most developed in East India. It leads in absolute number when it comes to number of doctors and nurses in the region with 74,054 registered doctors up to 2019 and 1,48,919 nurses as of 2018. Sikkim is an outlier in terms of doctors per 10,000 population due to the low population in the state. If we compare region wise, East India region as defined above has the lowest doctors and nurses per 10,000 population.

8.4 Overview of maternity and childbirth in India

India reports around 36-37 million pregnancies every year

India reports roughly 70,000 live births every day representing one sixth of the world's child births. This translates to 25-26 million live births every year. India reports 36-37 million pregnancies in a year.

India saw an increase in women registered for antenatal care (ANC) from fiscal 2015 to fiscal 2020. Nearly 97% of registered pregnancies register for ANC. Total 79% of registered pregnancies had at least 4 antenatal care visits in fiscal 2020. In fiscal 2015 at pan-India level only 51.2% of registered pregnancies had at least 4 antenatal care visits.

Estimated annual pregnancies

Area	Value	FY 2014-15	FY 2019-20
Estimated number of annual pregnancies	Nos in Million	37.4	36.6
Pregnant women registered for ANC (reported pregnancies)	% of estimated annual pregnancies	95.5%	97.0%
Live births	Nos in Million	26.2	25.4

Source: United Nations Population Fund – UNPFA, Health Management Information System (HMIS), Govt. of India

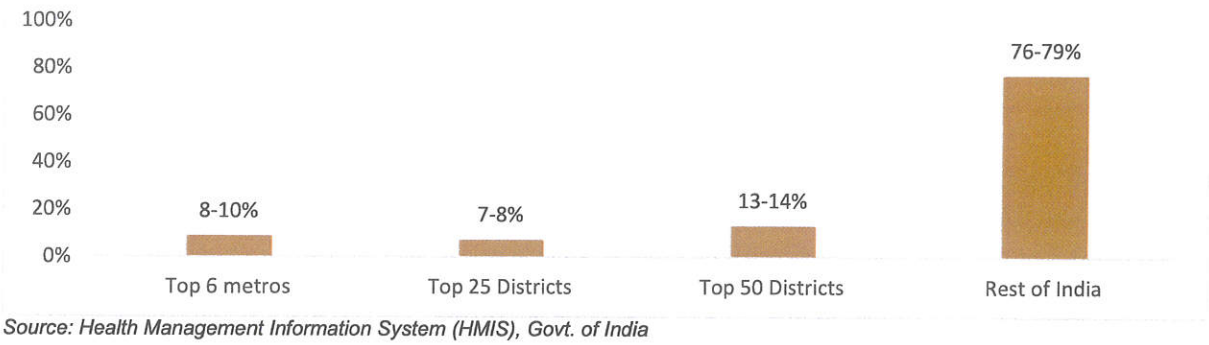
Maternity Care

Maternity Care	FY 2015-16	FY2019-20
	%	%
Mothers who had an antenatal check-up in the 1st Trimester	58.6%	70.6%
Mothers who had an antenatal check-up least 4 antenatal care visits	51.2%	79.0%

Mothers who received postnatal care from a doctor/nurse/ LHV/ ANM/ midwife/other health personnel within 2 days of delivery	62.4%	75.3%

Source: National Family Health Survey (NFHS)- 4 and National Family Health Survey (NFHS)- 5
Average data of 17 states namely, Andhra Pradesh, Assam, Bihar, Goa, Gujarat, Himachal Pradesh, Karnataka Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Telangana, Tripura, West Bengal for FY20 data

Total number of pregnant women registered for ANC



Source: Health Management Information System (HMIS), Govt. of India

Top 6 metro cities in India has share of 8-10% in registered ANCs

The metro cities contributes to 8-10% of the women registered for ANC in India whereas in terms of population the 6 metro cities contributes to 7.2% of India's population. The next top 25 districts have share of 7-8% and top 50 districts in total have a share of 13-14%. Thus rest of India contributes to 76-79% of total registered ANCs in India.

Indian eastern states report the highest fertility rates

8.5 Comparative analysis of key single-speciality and multi-speciality hospital chains

In this section, CRISIL Research has compared the key single-speciality and multi-speciality hospital chains operating in India. We have obtained data in this section from publicly available sources, including annual reports and investor presentations of listed players, regulatory filings, rating rationales, and company websites, as relevant.

For this assessment, we have considered the following key players:

Rainbow Children's Medicare Ltd (Rainbow Hospitals), Apollo Hospitals Enterprise Ltd, Fortis Healthcare Ltd, Max Healthcare Institute Ltd, Narayana Hrudayalaya Ltd, Krishna Institute Of Medical Sciences Ltd, Shalby Ltd, and Healthcare Global Enterprises Ltd.

Key operational parameters of major players

Key operational parameters

Key operational parameters (FY21)	No of Hospitals	No of beds	ARPOB (Rs '000 per day)	ALOS
Rainbow Children's Medicare Ltd^	14	1,475	40.9	2.6
Apollo Hospitals Enterprise Ltd	71	10,209	40.2	4.2
Fortis Healthcare Ltd	26	5,310	43.3	3.6
Max Healthcare Group	16	3,400	50.1	5.2
Narayana Hrudayalaya Ltd	21	6,725	28.5	4.6
Krishna Institute Of Medical Sciences Ltd	9	3,064	20.6	5.5
Shalby Ltd	11	2,012	27.4	3.2
Healthcare Global Enterprises Ltd*	22	2,036	32.6	2.3

^Operational data for Rainbow Children's Medicare is based on the data provided by the company

** The data in the table is of Q1FY22*

Source: Company reports, CRISIL Research

Key financial parameters of major players

Key financial parameters

Key financials (FY21)	Operating income		OPBDIT		PAT	
	Rs million	CAGR FY19 to FY21	Rs million	CAGR FY19 to FY21	Rs million	CAGR FY19 to FY21
Rainbow Children's Medicare Ltd^	6,501	9.4%	1,629	22.3%	396	-17.4%
Apollo Hospitals Enterprise Ltd	1,05,607	4.8%	11,381	2.9%	1,368	-17.3%
Fortis Healthcare Ltd	39,796	-5.1%	3,471	26.5%	(562)	-50.3%
Max Healthcare Group	38,610	-0.8%	6,360	35.2%	(950)	25.8%
Narayana Hrudayalaya Ltd	25,910	-4.8%	1,908	-19.5%	(207)	n.m.
Krishna Institute Of Medical Sciences Ltd	13,328	20.3%	3,738	48.8%	2,055	n.m.
Shalby Ltd	4,309	-3.4%	864	2.0%	406	13.2%

Key financials (FY21)	Operating income		OPBDIT		PAT	
	Rs million	CAGR FY19 to FY21	Rs million	CAGR FY19 to FY21	Rs million	CAGR FY19 to FY21
Healthcare Global Enterprises Ltd	10,146	2.2%	1,278	4.3%	(2,211)	n.m.

^Financials for Rainbow Children's Medicare are based on financials provided by the company

n.m.: Not meaningful

Source: Company reports, CRISIL Research

Key financial ratios

Key financial ratios (FY21)	OPBDIT margin (%)	Net profit margin (%)	RoCE (%)	RoE (%)	Gearing (times)	Interest coverage (times)	Current ratio	Net cash accruals to debt	Working capital days	OPBDIT/ CFO
Rainbow Children's Medicare Ltd^	25.1	6.1	21.0	9.6	0.1	3.9	1.6	2.0	(119)	1.7
Apollo Hospitals Enterprise Ltd	10.8	1.3	9.5	3.7	0.7	2.8	1.3	0.2	(18)	1.2
Fortis Healthcare Ltd	8.7	(1.4)	4.8	(1.8)	0.4	3.0	0.8	0.2	(155)	2.8
Max Healthcare Institute Ltd	16.5	(2.5)	4.5	(45.8)	1.3	1.5	1.5	0.0	(187)	(3.1)
Narayana Hrudayalaya Ltd	7.3	(0.8)	0.7	(2.1)	0.8	2.6	0.8	0.2	(174)	1.1
Krishna Institute Of Medical Sciences Ltd	28.0	15.4	32.5	26.8	0.4	11.7	1.6	1.0	(127)	1.0
Shalby Ltd	20.1	9.4	6.5	5.1	0.1	25.9	3.1	1.6	(507)	1.1
Healthcare Global Enterprises Ltd	12.6	(21.8)	(10.9)	(37.1)	0.8	1.2	0.9	(0.1)	(145)	(1.6)

^Financials for Rainbow Children's Medicare are based on financials provided by the company

#OPBDIT margin and Net profit margin are at Group level

Ratios calculated as per CRISIL Research standards are described below:

- OPBDIT margin = OPBDIT / operating income
- Net profit margin = Profit after tax / operating income
- RoCE = Profit before interest and tax (PBIT) / [total debt + adjusted net worth (includes only goodwill as part of intangible net worth) + deferred tax liability]
- RoE = PAT / Tangible Net Worth
- Gearing ratio = Adjusted Debt / Adjusted Net worth
- Interest coverage ratio = Profit before depreciation, interest and tax / (interest + finance charges)
- Current ratio = Current assets / Current liabilities
- Net cash accruals to debt = Net Cash Accruals / Adjusted Debt
- Working capital days = Receivable days + inventory days - payable days

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

Source: Company reports, CRISIL Research

Market capitalization to Revenue multiple

Market capitalization to Revenue multiple	M-Cap 31st Mar-21 (Rs million)	M-Cap 31st Mar-22 (Rs million)	Operating income FY21 (Rs million)	M-Cap Mar-21/ Operating incomeFY21	M-Cap Mar-22/ Operating Income FY21
Max Healthcare Institute Ltd	4,29,431	3,37,086.1	38,610	11.1	8.7
Krishna Institute Of Medical Sciences Ltd	1,14,092	1,10,694.4	13,328	8.6	8.3
Apollo Hospitals Enterprise Ltd	7,20,850	6,49,345.9	1,05,607	6.8	6.1
Narayana Hrudayalaya Ltd	1,30,689	1,52,320.3	25,910	5.0	5.9
Fortis Healthcare Ltd	2,24,449	2,19,239.8	39,796	5.6	5.5

M-Cap: Market Capitalization

Source: Market Capitalization- NSE India website, Company reports, CRISIL Research

CRISIL LIMITED MUMBAI

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CRISIL Research also undertakes Equity and Debt valuation, publishes Mutual Fund Ranking for mutual fund schemes (across equity, debt, and hybrid asset classes) and provides Portfolio Analytics for Institutional Investors, which involves deep analysis of portfolio for corporates, pension funds, and provident funds at an asset class level. Our platform for wealth managers, Alphatrax, offers in-depth analysis of performance and portfolio-based attributes for diverse asset classes. It also enables investors to assess industry and company level risks based on CRISIL's proprietary models. We also provide Equity Support services to the domestic market intermediaries that use our research reports to assist their clients in making investment decisions in relation to listed or to be listed securities in India.

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Our SME Performance Gradings, used by lenders, assess creditworthiness of SME enterprises relative to the peers leveraging our proprietary grading model. The framework includes assessment of entity-level financial and operating performance, as well as industry-level drivers.

Our defining trait is the ability to convert information and data into expert judgments and analytics with utmost objectivity. We leverage our deep understanding of the macro-economy and our extensive sector coverage to provide unique insights on micro-macro and cross-sectoral linkages.

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