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Medical Device Industry of India: Growth Dynamics and Key Challenges

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Abstract

Medical devices are one of the most crucial segment of a country's healthcare system. This paper reviews the demand and supply side factors, including socio-economic, market-enabling, technological and policy instruments, that could drive the growth of the medical device industry. It highlights some key issues and challenges the sector is grappling with. Despite there being several enabling factors for the sector's growth, India primarily manufactures medical equipment within the low-tech segment, from consumable to implantable devices. This leaves domestic requirements unmet in other segments, pushing the country to import expensive equipment in the advanced technology segment. This drives up the cost of medical equipment, leading to higher diagnostic test fees for end-users, which in turn places a significant out-of-pocket financial payment burden on households for diagnostic services.

Keywords: Medical Devices, Manufacturing, Diagnostic Test, Retail Price, End-Users, Medical-Technology, Medical Device Park, PLI.

JEL Codes: L6, L640, L650

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1. Introduction

The medical devices are a crucial segment of India's healthcare system (GoI, 2023a). Medical technology plays an important role in improving healthcare, saving lives, and ensuring better health outcomes, especially for those with chronic conditions, emergencies, or life-threatening illnesses. It encompasses a wide range of tools, devices, and techniques used to diagnose, treat, and manage various medical conditions (WHO 2007). It helps in both preventative care and advanced treatments, making healthcare more efficient, accessible, and effective across the globe (Haleem et al., 2022).

Globally, the demand for medical devices is rising, driven by technological innovations, the rising burden of chronic diseases, an aging population, and the global emphasis on preventive care (Thomas et al., 2023). As healthcare continues to evolve, medical devices expected to play an increasingly pivotal role in improving patient care, expanding access to healthcare, and reducing healthcare costs. Literature suggests that local manufacturing of medical devices is crucial in ensuring sustainable, effective, and affordable healthcare (PHFI 2023; IQVIA 2018).

Globally, this sector has experienced significant growth in the past decade (IBEF 2024). The growth potential of the Indian medical device sector is also immense (GOI 2023b; IBEF 2024), driven by several interrelated factors across socio-economic, market-enabling, technological, and policy dimensions. While these factors are critical for the continued growth of the sector, they are often either overlooked or only cited as potential enablers in many reports or discussions. Existing studies focus on aspects like market size, investment inflows, and overall sector performance (GOI 2023b; IBEF 2024; EY 2024), rather than a comprehensive analysis of the foundational elements that could drive the sector growth. The purpose of this paper is to highlight the role of these enablers and emphasize how, collectively, they can shape the future trajectory of the sector. It also highlights the need of prioritising local manufacturing for affordable diagnostic services along with the key challenges and issues associated with the sector.

The enabling factors have been classified around socio-economic factors, market-enabling factors, technology factors, and policy factors.

- Within the socio-economic factors, the role of rising level of income, urbanisation, a growing population, aging demographic, changing disease burden, increasing awareness and knowledge of various critical diseases, and shifting consumer preferences in driving the sector's growth are discussed.
- Market-enabling factors generally include the development of both public and private healthcare infrastructure, increasing health expenditure, promotion of government funded health insurance schemes, a growing preference for taking up private health insurance, and the rise of medical tourism.
- Technology-driven factors include foreign technology (that includes FDI), more affordable and innovative medical devices, e-commerce and digitalisation. The rapid adoption of robotics, big-

data, telehealth, wearables etc., advanced with artificial intelligence (AI), may further fuel the growth of this sector (FBI 2025).

- Policy factors include government initiatives towards regulatory reforms, including promoting / facilitating the global acceptability of domestically-manufactured equipment, the medical device policy, Production-Linked Incentives (PLI), promotion of medical device parks, and initiatives for promoting R&D (like the scheme for 'Promotion of Research and Innovation in Pharma and MedTech Sector' (GoI, 2023c).

These factors are broadly classified into demand-side and supply-side factors.

- Demand-side factors include the macro-economic, demographic profile, disease burden, health policy instruments, growth of private hospitals and diagnostic centres, shifting equipment demand from hospital to household level, growing medical tourism, and role of technology in reshaping the sector demand.
- Supply-side factors are summarised around GeM, a public procurement platform for boosting the domestic manufacturing demand, reform in medical device regulation (MDR) for improving the quality and global acceptability of medical device equipment, policy promoting medical device manufacturing through capital and other incentives like the special incentive package scheme, foreign direct invest, Make-in-India policy for medical device, promotion of medical device park and production linked incentive scheme for medical device sector.

The paper is primarily descriptive in nature. The paper begins by outlining the key factors that drive the growth of the medical device sector, followed by a discussion of the key challenges.

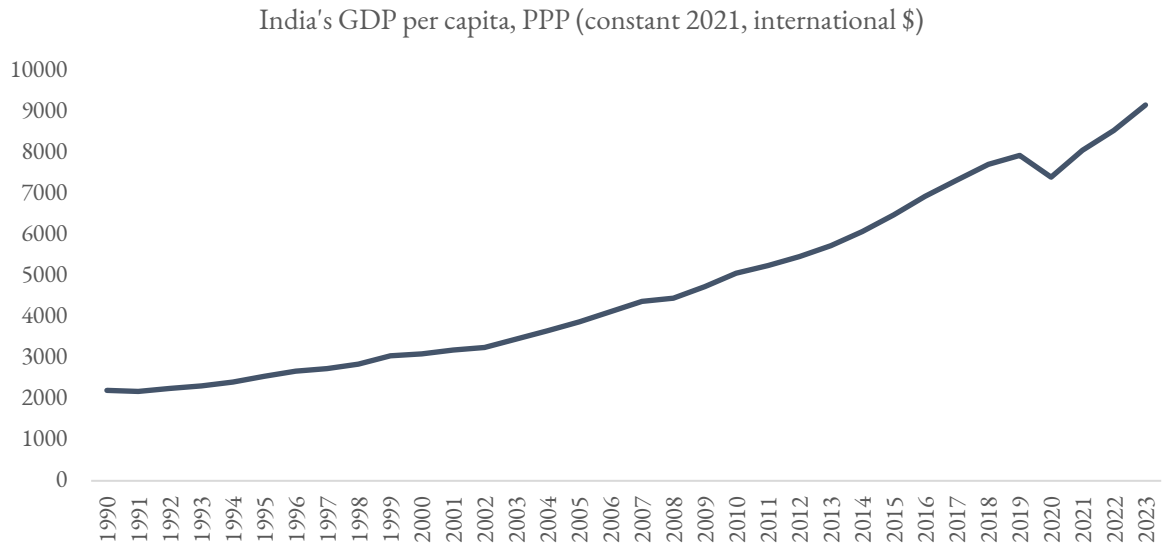
2. Socio-Economic Factors

2.1 Macro Aggregates and Disposable Income

India aspires to be a $5 trillion economy by 2027 (PIB 2018; PIB 2022). The disposable income of individuals is also rising (MOSPI 2023; Figure 1), which means that more and more people are capable of affording medical care. With the increase in income, the middle class grows, and more people opt to live in urban areas. The growing middle class population are highly likely to invest in health and wellness devices, such as fitness trackers, hearing aids, home diagnostic equipment, etc. (AMR 2024).

Similarly, more people moving to cities translates to higher demand for advanced medical devices, both in hospital and clinics. The greater access to healthcare services would lead to increased diagnosis and treatment, which, in turn, creates demand for more devices. The lifestyles of people also changes with growing urbanization, which will boost device demand related to diabetes, obesity, hypertension, and respiratory problems, etc. (Phadke 2024). Growing income also leads to demand for high technology driven devices.

Figure 1: India's Per Capita Income at constant PPP



Source: https://ourworldindata.org/grapher/gdp-per-capita-worldbank?tab=line&country=~IND

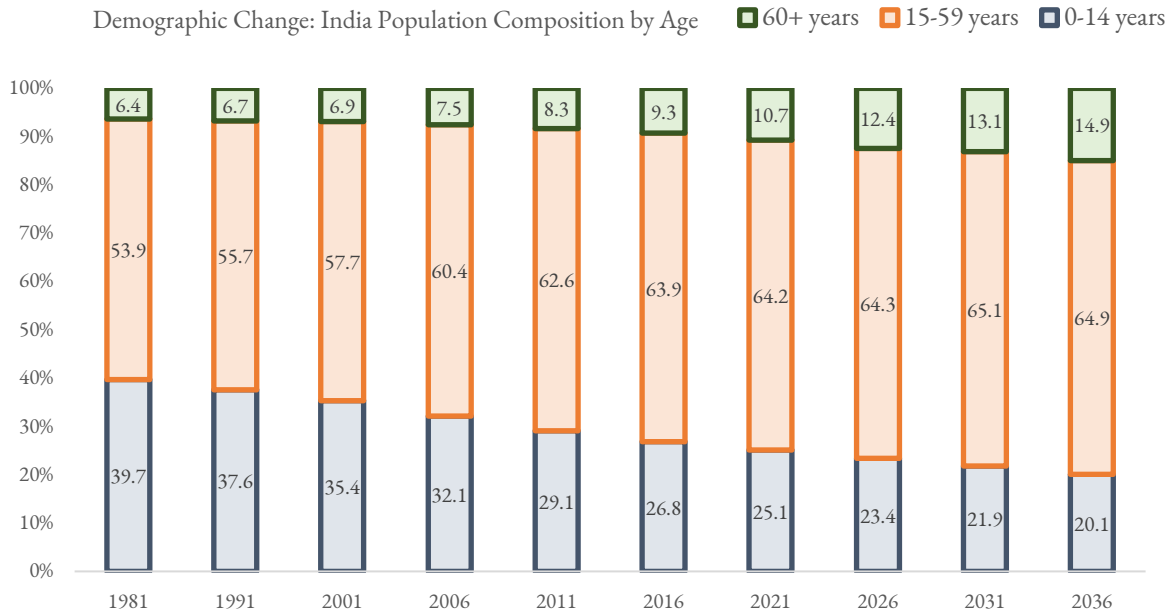
2.2. Growing Population and Changing Demographic Profile

The growing population and changing demographic profile have significant impact on boosting the medical device sector. India is a vast country with a population of over 1.45 billion. With the large population, the demand for medical devices to cater to diagnostic needs, chronic diseases, and advanced treatment options is also increasing.

Within the huge population, the aging population is also increasing. The elderly population (indicated persons aged 60 and above) was 43.7 million in 1981, which constituted around 6.4% of total population. The elderly population increased over five times, to around 227.44 million by 2023, with a share of about 14.9% in total population (Figure 2). The aging population is, in general, a major driver for medical device demand relating to diagnostics, mobility aids, and chronic disease management (WHO 2015). An aging population often requires continuous care for chronic illnesses, leading to a growing need for medical devices designed to manage these conditions, such as insulin pumps, blood pressure monitors, and wearable health devices (NITI 2024; Sun and Li 2023).

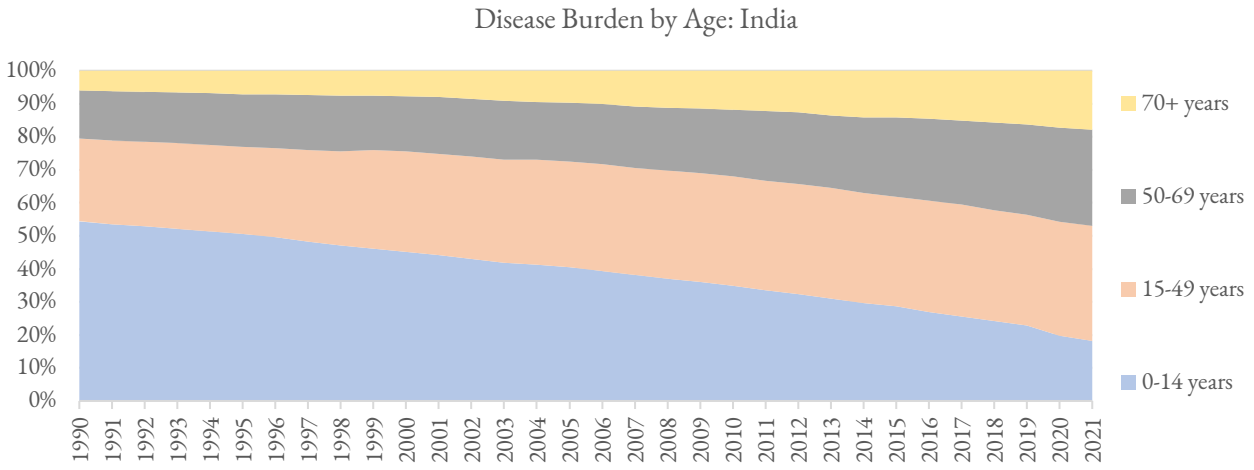
Data also suggests that, in India like the other advanced economies, the burden of disease is on the rise among the elderly / persons aged above 50 years (Figure 3). The prevalence of disease among persons aged 50 years and older in India has more than doubled, from 21.57% of the total disease prevalence in 1990 to 46.97% in 2020 (Figure 3). This requires medical technology intervention to meet such growing demand.

Figure 2: Demographic Change: India Population Composition by Age



Source: RGI, other sources

Figure 3: Rising Disease Prevalence among Elderly: India



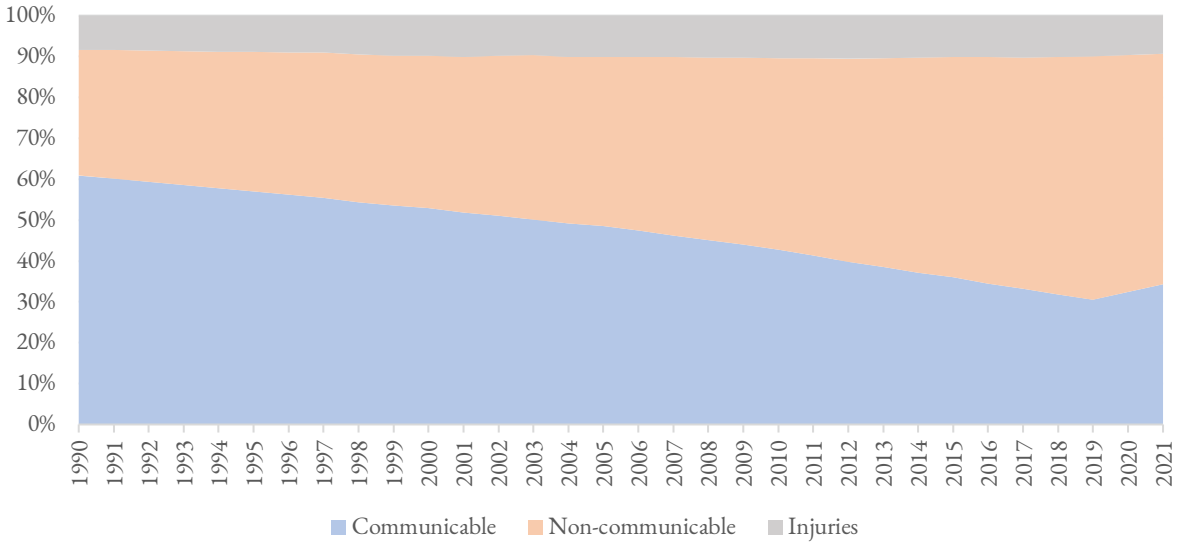
Source: IHME, Global Burden of Disease, 2024; ourworldindata.org

2.3 Changing Burden of Diseases

There is a significant change in the disease burden in India and the world. The disease burden in India, similar to the advanced world, is shifting from communicable diseases (like respiratory infections and TB, maternal health, nutritional deficiencies, HIV/AIDS and STIs, malaria & neglected tropical diseases, enteric infections, neonatal health, other infectious diseases) to non-communicable diseases (NCDs) like cardiovascular diseases, neurological disorders, diabetes and kidney diseases, digestive diseases, liver disease, mental disorders, respiratory diseases, musculoskeletal disorders, cancers, skin diseases, and substance use disorders (Figure 4).

The share of disease burden for NCDs almost doubled, from 30.8% in 1990 to 59.5% in 2019, though it saw a slight decline in recent years due to increase in respiratory disease during Covid-19 (Figure 4). The change in disease pattern from CDs to NCDs requires high medical technology intervention (Sarvestani and Sienko 2018).

Figure 4: Disease Burden for NCD and CDs: India

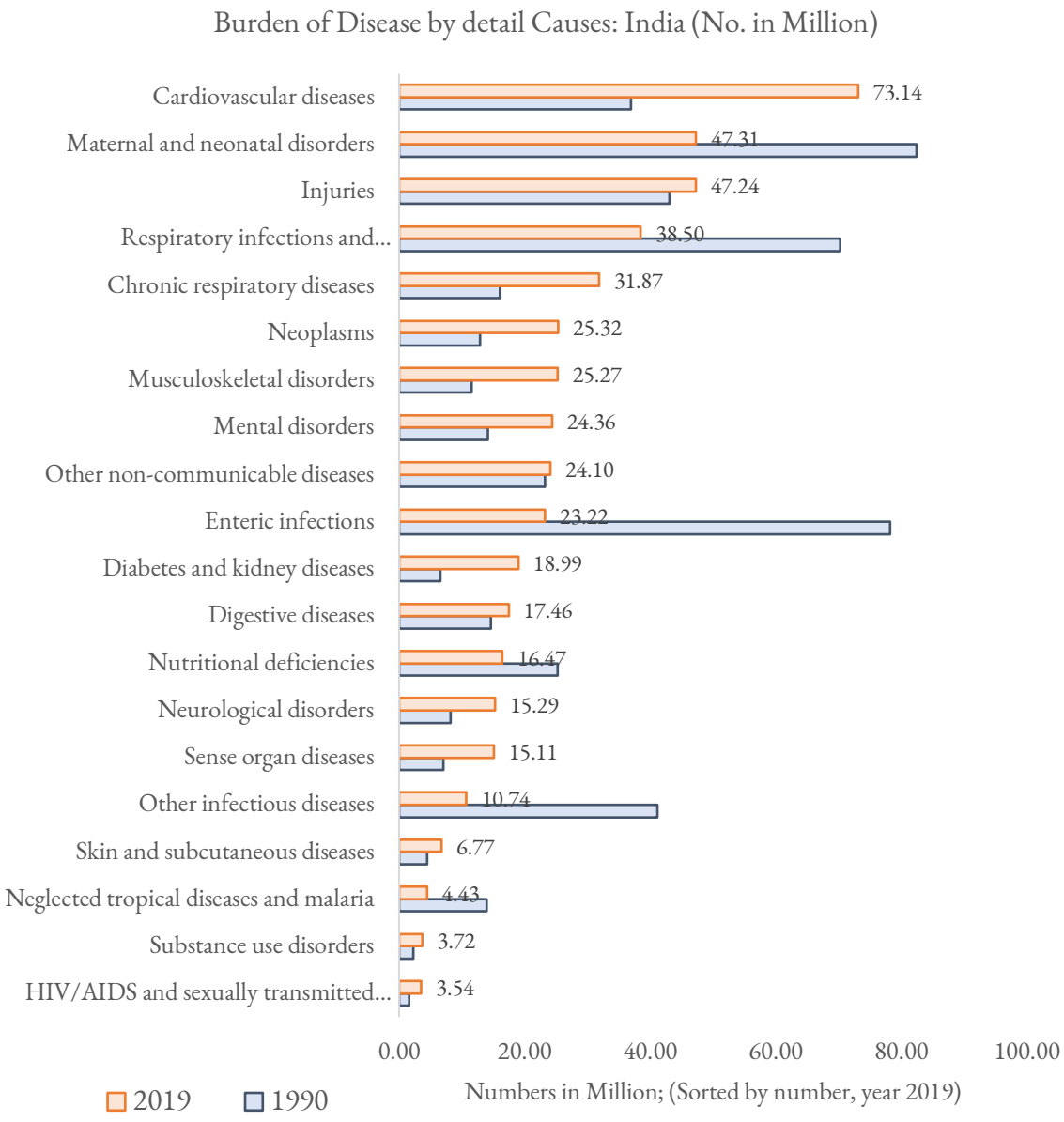


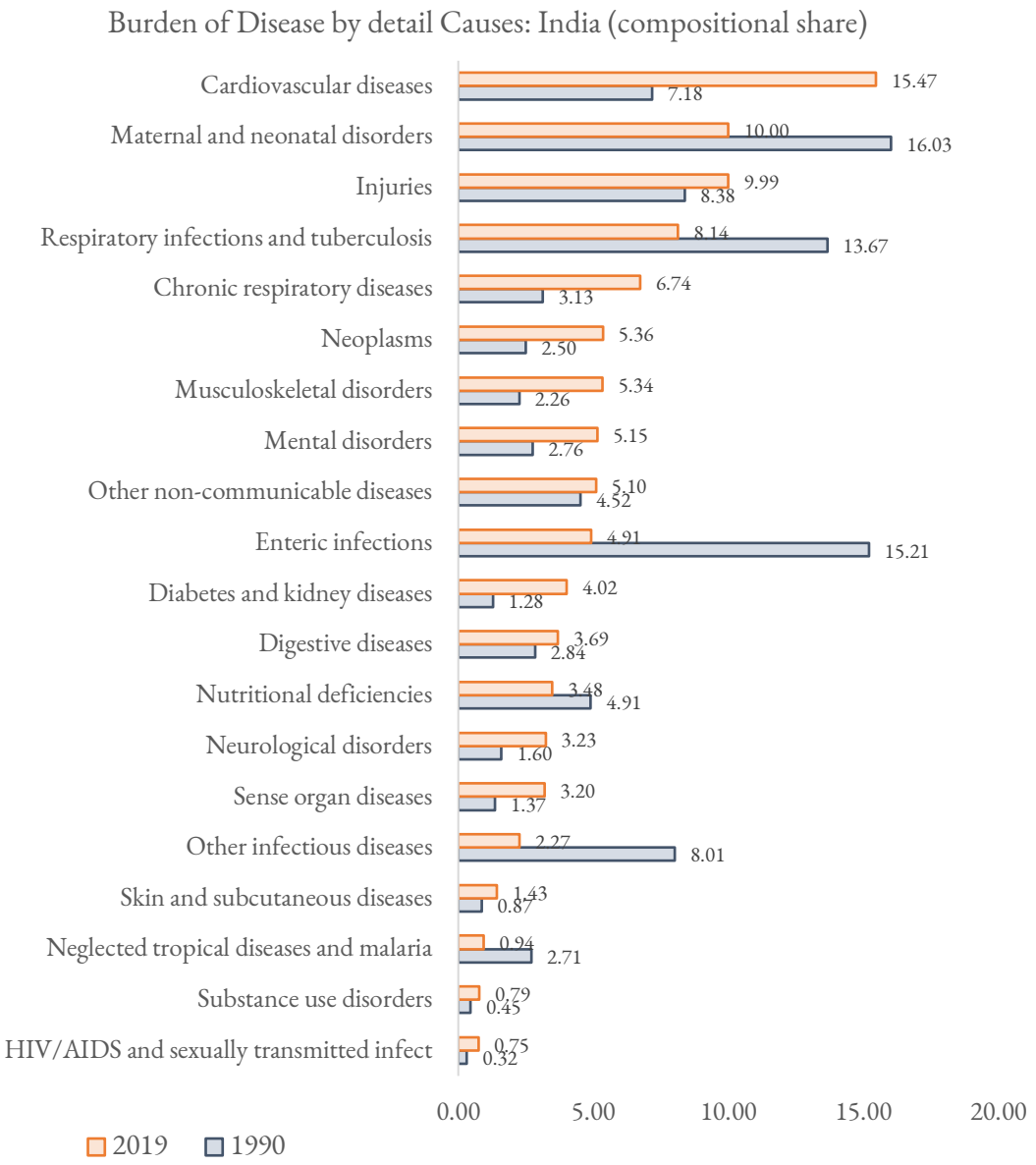
Source: IHME, Global Burden of Disease, 2024; oneworldindata.org

India, over a period of time, is turning into the world's capital of coronary heart disease and diabetes (Figure 5). Around 20% of the world's heart attack deaths are occurring in India (The Economic Times 2024). When compare the disease burden data, it reflects that heart disease alone constitute a major share, around 73 million (15.47%) in 2019 as compared to 37 million (7.18%) in 1990. Other NCDs are also on the rise in India (Figure 5).

With the changing demographic and disease burden profile, the rising prevalence of chronic diseases and aging population would drive the demand for medical device equipment including cardiovascular implants, stents, and laparoscopic instruments, as well as telehealth equipment for remote monitoring of patients. The high growth of NCDs like cardiovascular disease, cancers, kidney disorders, and other NCDs, reported in Figure 5, require more medical technology interventions. In order to meet such growing requirement, the medical device industry will have to prioritise their innovation towards diagnostic and therapeutic devices needed for such diseases.

Figure 5: Disease Burden by detail Causes: India





Source: IHME, Global Burden of Disease, 2024; oneworldindata.org

3. Market Enabling Factors

3.1 Changing Health Policy

Since 2017-18, India has been witnessing a considerable change in health policy, especially relating to how the health services will be delivered to the population, and how they are linked with the medical technology intervention (Hooda 2020). For instance, in 2018, Government of India launched the Ayushman Bharat mission, through which India aspires to upgrade 1.5 million primary health centres to health and wellness centres (HWCs), where testing for mental health, adolescent health, old age care, palliative, eye and dental cares, lung disease, hypertension, diabetes, common cancers, etc. will be made available (Hooda 2020).

As part of this initiative, a list of over 100 test list are prepared which will be conducted at the available government facility at the village-SCs/HWCs/PHC/CHCs/DHs[1]. These testing facilities are related to haematology, clinical pathology, biochemistry, microbiology, serology, and radiology, among others. Similarly, the Government of India introduced annual diagnostic testing for every government employee in 2018; accordingly, a National Essential Diagnostic List was prepared. All these steps are driving the medical device demand.

3.2 Health Spending and Infrastructure

The overall health spending in India has remained almost constant, hovering around 4% of GDP in recent past decade. This spending level is much lower than the global average (Hooda 2015), and even less than in some neighbouring countries like Nepal, Sri Lanka, and Thailand (Appendix 1). However, the health expenditure in per capita terms, both at current and constant prices, shows an increasing trend (Table 1).

Of the total health spending, the share of government spending has also been increasing over time in India, albeit the level of spending is still low. A low level of spending on health has led to inadequate availability of health infrastructure facilities in the country. In India, for instance, the total number of beds (consisting of private sector beds about 11,85,242 beds and public sector about 7,13,986 beds) has on average 1.4 beds per 1000 population, which is significantly lower than the 3.5 beds per 1000 population as per WHO standard (Hooda 2020; Gyani 2023).

Many primary and secondary care level government's facilities in India face a shortfall of doctors, specialists, technicians, beds, and medical equipment. With the increase in overall health expenditure in the country in the time to come, the shortfall in health infrastructure can be addressed (Hooda 2021), which would further boost medical technology demand in the country at hospitals and clinics.

The government health facilities in India face physical and human infrastructure shortage, however, the country has observed a high growth in the number of private medical/hospitals, especially in the post-liberalisation phase (Table 2). Presently, a majority of health services are provided in the private sector (Hooda 2020).

Along with the rise of overall private medical facilities, several diagnostic centres have also come up that exclusively provides diagnostic services. In the post-liberalisation period, the number of diagnostic centres grew with a CAGR of 1.18% between 1990-2010 as compared the 1.11% CAGR of other medical facilities (Table 2; Figure 6). Of the total number of private health facilities, the share of diagnostic centres constituted around 4.4% (Table 2). A rising number of private clinics, hospitals, medicals and diagnostic centres are likely to boost the demand for medical devices in the country, as these are likely to procure medical equipment to deliver better care at their facility.

[1] SC- sub-centre, HWCs- health and wellness centre, PHCs- primary health centre, CHCs- community health centre, DHs- district hospitals

An important aspect of India's health care financing is that the country has observed a significant change in the source of health financing mechanism in the past decade (Table 1). Out of the total health financing, the share of social security expenditure and health insurance expenditure witnessed a sharp rise. The share of social security expenditure increased from 6% in 2013-14 to 8.7% in 2021-22 (Table 1). Similarly, due to the uptake of health insurance by population, the share of private health insurance expenditure increased from 3.4% to 7.4% between 2013-14 and 2021-22 (Table 1), indicating the rising role of health insurance in health financing in India. This may have several implications for patient behaviours and adoption on medical technology, discussed in the next section.

Table 1: Key Health Financing Indicators: India

	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Total Health Expenditure (THE) as percent of GDP	4.0	3.9	3.8	3.8	3.3	3.2	3.3	3.7	3.8
Total Health Expenditure (THE) per capita (Rs.) at current prices	3,638	3,826	4,116	4,381	4,297	4,470	4,863	5,436	6,602
Total Health Expenditure (THE) per capita (Rs.) at constant (2011-12) prices	3,174	3,231	3,405	3,503	3,333	3,314	3,516	3,752	4,205
Current Health Expenditures (CHE) as percent of THE	93.0	93.4	93.7	92.8	88.5	90.6	90.5	89.7	87.3
Government Health Expenditure (GHE) as percent of THE	28.6	29.0	30.6	32.4	40.8	40.6	41.4	42.8	48
Out of Pocket Expenditures (OOPE) as percent of THE	64.2	62.6	60.6	58.7	48.8	48.2	47.1	44.4	39.4
Social Security Expenditure on health as per cent of THE	6.0	5.7	6.3	7.3	9.0	9.6	9.3	8.6	8.7
Private Health Insurance Expenditures as percent of THE	3.4	3.7	4.2	4.7	5.8	6.6	7.0	7.3	7.4
External/ Donor Funding for health as per cent of THE	0.3	0.7	0.7	0.6	0.5	0.4	0.5	0.7	1.1

Source: NHA, GoI. https://nhsrcindia.org/sites/default/files/2024-09/NHA%202021-22.pdf

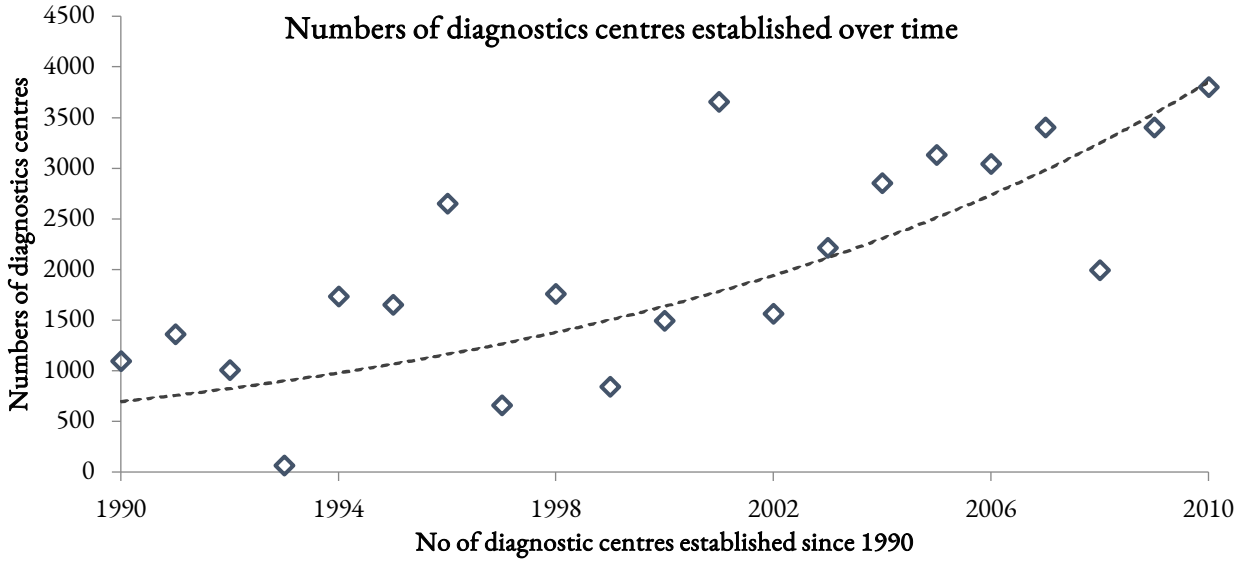
Table 2: Growth and Structure of Private Healthcare Enterprise in India across Segments

Segments	1905-1950	1951-1960	1961-1970	1971-1980	1981-1990	1991-2000	2001-2010	Total entities	CAGR	% dist. total
Hospital	187	11	1284	4332	8123	13973	52240	80265	1.13	7.8
Medical	331	2342	2539	19630	42847	137144	368517	576027	1.12	55.6
Dental	42	0	201	73	1747	7841	31805	42052	1.16	4.1

Ayurvedic	504	449	1796	6866	9812	29662	27767	76891	1.08	7.4
Unani	0	512	477	202	61	6187	9346	16837	1.06	1.6
Homeopathic	0	23	765	4709	11150	34000	64748	115760	1.16	11.2
Nursing	0	0	2366	1360	1130	13712	23663	42231	1.07	4.1
Diagnostic centres	0	0	32	707	2342	13215	29056	45805	1.18	4.4
Others	0	0	1239	1053	2591	5688	12931	23856	1.07	2.3
Residential	289	90	42	429	127	1233	4232	6521	1.05	0.6
Social	0	1	0	388	800	2270	5783	9252	1.10	0.9
Total	1353	3428	10741	39749	80730	264925	630088	1035497	1.11	100

Note: Total enterprises established during the time period. Total entities are higher than cumulative add up from 1905-1950 to 2001-2010, as it also includes number of entities for the year 2010-11.
Source: NSS 67th round

Figure 6: Number of Diagnostic Centre in India established in Post-Liberalisation Period



Source: Same as Table-2

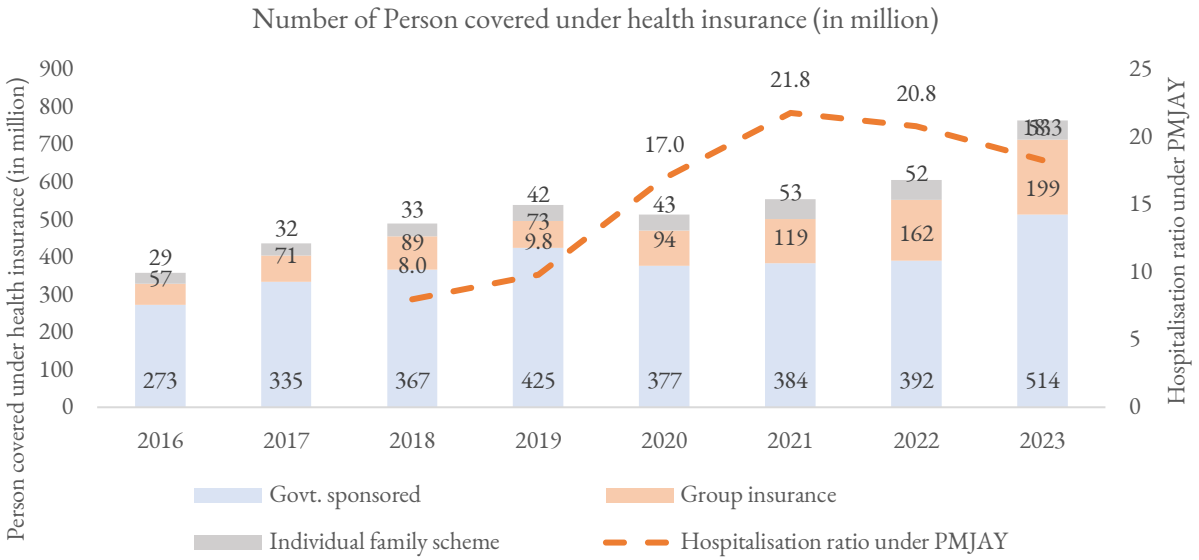
3.3 Health Insurance

As discussed, the role of health insurance is increasing in financing health care in India. This is also reflected with the rising coverage of population under health insurance. The population coverage under private (group and individual family scheme) health insurance increased from 86 million persons in 2016 to 252 million persons in 2023. With the launch of Ayushman Bharat PMJAY scheme in 2018, the persons covered under government-sponsored schemes also increased substantially (by almost double), from 273 million person in 2016 to 514 million person in 2023 (Figure 7), suggesting a substantial increase of population coverage under health insurance.

With the increase in population under insurance protection, people have a high tendency for reporting for hospitalisation (Figure 7). For instance, the hospitalisation ratio under PMJAY was just

8% (ratio of hospitalisation to total population coverage under government funded health insurance schemes) in the initial year 2018-19 of the scheme launch. The hospitalisation ratio under PMJAY more than doubled, to around 18% in 2023 (Figure 7). This indicates that a substantial increase in the number of insured patients seeking medical care, thereby boosting the demand for medical devices. (With the increase in hospitalisation, patients going through diagnostics also increase, as discussed in the subsequent section.)

Figure 7: Population Coverage under Health Insurance



Source: National Health Profile and PMJAY websites.

3.4 Hospitalisation Prevalence Boosting Diagnostic Services

In addition to the insurance, several other factors including patient awareness might boost the prevalence of hospitalisation. Figure-8 (Part-A) shows a significant rise in number of hospitalisation cases, from 14 million in 1995-96 to around 43 million in 2017-18. The increase in hospitalisation cases was much sharper among urban (from 9.5 to 29.4 million cases) than rural (from 4.6 to 13.7 million cases) residents.

If one looks at the hospitalisation prevalence rate, measured through hospitalisation cases as a share of total estimated population in the respective NSSO rounds, it shows a rising trend from 1.67% in 1995-96 to about 3.78% in 2017-18 (Figure 8, Part-B). The prevalence rate of ailment reporting also shows rising trends over the last two decades (Figure 8, Part-C). The rising prevalence of hospitalisation and ailment reporting are expected to boost the medical device industry, because with the increase in hospitalisation cases, the number of persons receiving medical services (like X-ray / ECG scans, as well as other diagnostic tests) is likely to increase, as reported in Figure 9.

Figure 8: Rise in Hospitalisation cases in India

Source: NSS Health Rounds, various years.

Our analysis corroborates that among patients who were hospitalised, a large number go through X-ray/ECG/scan as well as other diagnostic tests. The estimates from unit-level data of various health rounds of NSSO suggest that almost two-thirds of hospitalised cases received X-ray/ECG/Scan services, and more than three-fourths received other diagnostic tests. The share of receiving such diagnostics has been increasing between 2004-05 to 2017-18 (Figure 9).

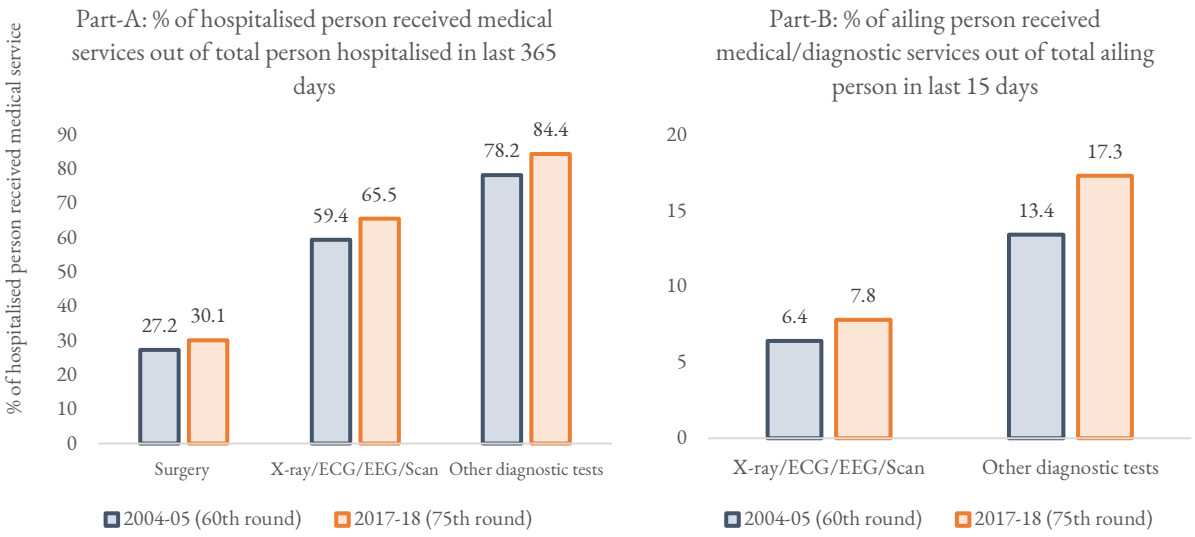
This is true for persons receiving outpatient care as well. Though, for patients receiving treatment for minor ailments, adoption of medical technology intervention is not as high as was the case of hospitalisation, diagnostic intervention are increasing in such cases as well. For instance, percentage of ailing persons who received a diagnostic test service out of total ailing persons increased from 13.4% in 2004 to 17.3% in 2018 (Figure 9, Part-B). Similarly, the percentage of hospitalised persons who received diagnostic test service out of total hospitalised persons increased from 78.2% in 2004 to 84.4%

in 2018 (Figure 9, Part-A). This indicates that demand for medical technology intervention would increase with the rise in both IPD (in-patient) and OPD (out-patient) cases.

Figure-9 also reflect the rising number of surgeries in the country, possibly both general and minimally invasive nature, upon hospitalisation. The rise of minimally invasive surgery and general surgery segments could be significant factor contributing to the growth of medical device.

The rise in health-seeking behaviour and preferences of persons seeking diagnostic tests suggest a potential role of medical device industry in the times to come. As discussed, the emerging role of insurance-based systems is going to add significantly in influencing such behaviours and preferences.

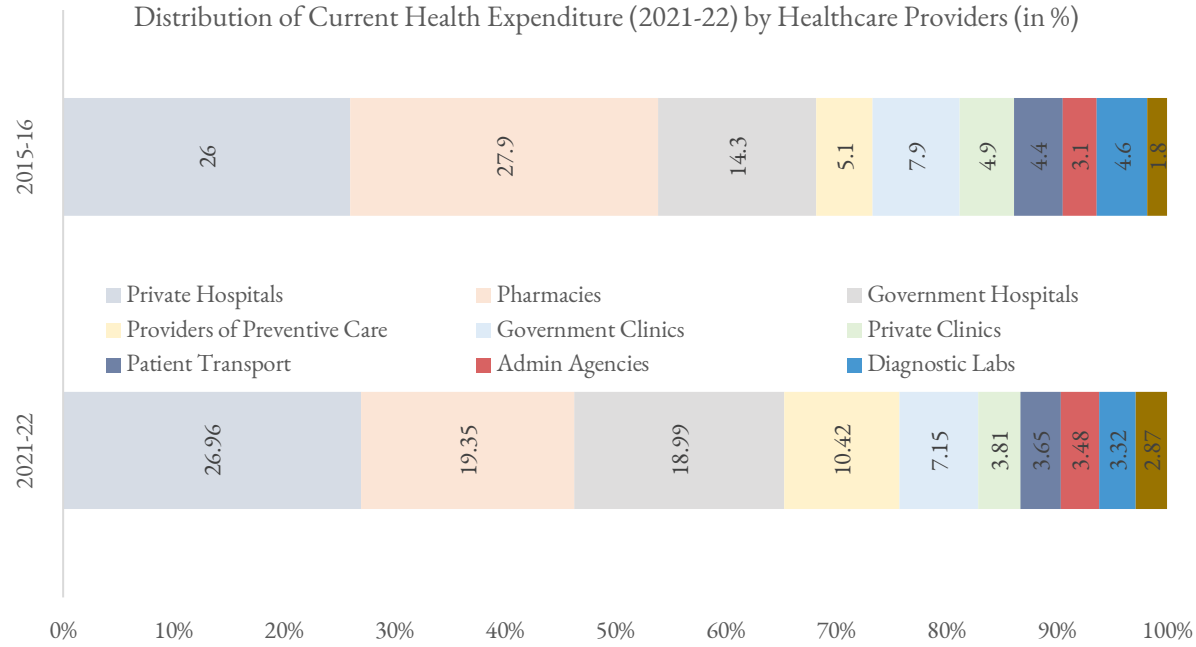
Figure 9: Share of hospitalised and ailing persons received medical/diagnostic services



Source: NSS Health Rounds, various years. Based on sample hospitalisation cases.

The rising number of outpatient and inpatient visits for various surgical procedures and treatments to hospitals, clinics, and others services, as reported above, support the dominance of hospitals/clinics segments in overall health financing in the country. Figure-10 reflects the dominance of public and private hospitals/clinics/providers in overall financing. In addition, the health expenditure of medical and diagnostic / laboratory services providers was around Rs. 26,238 crore, and that of Patient Transport and Emergency Rescue providers was around Rs. 28,906 crore in 2021-22 (NHA 2021-22). This is a significant amount that is directly linked with medical devices equipment and ambulances.

Figure 10: Distribution of Current Health Expenditure by Healthcare Providers (in %)



Source: NHA, various years.

3.5 Medical Tourism

With the growing medical facilities, coupled with the cost-effective care in the country when compared with other advanced countries, medical tourism has witnessed tremendous growth in India. The number of medical tourists witnessed high growth prior to COVID period, with a setback in COVID years. The number of tourists started rising again, and reached even slightly more than pre-pandemic level in 2024.

In 2024, around 7.30 lakh patients visited India from more than 78 countries for seeking medical care (mainly for cancer, cosmetic, cardiovascular, orthopedic, neurology, dental fertility/IVF treatments, wellness and others) – compared to just 1.1 lakh in 2009 (Figure 11). In general, the demand for services like cosmetic surgery, orthopedics, fertility treatments, and organ transplants is contributing significantly to the growth of India's medical tourism market (GOI 2022).

Some market research agencies has projected a sustained growth of India's medical tourism industry. It is expected to increase, with a CAGR of 12.3%, from an estimated USD 18.2 billion in 2025 to USD 58.2 billion by 2035 (FMI, n.d.). High growth is particularly driven by India's reputation of delivering high-quality healthcare services at a very low cost when compared with advanced countries, alongside the availability of cutting-edge technology and internationally trained medical professionals in Indian hospitals (FMI, n.d.).

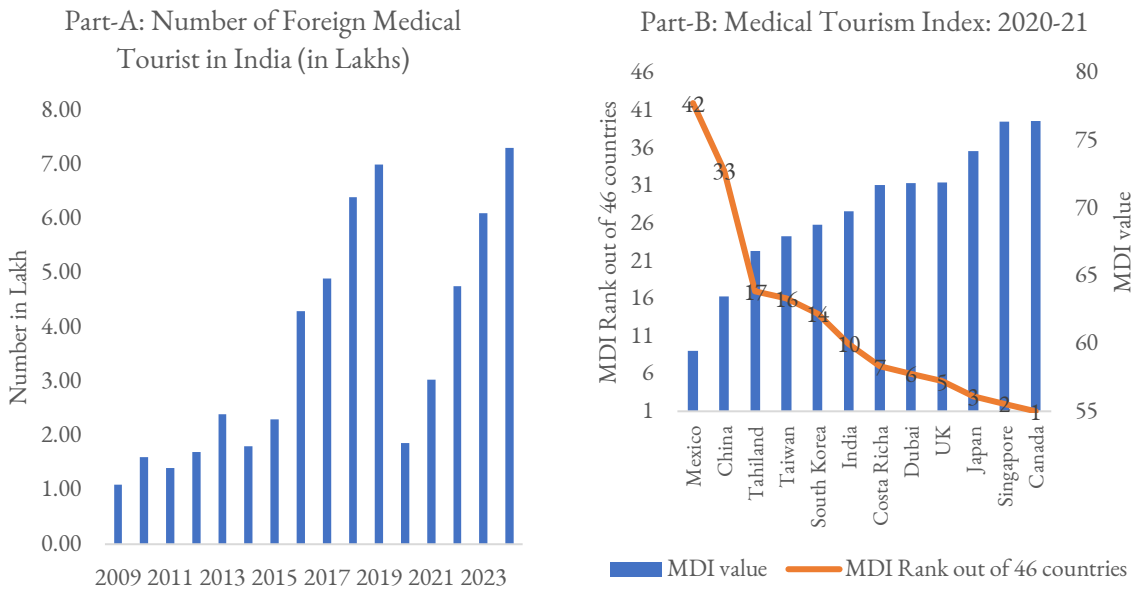
India's comparative cost advantage in delivering high quality care has been acknowledged world-wide (KPMG-FICCI 2014).

- For instance, the cost for heart bypass (in USD) is around 1,30,000 (USA), 11,000 (Thailand), 18,500 (Singapore), 9,000 (Malaysia), 40,900 (U.A.E.), 31,700 (South Korea), 27,000 (Mexico), 24,100 (Costa Rica), while only 7,000 in India.
- Similarly, the cost for heart valve replacement was reported to range from USD 9,000 (in Malaysia) to 1,60,000 (in USA), and 9,500 in India.
- For hip replacement, it ranged from USD 10,000 (Malaysia) to 43,000 (USA), and 7,020 in India.
- For knee replacement, it was reported to range from USD 8,000 (Malaysia) to 40,000 (USA), and 9,200 in India, reflecting that India delivers care at a fraction of cost when compared with other countries.

The International Healthcare Resource Center (IHRC) constructed a Medical Tourism Index (MDI) covering 46 countries, using factors like tourist popularity, medical facility quality, hospital accreditation, healthcare costs, economic stability, and the overall environment of the destination (IHRC 2020). India ranked at 10th place in Medical Tourism Index in 2020-2021 out of 46 major destination countries of the world (Figure 11).

The Ministry of Tourism has recently taken up several initiatives, in a holistic manner, for the promotion of medical tourism in the country (GOI 2022). With the rise in medical tourism, one can expect that it will drive the demand for medical devices at the hospital level. The manufacturers will have to cater to the demand for high quality medical care through developing high technology equipment within the country.

Figure 11: Emerging Trends of Foreign Medical Tourism in India



Source: Part-A: Ministry of Tourism and
https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1987820;
Part-B: Global Healthcare Resources & International Healthcare Resource Center

4. Integration of Medical Device for Domestic Usage

The recent pandemic have significantly accelerated the adoption of medical device equipment in homecare in India, which is reflected from a nation-wise survey on households consumption expenditure (HCE) conducted by Government of India in 2022-23. This HCE survey captures the household's expenditure on purchase of different consumption items including medical equipment used for homecare. The medical equipment segment includes the expenditure on wheelchair, massagers, hearing aids & orthopedic equipment, nebulizer, other medical equipment (like, blood pressure monitoring machine, other remote patient monitoring devices, etc.). We assessed the household expenditure on purchase of medical equipment for domestic use from this consumer expenditure survey round of NSSO 2022-23.

Estimates indicate that households spent about Rs. 2,327 crore on medical equipment for home use (Table 3). When compared to the total expenditure by the central government on medical equipment for its facilities, this figure appears significant. For instance, according to the National Health Account 2021, the central government allocated around Rs. 1,13,019 crore to the health sector, covering general hospitals, defense/railway, and other government-owned facilities (NHA 2021). Of this health budget, about 90% is spent on salaries, 5.36% on purchasing drugs, 2.6% on administrative costs, and the remaining portion on medical equipment for government facilities. Translating this spending on medical equipment into actual figures, it amounts to roughly Rs. 1,514 crore, which is even less than the Rs. 2,327 crore spent by households on purchase of medical equipment for domestic use. Similarly, the state government allocated Rs. 2,03,561 crore for health in 2021, with approximately Rs. 2,728 crore earmarked for medical equipment, underscoring the growing demand for medical equipment at household level.

The analysis of household expenditure on the purchase of medical equipment for domestic use suggests that a significant proportion (around 58.5%) goes to the 'other medical equipment' category (which includes blood pressure monitoring machines), around 15% on nebulizers, 12% on hearing aids and orthopaedic equipment, 9% on massagers, and 6% on wheelchairs. Of the total amount spent by households on purchase of medical equipment, urban households' expenditure constitutes about 56% overall (Table 3); however, rural-urban spending share vary across medical equipment.

Table 3: Household Expenditure on Purchasing of Medical Equipment for Domestic Use during last 365 days: Analysis by type of equipment, 2022-23

	Expenditure Composition by medical equipment items			Rural-Urban Distribution	
	Rural	Urban	Total	Rural	Urban
Wheelchair	6.20	6.11	6.15	44.71	55.29
Massagers	5.84	11.16	8.80	29.45	70.55
Hearing aids & orthopaedic equipment	15.32	9.19	11.91	57.06	42.94
Nebulizers	14.14	15.03	14.64	42.84	57.16
Other medical equipment (blood pressure monitoring machine, etc.)	58.50	58.54	58.52	44.35	55.65
Medical equipment: sub-total (in million & %)	**10322**	**12950**	**23272**	**44.35**	**55.65**

Source: Unit-level data of Consumer Expenditure survey of NSSO 2022-23

A state-level analysis suggests that medical devices are integrated in homecare differently across Indian states, possibly due to differential preference and/or difference in income and disease profiles of states. Therefore, expenditure by households on medical equipment for domestic use differs significant across states. The composition share of expenditure on blood pressure monitoring machine etc. in Andaman and Nicobar, for instance, is more than 90% (Table 4).

Table 4: Household Expenditure on purchasing of medical equipment for domestic use: Analysis by Type of Equipment across Indian States, 2022-23

States	Wheelchair	Massagers	Hearing aids & orthopaedic equipment	Nebulizer	Other medical equipment (blood pressure monitoring machine, etc.)
Ladakh	1.08	1.28	34.08	37.56	26.00
Telangana	8.96	5.28	18.35	33.16	34.26
Maharashtra	12.15	14.18	14.50	20.89	38.29
Mizoram	1.93	25.27	14.81	17.78	40.21
Jharkhand	4.47	15.04	27.20	12.83	40.46
Chandigarh	0.11	29.44	13.29	15.49	41.67
Kerala	6.07	2.19	22.39	25.96	43.39
Lakshadweep	7.01	0.00	15.11	33.37	44.52
Meghalaya	0.39	30.81	13.11	3.67	52.02
Madhya Pradesh	1.40	9.55	24.64	11.87	52.54
Uttrakhand	5.73	15.09	18.03	4.65	56.50
Gujarat	9.33	13.70	11.93	7.87	57.18
Karnataka	11.17	9.79	11.58	10.18	57.28
Delhi	1.21	17.50	4.98	19.00	57.31
Tamil Nadu	13.10	6.72	11.96	7.95	60.26
Arunachal Pradesh	0.45	25.94	5.41	7.62	60.57
Nagaland	7.25	20.17	11.73	0.00	60.85
DNH & DD	0.00	11.98	18.30	4.81	64.91
Odisha	0.77	7.77	22.79	3.30	65.38
Jammu & Kashmir	6.15	1.73	15.07	11.66	65.39

Rajasthan	4.93	7.26	9.01	13.19	65.62
Punjab	2.38	17.52	9.55	2.66	67.88
Andhra Pradesh	12.64	1.03	4.98	12.72	68.63
Bihar	6.94	8.44	6.93	8.48	69.20
Tripura	5.07	15.65	4.24	5.18	69.87
Sikkim	0.00	23.89	5.25	0.77	70.08
Chhattisgarh	7.66	3.39	17.86	0.88	70.21
Uttar Pradesh	4.69	6.62	5.63	12.79	70.27
West Bengal	0.98	1.77	9.07	17.73	70.45
Haryana	1.03	8.19	6.92	7.96	75.90
Manipur	1.97	3.45	8.22	10.10	76.26
Assam	5.14	3.88	7.87	2.71	80.40
Goa	0.00	5.97	12.98	0.00	81.05
Himachal Pradesh	6.72	2.29	3.07	1.04	86.88
Puducherry	0.00	5.58	4.96	1.10	88.36
Andaman and Nicobar	0.00	0.00	3.41	1.43	95.16
All (India)	6.15	8.80	11.91	14.64	58.51

Source: Unit-level data of Consumer Expenditure Survey (CES) of NSSO 2022-23.
(CES captures such information during last 365 days on the day of survey.)

4.1 Role of e-Commerce Platforms

Our estimates from consumer expenditure survey of NSSO 2022-23 suggest that a large number of households, around 4.15 crore households, purchased medical equipment for domestic use (both online and offline mode) in 2022-23. Of the total households who purchased medical equipment for their domestic use, about 1.81 crore households belong to rural area and 2.34 crore were urban households.

The COVID-19 pandemic accelerated the adoption of digitalisation by firms (Deloitte, n.d.; TCS, 2020). Households are also shifting towards online purchasing of different manufacturing items, including medical devices, as reported in Table-5. e-commerce platforms are making the purchase easier, efficient, and convenient for users of medical devices (Deloitte, n.d.). Estimates from NSSO 2022-23 suggest that, of the total 4.15 crore households, around 11,59,350 (2.79%) households purchased medical equipment through online mode in 2022-23. A majority of them were from urban areas (79%, or 9,19,600 households) and around 21% (2,39,750 households) were from rural areas. The tendency of purchasing of medical equipment through online mode was higher among high-income households than low-income households (Table 5 and Figure 12).

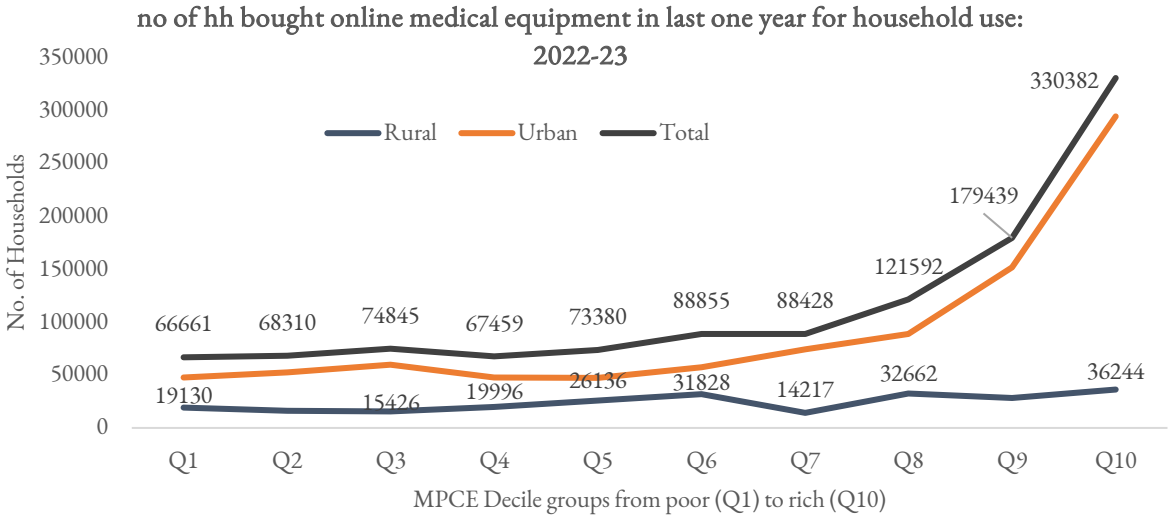
Table 5: Number of Households purchased online medical equipment by MPCE: 2022-23

MPCE	Number of HH purchased online medical equipment in last 365 days			Distribution of HH by MPCE			Composition of HH by R-U	
	rural	urban	Total	rural	urban	Total	rural	urban
Poor-Q1	35272	99699	134971	14.7	10.8	11.6	26.1	73.9
Near Poor-Q2	35421	106883	142304	14.8	11.6	12.3	24.9	75.1
Middle-Q3	57965	104270	162235	24.2	11.3	14.0	35.7	64.3
Upper Middle-Q4	46879	163141	210020	19.6	17.7	18.1	22.3	77.7
Rich-Q5	64213	445608	509821	26.8	48.5	44.0	12.6	87.4
Total	239750	919600	1159350	100	100	100	20.7	79.3

Source: Unit-level data of Consumer Expenditure survey of NSSO 2022-23

When examining the distribution of households that purchased online medical equipment by MPCE (Monthly Per Capita Consumption Expenditure) decile class, particularly to assess whether income influences this behavior, we observe that the number of households buying medical equipment online increases as the MPCE of households rises. This trend is particularly pronounced more among urban households compared to rural ones (Figure 12). This may be due to urban households being more aware of the availability and utility of such products, as well as having a greater ability to spend on them.

Figure 12: Number of Household bought online medical equipment in last one year for domestic use: 2022-23



Source: Unit-level data of Consumer Expenditure survey of NSSO 2022-23.

5. Technological Factors

In the aftermath of the Covid-19 pandemic, stakeholders like doctors, patients and others emphasized the need for digital technologies to provide seamless care to patients, leading to a gradual adoption of digital practices. India's health-tech business is projected to grow at a CAGR of 39% (IBEF 2023). With government initiatives such as the Ayushman Bharat Digital Mission, National Health Digital Mission, and e-Sanjeevani, India is unlocking its potential in the digital health space.

Emerging technologies like telehealth and remote patient monitoring devices are enabling healthcare providers to monitor patients from a distance. Additionally, wearable and smartphone technologies are driving a transformative shift in patient observation and personalized care, with medical devices, electronic medical records, wearables, and telehealth gaining popularity for household use. As electronic medical records, wearables, smartphones, and telehealth gain popularity, these devices are also becoming more common in households usage. Wearables, equipped with sensors such as accelerometers and optics, are emerging as valuable tools for diagnostics and therapy, facilitating a move towards a more decentralized and personalized healthcare system. Both healthcare

providers and patients are increasingly adopting these technologies for continuous monitoring beyond clinical settings.

Smartphones, once solely for communication, have evolved into essential tools for health monitoring, utilizing internet of thing (IoT) connectivity to support a seamless transition to a digital and interconnected healthcare system (Wall et.al. 2023). This suggests that the demand for emerging medical equipment is expanding beyond traditional medical settings and hospitals to digital technologies such as electronic health records, wearable devices, mobile health applications, and other forms of digital health technology. Additionally, research and development activities in these areas are gaining momentum across the globe (Hooda 2025).

In the next sections, we will discuss the supply-side factors, including (i) public procurement platform for boosting the domestic manufacturing, (ii) reform in Medical Device Regulation (MDR) for improving global acceptability of our medical device equipment via quality enhancement, and (iii) government policy initiatives that promote medical device manufacturing specifically through the special incentive package scheme, foreign direct invest, Make-in-India, Medical Device Parks, and PLI (production-linked incentive scheme) for the medical device sector.

6. Public Procurement Platform for Reshaping the Medical Device Sector

The Government of India launched the e-commerce platform 'Government eMarketplace' (GeM) as part of the Make in India initiative. GeM allows companies to register and list their products on the platform.

With the issuance of the Public Procurement Order (PPO) 2017 (MeitY 2020), the government has taken steps to prioritize domestic manufacturers in public procurement of medical devices for hospitals under the Central Government. State governments have also been instructed to follow this approach. Under the order, around 19 medical devices and 135 In-vitro diagnostics (IVD) products were designated, with local manufacturers receiving the first preference (GoI 2024a). A recent PPO displayed a list of 592 medical device items and invited local manufacturer to register for providing these equipment at GeM platform (GOI, 2024b).

Hospitals are required to purchase these items from domestic manufacturers, even if they are priced higher. The PPO and GeM initiatives are expected to assist local medical device manufacturers by providing them with a platform for procurement, which is likely to contribute to the growth of the industry. It is reported that India has around 700-800 medical device manufacturers, of which 300 are domestic manufactures, they are expected to contribute significantly at such platform (AiMeD, n.d.).

7. Medical Device Regulation 2017

Following the risk-based classification system for medical devices in line with the Global Harmonization Task Force guidelines, the Central Drugs Standard Control Organisation (CDSCO) introduced a Medical Devices Rule in 2017 (GOI 2017). This system categorizes medical devices into four classes based on the potential risk associated with their use: Class A (low risk), Class B (low-moderate risk), Class C (moderate-high risk), and Class D (high risk). This international classification has been adopted especially to improve the quality of manufactured products and increase the global acceptability of medical device equipment manufactured in the country (GoI, 2017).

8. Policy Promoting Medical Device Manufacturing

In 2012, government of India announced a special incentive package scheme for medical device-related MSME, SEZ, and non-SEZ units to boost domestic manufacturing of medical devices (especially relating to electronic equipment) (Hooda 2025). Since then, India has implemented several measures to support the sector's growth.

For instance, in 2015, the medical device sector was designated as a "sunrise sector" under the Make in India initiative (Hooda 2025). The government has streamlined the regulatory processes, and has worked towards promoting the research development and innovation especially to build a strong manufacturing ecosystem. India allowed 100% foreign direct investment (FDI) in medical devices, which is crucial for attracting international players and enabling them to tap into India's growing healthcare market (Hooda 2025).

Our report on medical device industry (Hooda 2025) suggests that Indian medical device sector face several challenges viz., inadequate logistic infrastructure, constraints in the local supply chain, high financing costs, unreliable power supply, limited design capabilities, and low investment in R&D. To address such issues, Government of India announced a policy to establish four Medical Device Parks for strengthening and developing a robust manufacturing ecosystem for MD in the domestic market, and reducing manufacturing costs up to 50%. Each park also includes raw material consolidated facility, standard testing facility to enhance product quality, export / import facilitation centres, regulatory & engineering services, and academia-industry linkages (including patent use).

India introduced the Production Linked Incentive (PLI) scheme to encourage domestic manufacturing of medical devices, with an increased emphasis on research and development. The PLI cover 4 major segments of medical device: cancer care/radiotherapy; radiology, imaging, and nuclear imaging devices; anaesthetics, cardio-respiratory, and renal care; and all implants. Further, to simplify the import process for medical devices and equipment, the government introduced the National Single Window System (NSWS). In April 2023, the Government of India approved the National Medical Devices Policy 2023, aimed at fostering industry growth through initiatives such as developing infrastructure, supporting R&D and innovation, attracting investment, streamlining regulations, building human resources, and enhancing industry awareness and positioning.

With continued government support, India's medical device market is poised for significant growth. While a comprehensive analysis is required to assess the full impact of these initiatives on the sector's development, an overview of India's domestic medical device manufacturing, market size, and the import/export dynamics across various categories offers useful insights.

Our comparative analysis on market size suggests that India's share in the global medical device market hovered around 2%. If one goes by medical device components, it reflects that India's medical device market is fairly distributed among diagnostic imaging, orthopaedic devices, ophthalmic devices, cardiology devices, IVD, and other categories, whereas the world market itself is concentrated around in-vitro diagnostic, cardio-related, and 'other' medical devices (Table 6)

Table 6: Medical devices market size in 2022-23: Global and India Comparison (Rs.Cr.)

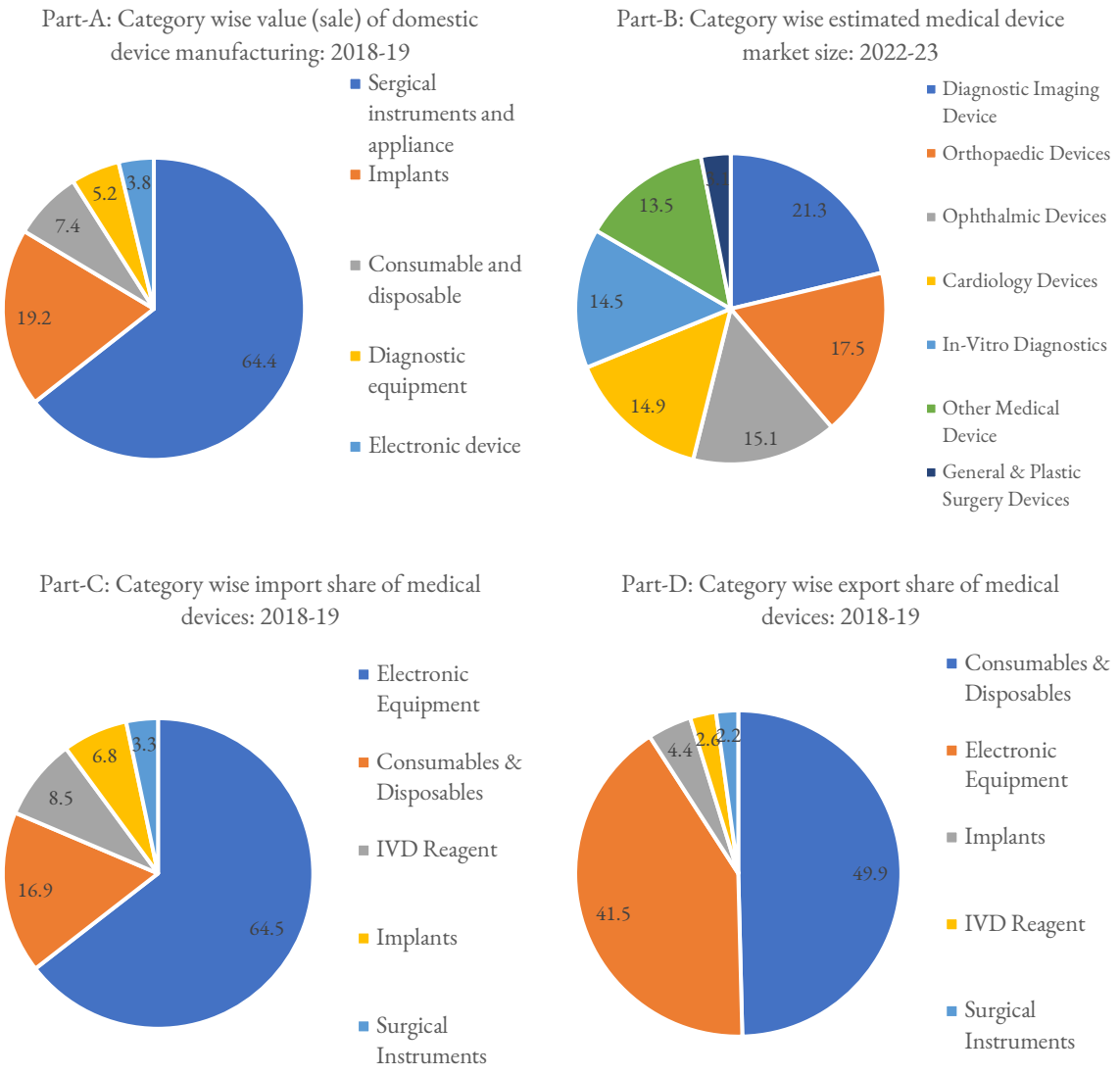
Items-group	Global	Global composition	India	India Composition	India's share in World
In-Vitro Diagnostics	6,28,619.64	14.56	12,883.20	14.55	2.049
Cardiology Devices	4,51,702.63	10.46	13,240.16	14.95	2.931
Orthopaedic Devices	3,04,563.68	7.06	15,499.16	17.50	5.089
Diagnostic Imaging Devices	2,56,858.80	5.95	18,835.52	21.27	7.333
Ophthalmic Devices	2,23,620.14	5.18	13,399.49	15.13	5.992
General & Plastic Surgery Devices	133328.24	3.09	2,737.68	3.09	2.053
Other Medical Devices	23,18,145.11	53.70	11,976.79	13.52	0.517
Total	43,16,838.24	100.00	88,572.00	100.00	2.052

Source: KIHT, GLOBEXIM, 2022-23

As reported in Figure 13 (Part-B), India's domestic demand for medical devices is fairly distributed around various items (listed in Table 6). However, domestic manufacturing in India is primarily focused on producing surgical instruments, appliances, implants, and consumables (Figure 13, Part-A). The country has minimal production in diagnostic and electronic devices, despite the higher domestic needs. As a result, India is highly depended on imports of electronic medical devices, which account for about 64.5% of total medical device imports (Part-C).

Given that India primarily manufactures low-tech equipment, it is not surprising that exports are mainly concentrated in consumables, disposables, and low-end electronic equipment category (Part-D). This reflects that India mainly produces low-tech segment medical equipment, which pushes the country to depend more import on high-tech segments equipment. This is a cause of serious concern for a country like India where this sector have high potential to grow.

Figure 13: Category-Wise Value of Manufacturing, Market Size, Import and Export: India



Source: Part A, C and D - Hooda (2025); Part-B- KIHT (2023)

9. Key Challenges

9.1 Expensive Medical Technology for End-Users

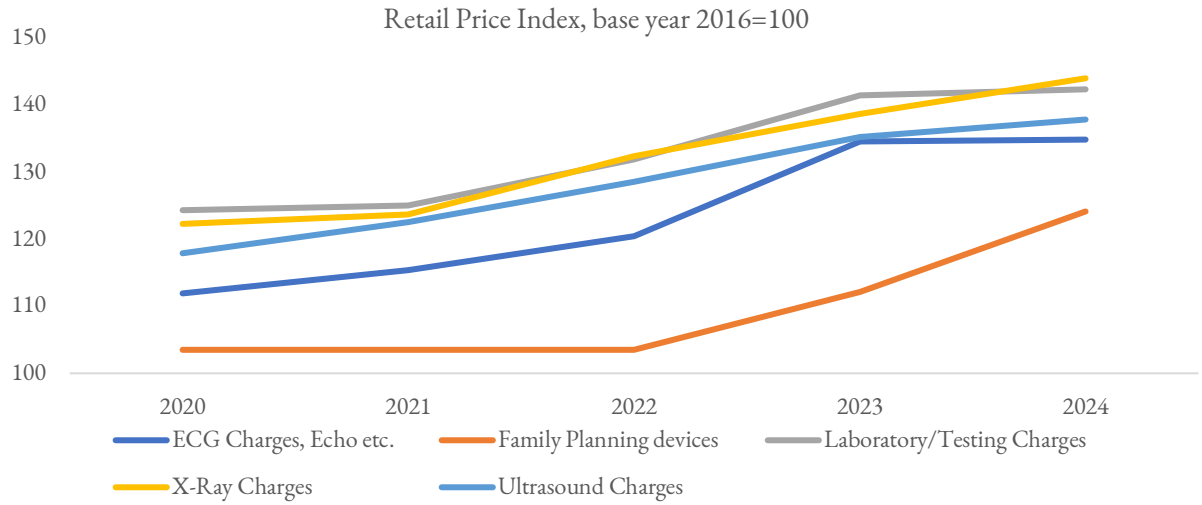
Despite several enabling factors for sector growth, and while the medical device sector of India produces a wide range of medical equipment ranging from consumables to implantable devices, the sector's growth has tilted towards producing low-tech equipment in the disposables segment (catheters, perfusion sets, cannulas, feeding tubes, needles, syringes) and implants segment (such as cardiac stents, intraocular lenses, and orthopedic implants). This is because the sector is highly capital-intensive, requiring high R&D and skilled personnel to adapt emerging and new technologies (Hooda 2025).

India remains heavily reliant on imports, especially for high-tech equipment that requires specialized skills. The high-tech and advanced medical technologies are often expensive (Awasthi and

Stanick 2021), thereby forcing the medical providers to charge higher prices to end-users. Our data analysis of the Retail Price Index (RPI) of different diagnostic testing charges support this argument.

The RPI data suggest a sharp rise in diagnostics test charges in the country. The growth rate (CAGR) in charges for different diagnostic usage ranges between 14% to 20% from 2020 to 2024, taking RPI in 2016 as the base year (Figure 14). The charges grew 20.4 percent for ECGs-ECO followed by, family planning device (19.9%), X-ray (17.7%), ultrasound (16.9%) and laboratory test (14.5%), indicating that use of medical technology is becoming expensive in India.

Figure 14: Increase in ECG/ECO, Laboratory Test, X-ray and Ultrasound Charges in India

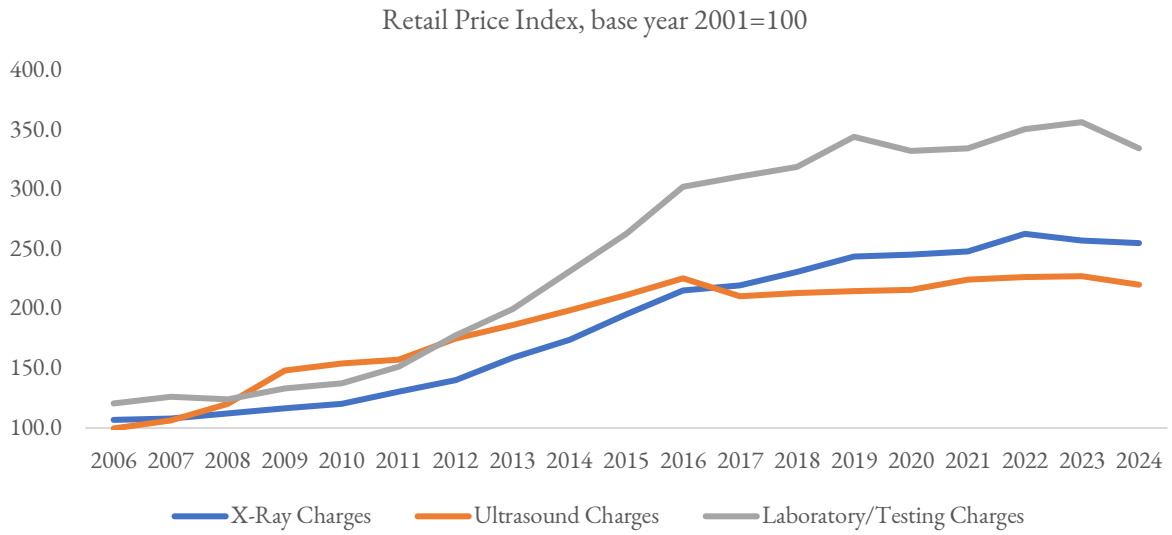


Source: Labour Bureau, Government of India, Retail Price Series.

When examining the long-term trends in diagnostic test charges at constant prices (with a base of 2001=100), it is evident that over the past two decades, the charges for various tests have increased significantly (Figure 15). The average value of RPI increased from 106.9 to 225.1 for x-ray, from 106.6 to 220.2 for ultrasound, and from 120.6 to 334.7 for laboratory testing charge between 2006 to 2024. The average growth rate for these charges has ranged from 120% to 177% between 2006 and 2024. Diagnostic test charges saw an increase of around 177.4%, followed by X-ray charges (138.8%) and ultrasound charges (120.96%).

This substantial rise in charges indicates that use of medical technology in India is becoming increasingly expensive. The escalating costs of medical technology are likely to drive up the overall cost of healthcare, contributing to higher out-of-pocket (OOP) spending. In this context, manufacturers (especially via boosting local manufacturing) and regulators have a crucial role to play.

Figure 15: Increase in Laboratory test, X-ray and Ultrasound Charges in India at Constant Price



Source: Labour Bureau, Government of India, Retail Price Series.

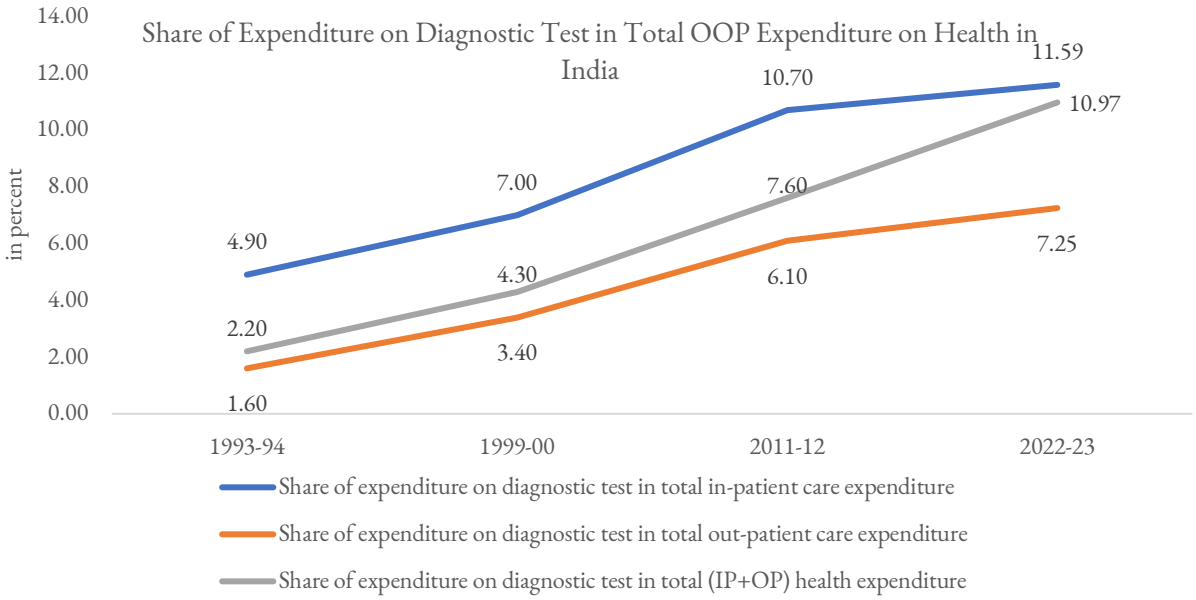
9.2 End-Users' Expenditure on Diagnostic Test

As reported earlier, the number of patients receiving OPD and IPD services is growing rapidly across different NSS health rounds in the country. This increase in OPD and IPD cases may lead to higher spending of households on diagnostic tests, unless these tests become cost-effective and/or covered under government-sponsored insurance schemes.

High out-of-pocket (OOP) health expenditure often pushes millions of people below the poverty line and contributes to catastrophic expenses, resulting in significant indebtedness for many households (Hooda 2017). In various NSSO consumption expenditure surveys (CES), OOP expenditure is reported for hospitalization (in-patient) over the past 365 days and non-hospitalization (out-patient) over the last 30 days. In CES schedule, OOP health expenditure is typically categorized into five areas: medicine, doctor's/surgeon's fees, diagnostic tests (such as X-rays, ECGs, and pathological tests), hospital and nursing home charges, and other medical expenses. Historically, spending on medicine accounted for about 70% of the total, while spending on diagnostic tests was minimal. However, our analysis from several successive CES rounds of NSSO shows a steady increase in OOP expenditure on diagnostic tests over time.

We observed a significant rise in OOP expenditure for diagnostic tests in both in-patient (IPD) and out-patient (OPD) care (Figure 16). The growth rate in the share of OOP expenditure on diagnostic tests in total out-patient care expenditure was particularly striking, rising from 1.6% to 7.25% during the study period. The share of OOP spending on diagnostic tests increased more than fourfold, from 1.6% in 1993-94 to 7.25% in 2022-23. Similarly, the share of diagnostic test expenditure in total in-patient care costs rose from 4.9% in 1993-94 to 11.59% in 2022-23, a more than two-and-a-half time increase over the study period (Figure 16).

Figure 16: Share of Expenditure on Diagnostic Test in Total OOP Spending on Health in India

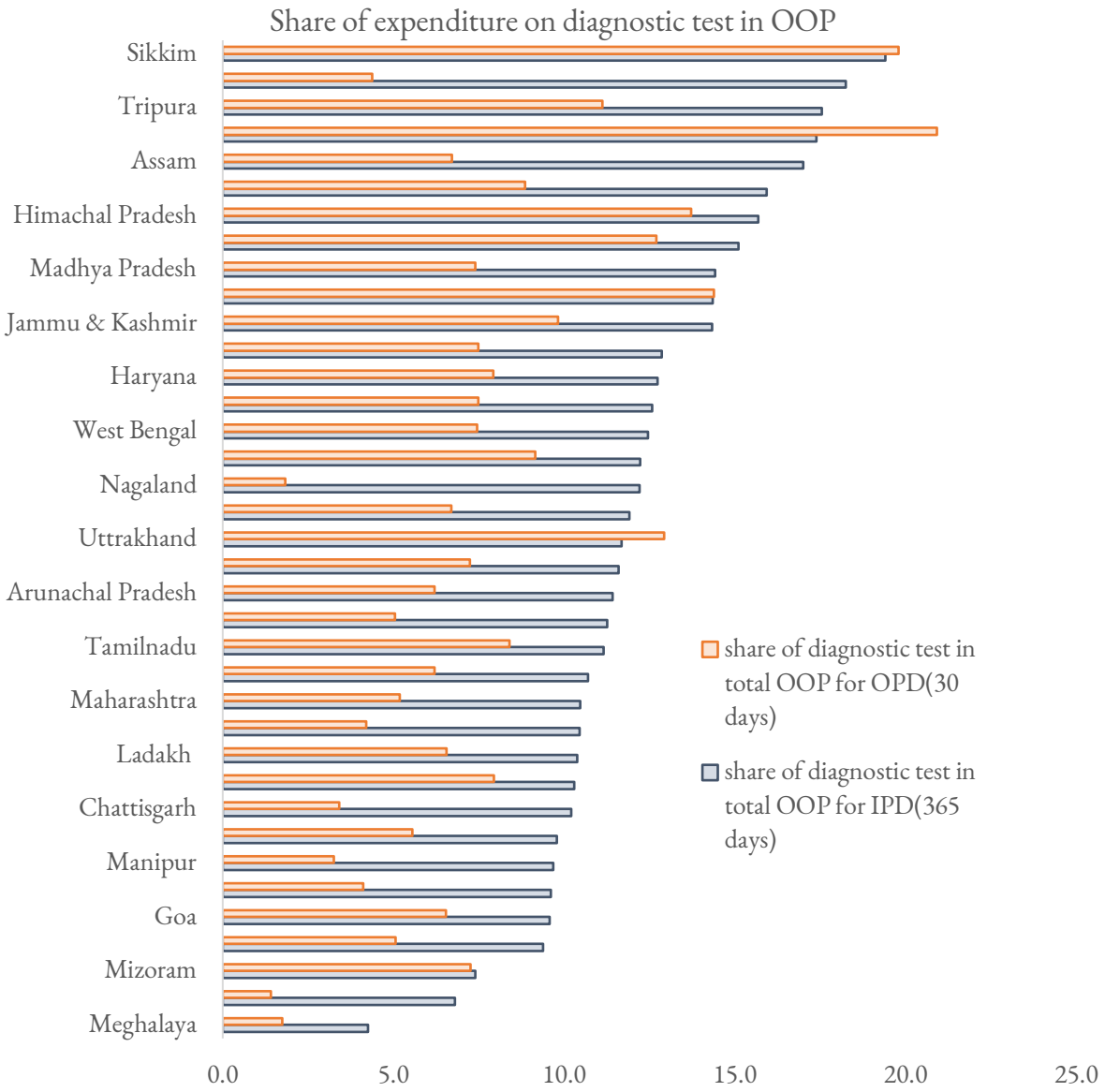


Source: Unit-level data of Consumer Expenditure survey of NSSO (various rounds)

As reported in Figure-16, in 2022-23, share of expenditure on diagnostic test in total OOP health expenditure at national level was around 10.97%. For IPD and OPD, this share was 11.59% and 7.25% respectively. The state-level diagnostic test spending share for IPD and OPD, however, vary significantly. In some states, spending share on diagnostic services for both IPD and OPD cases, exceeded even 20%, almost double the national averages 11.59% and 7.25% respectively. (Figure 17).

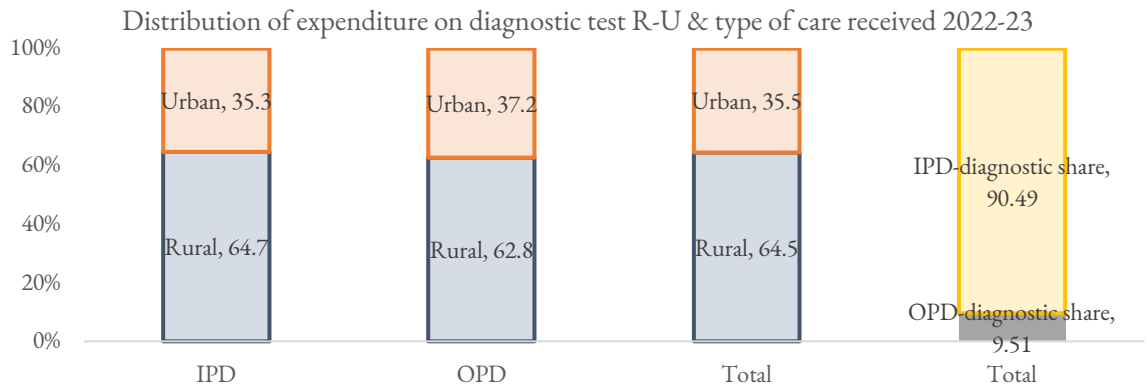
Of the total out-of-pocket (OOP) expenditure on diagnostic services for both IPD and OPD, we found that in-patient (IPD) services accounted for a significant share of approximately 90.49%, while the remaining 9.51% was spent on OPD diagnostic services (Figure 18). A major share of expenditure on diagnostic tests is primarily borne by rural patients, which account around 64.5% of the total OOP expenditure on diagnostic tests in 2022-23, compared to 35% by urban residents (Figure 18).

Figure 17: Share of OOP Expenditure on Diagnostic Test in Total OOP across States 2022-23



Source: NSS Consumption Expenditure Survey Round, 2022-23

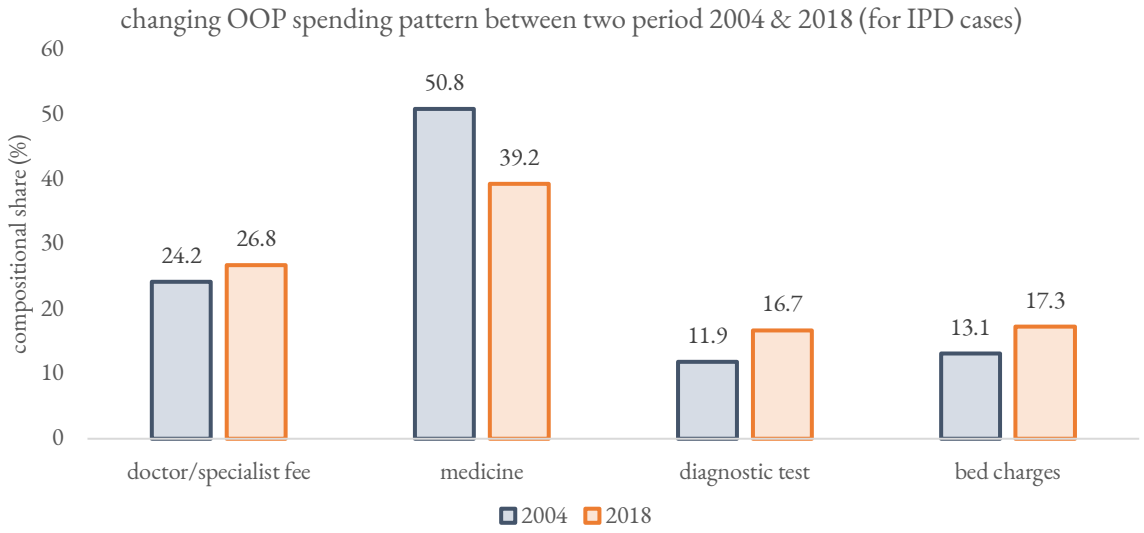
Figure 18: Share of OOP Spending on Diagnostic Care by Rural-Urban 2022-23



Source: Unit-level data of Consumer Expenditure survey of NSSO 2022-23

With the increase in charges of diagnostic testing for end users, OOP spending for diagnostic tests has risen between the two health rounds of NSS 2004 and 2018. The compositional share of the spending on diagnostic test increased from 11.9% to 16.7% between these two rounds. The spending share for doctor fee and bed charges also see a rising pattern, though by a smaller percentage than spending of diagnostic tests, whereas the share of OOP spending on medicine declined from 50.8% to 39.2% during this time period (Figure 19).

Figure 19: Changing OOP spending pattern between NSS Health Rounds 2004 & 2018



Source: NSS health round 2004 and 2018

9.3 Skill Gap Challenge

The medical device sector is highly critical and different from other consumable goods. It encompasses lifesaving equipment, and its usage require a reasonable ecosystem of high-skilled personnel and technicians. However, in reality, India face a skill gap in this sector. The data from Global Health Observatory shows that density of biomedical engineers and technicians per 1000 population in India *decreased* from 0.32 in 2014 to 0.23 in 2017 (WHO, 2018).

Such type of personnel are essential for ensuring innovative technological solutions and ensuring correct development of medical device equipment (James and Jaiswal 2020). The shortage of such technicians and biomedical engineers will have implications for growth and development of this industry. For instance, as reported in James and Jaiswal (2020), globally around 30% of sophisticated equipment remained unused, while those in operation had 25-35% equipment face downtime because of weak capacity to maintain and use these equipment (World Bank, 2003).

10. Conclusion

This paper outlines the socio-economic, market, technological, and policy factors that could drive the growth of India's medical device industry. It also highlights the key challenges and issues the sector is currently facing. The study observed that while India has made significant strides toward developing its local medical device manufacturing, it remains heavily dependent on imports (Hooda 2025; Datta and Sakthivel, 2019). Indian medical device manufacturing explored a wide range of medical equipment ranging from consumables to implantable devices. However, sector growth has been primarily focused on low-tech equipment in disposable segments such as catheters, perfusion sets, cannulas, feeding tubes, needles, syringes and implants segment like cardiac stents, intraocular lenses and orthopedic implants (CMRSD 2023; Hooda 2025).

This biasedness may be because of high capital-intensive requirement of the sector, which require continued investment in R&D, regulatory improvements, infrastructure development and skilled personnel to adapt to emerging technologies (GoI 2020; IBEF 2024). In short, despite several enabling factors for the sector's growth, India mainly produces medical equipment within the low-tech segment, from consumables to implantable devices. As a result, the country remains reliant on imports for expensive high-tech equipment.

Our analysis also indicates that medical equipment costs are rising, leading to higher diagnostic test fees for end-users, which in turn contribute to a significant out-of-pocket payment burden on households for using diagnostic services. This underscores the need to boost domestic manufacturing of high-tech medical devices and calls for a greater regulatory role in controlling the rising prices of medical equipment.

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Appendix 1: Health Expenditure: A Global Comparison

	Current Health Expenditure (CHE) as % Gross Domestic Product (GDP)		Current Health Expenditure (CHE) per Capita in US$		Social Health Insurance (SHI) as % of Current Health Expenditure (CHE)	
	2003	2019	2003	2019	2003	2019
USA	15	17	5732	10546	19	24
Germany	10	12	3153	5489	69	70
Canada	9	11	2535	5104	2	1
France	10	11	3006	4509	75	71
Australia	8	10	2227	5529	NA	NA
Brazil	8	10	253	868	NA	1
UK	8	10	2789	4259	NA	NA
China	4	5	57	539	15	39
Mexico	6	5	412	550	28	27
Malaysia	3	4	142	419	1	1
Nepal	4	4	11	54	NA	2
Sri Lanka	4	4	41	155	1	1
Thailand	3	4	76	288	6	9
India	4	3	22	61	2	6
Indonesia	2	3	26	118	3	25
Pakistan	2	3	14	36	1	1
Bangladesh	2	2	10	48	NA	NA

Source: https://apps.who.int/nha/database/ViewData/Indicators/en