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Leapfrogging to a Digital Healthcare System

Re-imagining Healthcare for Every Indian

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FICCI HEAL 2020
HEALTH ★ ENTERPRISE ★ LEARNING

Post Covid Healthcare World:
The New Begining

Sept 29th-Oct 1st, 2020



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Foreword



Dr Indu Bhushan
CEO, National Health Authority (NHA) and Ayushman Bharat Pradhan Mantri Jan Arogya Yojna (AB-PMJAY)



J Satyanarayana
Chief Advisor, National Digital Health Mission (NDHM)

The honorable Prime Minister announced the launch of the National Digital Health Mission (NDHM) on 15th August 2020. NDHM aims at creating a robust public digital infrastructure that can be leveraged by all entities, public and private, to transform how health care is delivered in India. The secure digital health framework that NDHM will build will unlock creativity and enable innovation to solve some of the hardest problems in Indian healthcare today.

Despite multiple initiatives in the recent past, the health system in India needs to be strengthened further and we need to improve access, affordability and quality of care for all citizens. In our view, building digital commons can improve health care delivery and health outcomes significantly in India. Just like the creation of the digital infrastructure in the financial industry, NDHM, in next few years, will catalyze a robust digital infrastructure for the Indian healthcare ecosystem.

With the guiding principles outlined in the National Digital Health Blueprint (NDHB), the government has laid out a comprehensive strategy to bring a fundamental transformation in healthcare and open a range of market opportunities for all stakeholders. This report details out how the entire ecosystem will gain, and the industry will be galvanized as a result of the implementation of NDHB over the next few years.

Altogether, the entire ecosystem stands to benefit with the public digital health infrastructure that is envisaged, and it will lead to improved health outcomes for all citizens in the country.

We are yet again at a point of inflection in the evolution of the digital world. New and emerging technologies are beckoning to us to unlock their immense potential to help the humanity. On the other side, we have the prospects of large and boundaryless ecosystems evolving rapidly blurring the lines between public and private sectors. Unbundling systems into small, but infinitely scalable, and reusable building blocks appears to be a powerful architectural option.

The National Digital Health Mission (NDHM) is a major step in the evolution of a digital health ecosystem. It is based on a set of principles, standards, and core building blocks. Successful implementation of NDHM would also enable faster adoption of the emerging technologies like AI/ML and IoT to achieve a quantum jump in the quality of healthcare and ease of access.

Technology is but one dimension of health sector transformation. A multi-pronged approach is needed to make a significant impact in terms of health outcomes. Issues like upgrading the health infrastructure and resources, addressing the urban-rural divide in health service delivery, improving the environmental factors like safe water, pure air and wellness behavior are some of the major items on the national health agenda.

The BCG-FICCI report analyzes the health landscape of the country and makes out a strong case for an Open Digital Health Ecosystem, with a view to unleashing the power of digital technologies to benefit the patients in an affordable and sustainable manner. The report makes actionable recommendations to the different groups of stakeholders. I hope it will promote investment and innovation to transform the health sector.

Foreword

The way we live, and work has been profoundly impacted by the COVID-19 pandemic. In addition to upending our lives the pandemic has also exposed India's weak healthcare system and reinforced the need to urgently improve all levels of healthcare, including primary care. As is inevitable in times of adversity, the pandemic has also inspired promising innovations, particularly in digital healthcare models.

As a nation, today we have the opportunity to build on and scale these innovations and fundamentally transform our healthcare system. Multiple examples from India and other countries underscore how a robust digital public infrastructure can create a fertile environment for "consumer centric" innovation, bridge the need gaps, and cater to unfulfilled demand. The Unified Payments Interface (UPI) and AADHAAR are prime examples of such an infrastructure. The Indian healthcare sector has already embarked on a similar digitization journey, albeit with tiny steps. The pressing needs exposed by the current crisis, supported by private sector initiatives and new health policies, will jointly accelerate India's realization of a digital healthcare system.

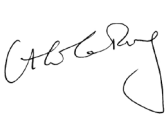
In this joint FICCI-BCG publication, we have explored how the healthcare delivery transformation can be achieved through the creation of an "open digital health ecosystem" or a health ODE. Such an ecosystem is defined as an open and secure digital health platform that can be leveraged by all entities, public and private, to unlock transformative health delivery solutions. We believe that this ecosystem will fundamentally change the way in which healthcare is delivered today and unlock significant incremental economic opportunities for all the stakeholders in the healthcare ecosystem. Additionally, it will accelerate India's journey towards universal health coverage by creating a healthcare system that puts the patient at the center of all solutions and incorporates healthcare access and affordability to all.

The advent of open digital health ecosystem in India will change the rules of the game for all healthcare stakeholders to win in the new era. It calls for all stakeholders to embrace themselves for a new beginning – and update their strategies and models to stay ahead of the curve

The objective of this report is three-fold –

1. To emphasize the urgency for a healthcare transformation in India and highlight the critical role that digital can play in enabling this journey.
2. To evaluate the implications of an open digital health ecosystem on the multiple stakeholders in the ecosystem and suggest solutions to keep up with the change.
3. To size the impact potential of such an ecosystem and identify the key associated risks that will need to be mitigated.

We believe that the themes discussed in this report will serve as a stimulus for a meaningful discussion among the healthcare participants in the country and expedite the implementation of the open digital health ecosystem in India. Additionally, we hope to create an awareness among the healthcare stakeholders regarding the game-changing nature of this revolution and the need for them to act soon. We continue to commit our support to collaborate on these initiatives and look forward to the times ahead.



Dr Alok Roy
Chair – Health Services Committee, FICCI
Chairman, Medica Group of Hospitals



Bart Jannsens
Managing Director and Senior Partner
Boston Consulting Group

Industry Voices



President's Desk

"There is an imminent need to shift to a new care delivery paradigm that leverages shared technology infrastructure, derives insights from interoperable data systems to bolster user-centricity, and ensures adequate digital security. It is great to see that a very timely and insightful report has been put together to drive active discussions amongst the stakeholders."

Dr Sangita Reddy
President, FICCI
Joint MD, Apollo Hospitals



"India has made significant strides in the last few decades in improving some key health indicators through narrowly targeted programs in addition to the impact of rising incomes, sanitation and education levels. However, as this pandemic lays bare - we have a long way to go to achieve 'Health For All'. This moment in time should cause us to pause and fundamentally re-imagine how our health system should work. While we need continued investment in infrastructure and human resources for health, we also have an opportunity to use technology to drive improvements in access, quality and affordability all along the continuum of care. This report builds on the NDHM strategy and highlights some of the imperatives for all health system actors, public and private, to work proactively and collaboratively to achieve the vision of 'Health for All' ".

Dr Ajay Nair
CEO, Swasth Digital Health Foundation



"The positive side of year 2020 has been identification of the huge potential in digital implementation of healthcare delivery through means like telemedicine etc. Though the open digital health ecosystem is at its nascent stage, I can foresee its capability to integrate different stakeholders to deliver better customer experience. I believe this model can be transformational because it is set to empower the public in making better decisions. From the perspective of Health Insurers, the open digital health ecosystem will aid them in providing services more efficiently with utmost transparency."

Anand Roy
Managing Director
Star Health Insurance

Industry Voices



"An open digital health ecosystem can empower all stakeholders to make better decisions. Not only will it bring transparency and thus protect rights of patients, but also weed away inefficiencies from the system due to loss of medical records or information disparity. For insurers, it can potentially help reduce frauds and thus make insurance premiums more sustainable, while also empowering them with structured data to design better and innovative products. This report highlights the opportunities for insurance companies and how we will need to gear up for the digital transformation of this sector."

Anuj Gulati
MD & CEO
Care Health Insurance



"In modern healthcare, the role of early detection and correct diagnosis cannot be overstated. About 70% of all clinical decisions are taken on the basis of diagnostic tests that require a highly evolved digital platform. Therefore, enabling our health system to leverage digital technology will form the backbone for India to become Aatmanirbhar in Healthcare. This report comes at the right time to facilitate discussions amongst all the stakeholders in order to bring this to fruition"

(Hony) Brig Dr Arvind Lal
Advisor, FICCI Health Services Committee
Executive Chairman, Dr Lal PathLabs



"The Covid-19 pandemic has negatively affected various aspects of human lives and activities, including one of the most fundamental of all: the ability to access, afford and avail medical care. It thus becomes imperative for governments, law makers, healthcare service providers, consumers and all other stakeholders to join hands to adapt and develop novel solutions to not only cope with this pandemic but to overcome all other hurdles and challenges to provide a new healthcare ecosystem in the country which puts our citizens at the core and paves way to a healthier nation. This report has done an exceptional work in highlighting many of the key benefits and imperatives for the different stakeholders"

Mr Gautam Khanna
Co-Chair, FICCI Health Services Committee
CEO, P D Hinduja Hospital



"August 15th 2020 will be regarded as an inflection point in Indian Healthcare due to the launch of the National Digital Health Mission- NDHM; it will bring about the much needed efficiency , transparency , accountability and democratization for the critical interactions amongst all vital stakeholders – Patient, Providers and Payors . The governance & economic impact resulting from this new age architecture will not just increase the market size manifold but bring to focus outcome-based incentives. "

Dr Harish Pillai
Chair, FICCI MVT Committee
CEO, Aster India, Aster DM Healthcare Ltd

Industry Voices

"The Open Digital Ecosystem era represents a fundamental change in the way government leverages technology for creation of a public digital infrastructure, while also enabling private players to drive innovation. We have seen this across multiple industries in recent time and its time we drive the same in healthcare as well."



Dr Harsh Mahajan
Co-Chair, FICCI Health Services Committee
Founder & Chief Radiologist, Mahajan Imaging



"I believe that the digital health ecosystem is transformational for health financing and delivery in India. It will serve as a catalyst on several fronts. For the patient – a better experience, superior health outcomes and better value. For the health delivery system – enhanced ability to coordinate care along the continuum, rapid sharing of best practice based on evidence & superior quality. As highlighted in this report, the ecosystem will bring in greater transparency for health insurance, enable frictionless claims services and product innovation."

Krishnan Ramachandran
MD & CEO,
Max Bupa Health Insurance

"India's healthcare system is paradoxical - on the one hand, it boasts of 'best in class' healthcare delivery attracting medical tourists from across the world, while on the other, it is characterized by a near absence of accessible, affordable quality health services for a large part of the population. Some of these challenges have been made visible during the current pandemic. This report highlights how a robust public digital infrastructure to be implemented by NDHM can help bridge these gaps and lays out the imperatives for the healthcare industry leveraging digital technologies, IT talent in the country and emerging technologies like AI/ML."



Kris Gopalakrishnan
Chairman, Axilor Ventures



"While Health Insurance has been one of the fastest growing segments in Insurance, yet the opportunity has not yet been tapped to desired levels. With heightened awareness, increased sales numbers, and digitization, health insurance is becoming more entrenched in a consumer lifestyle than ever before. Ayushman Bharat (PMJAY) has shown a new way to industry to make the processes scalable and efficient using the digital and tech platforms. With customers becoming more comfortable with 'Phygital' (Physical and Digital) ways, insurers will need to work on digitizing the whole process and ensuring better customer experience with the most significant changes being in claims journey, servicing and usage of customer data. The current industry initiative under NDHM banner to create a digital intermediary to ensure seamless exchange of required data among stakeholders will lead to radical transformation; making the present scenario a great opportunity to transform the health insurance value chain for customers."

Mayank Bathwal
CEO, Aditya Birla Health Insurance

Industry Voices

"The advent of open digital health ecosystem will lead to a paradigm shift in the way healthcare is delivered by providers. It would drive new demand pools, better resource utilization and empower clinicians for improved clinical effectiveness. We as providers will have to equally shoulder this responsibility of adopting to the NDHM standards for a better future."



Dr N Subramaniam
Co-Chair, FICCI Health Services Committee
Director, Medical Services, Indraprastha Apollo



"Indian healthcare will need to use technology to drive healthcare outcomes. While video consultation is one narrow manifestation of this, the other, and in my view a much more important one, is enhancing the ability of a broadly trained health workforce, to serve their patients in-person with the best that health science has to offer, in the remotest parts of this great nation of ours."

Nachiket Mor
The Banyan Academy of Leadership in Mental Health (BALM)
CITAPP, IIIT Bangalore

"An Open Digital Health Ecosystem (ODE) has the potential to deliver quality healthcare at scale and to radically impact health outcomes in India. The pharmaceutical sector has never been better prepared for something like ODE as Covid pandemic has made this traditionally slow to digitize sector accelerate the adoption of digital initiatives in critical areas like patient awareness, treatment compliance, and doctor engagement."



Namita Thappar
Executive Director, Emcure



"The need to accelerate changes in our health care system is an obvious inference of this pandemic. It is fortunate that all stake holders and the Government are addressing this on a war footing. NDHM and the stakeholder discussions that this report will drive will go a long way in shaping the future of healthcare in India."

Dr Nandakumar Jairam
Advisor, FICCI Health Insurance Committee
Chairman, CEO & GMD, Columbia Asia

Industry Voices



"Data is and shall increasingly be the biggest force multiplier. Although India is rich in huge "potential" data streams in terms of clinical material and its sheer variety and volume, data capture, mining, analysis and use has been stymied by lack of a reliable digital framework. Both in terms of quantity and quality, NDHM,if implemented, right, offers us a chance to correct some of the anomalies and problems that have beset us in delivery of healthcare in India. This reports lays out the fundamentals benefits that can be derived from such open ecosystems"

Dr Narottam Puri
Advisor, FICCI Health Services Committee
Former Chairman- NABH; Advisor-Medical Operations, Fortis Healthcare Ltd



"The advent of NDHM's open digital health ecosystem should unleash a new wave of innovation and transform the way primary healthcare is delivered in India. As also illustrated in this detailed report, an open digital health ecosystem will enable patients who are under-served by the physical healthcare infrastructure to access healthcare of the highest quality, by leveraging digital infrastructure. This should create better access and affordability - and empower clinicians with better data for improving outcomes in a systematic manner. As health tech start-ups, we are excited to play a supporting role this process, ushering the third era of digital revolution in India. This particular wave will meaningfully impact the traditionally underserved citizens, through use of the most sophisticated technology supplementing the tremendous human capital of our healthcare system."

Prashant Tandon
CEO, 1mg



"The COVID-19 pandemic has catalysed the pharmaceutical and healthcare industry to reimagine its future. Widespread adoption of digital technologies has opened up new pathways. Patients have turned savvy about their own personal health, proactively seeking healthcare information and intervention. Providers too are shedding past inhibitions and fully embracing e-health and e-prescription platforms to maintain and enhance their connect with patients. In this new era of personalised healthcare and digital knowledge, all stakeholders in the ecosystem will need to demonstrate agility and adaptability. We could well be at an inflection point from where healthcare access and penetration could take a giant leap forward in India."

S Sridhar
Chair, FICCI Pharma Committee and MD, Pfizer India



"An open digital health ecosystem to be implemented by NDHM will transform healthcare delivery in India and improve access, affordability and quality for 1.3 billion citizens. The robust public digital infrastructure that is envisioned in NDHB will drive innovation and open a range of market opportunities for all stakeholders in the ecosystem. This report highlights this in detail and laying out benefits and implications for various stakeholders."

Shashank ND
CEO, Practo

Industry Voices



"With the launch of NDHM, the digital revolution in healthcare is just starting. Similar to the transformation we witnessed with UPI and Aadhar, the creation of a robust public digital infrastructure in healthcare will fundamentally transform how care is delivered in India. It will improve affordability, access, and quality of care by creating new market opportunities for all public and private stakeholders. This improvement can make India's healthcare delivery system one of the most advanced in the world over the next ten years. This report highlights some of the benefits of a health ODE and how various stakeholders in the ecosystem need to prepare for this new era of digitisation."

Sharad Sharma
Co-Founder, i-SPIRT



"The advent of open digital health ecosystem to be implemented by NDHM will lead to a paradigm shift in the way healthcare is delivered in India. It will create better access and affordability for all citizens in the country. We as payors have an important role to play in increasing penetration of insurance and ensuring adequate coverage at affordable rates. The claims engine proposed under the NDHB will significantly reduce costs for claim processing and enhance ability of payors to offer more relevant products that are affordable and provide comprehensive coverage. This report details out this and many other key benefits that open digital health ecosystem will have on health care delivery in India."

Varun Dua
CEO, Acko



"A health system like ours needs to enable open innovation platforms which allow for the ecosystem as a whole to grow and prosper. It would be crucial to promote collaboration amongst the stakeholders in the healthcare ecosystem to enable efficient, affordable and accessible healthcare for all. A robust public digital health infrastructure will be the bedrock which will enable us to achieve this universal health coverage."

Vikram Chhatwal
Chairman, Medi Assist



"NDHM will do for insurance what India Stack did for payments, by reducing the cost of processing claims. While customers, acting through an ISNP access, will benefit from faster claims reimbursements, the insurance ecosystem will see increased product innovations and improved analytics. We are excited about this new era of digital revolution that the country will witness over the next 3-5 years – some of which is highlighted in detail as part of this report"

Yashish Dahiya
CEO, PolicyBazaar

List of Abbreviations

AERB:	Atomic Energy Regulatory Board
AI:	Artificial Intelligence
AIOCD:	All India Organization of Chemists and Druggists
AoI:	Authority of India
API:	Application Programming Interface
Apps:	Application
B2C:	Business to Consumer
BHIM:	Bharat Interface for Money
Bn:	Billion
BPL:	Below Poverty Line
CAC:	Customer Acquisition Cost
CAGR:	Cumulative Annual Growth Rate
CDSS:	Clinical Decision Support System
CHC:	Community Health Centre
CKD:	Chronic Kidney Disease
COVID-19:	Coronavirus Disease - 2019
Cr:	Crore
CSC:	Community Service Centre
DALY:	Disease Adjusted Life Years
DIKSHA:	Digital Infrastructure for School Education
DPA:	Data Protection Authority
E2E:	End to End
EBITDA:	Earnings before Interest, Tax, Depreciation and Amortization
EHR:	Electronic Health Record
EUA:	End User Application
FWA:	Fraud, Waste and Abuse
GDP:	Gross Domestic Product
GoI:	Government of India
HAQ:	Healthcare Access and Quality Index
HIMS:	Hospital Information Management System
HIP:	Health Information Provider
HIR:	Health Information Repository
HIU:	Health Information User
HIV:	Human Immunodeficiency Virus
HMIS:	Hospital Management Information System
HSP:	Healthcare Service Provider
HWC:	Health & Wellness Centre
ICT:	Information and Communications Technology
ICU:	Intensive Care Unit
ID:	Identity
IHME:	Institute of Health Metrics and Evaluation
IIB:	Insurance Information Bureau of India
IMR:	Infant Mortality Ratio
INR:	Indian Rupees
IP:	Intellectual Property
IPD:	In-patient Department
IPHS:	Indian Public Health Standards
IRDAI:	Insurance Regulatory and Development
IT:	Information Technology
IVRS:	Interactive Voice Response System
JSY:	Janani Suraksha Yojana
KOL:	Key Opinion Leader
KPI:	Key Performance Indicator
KYC:	Know Your Customer
MMR:	Maternal Mortality Ratio
ML:	Machine Learning
Mn:	Million
MoHFW:	Ministry of Health and Family Welfare
MS:	Market Share
NCD:	Non-Communicable Disease
NDHB:	National Digital Health Blueprint
NDHM:	National Digital Health Mission
NFHS:	National Family Health Survey
NHA:	National Health Authority
NHAI:	National Highway Authority of India
NHP:	National Health Policy
NHS:	National Health Stack
NSS:	National Service Scheme
NSSO:	National Sample Survey Office

List of Abbreviations

NUIS:	National Urban Innovation Stack
ODE:	Open Digital Ecosystem
OECD:	Organization for Economic Co-operation and Development
OPD:	Outpatient Department
PDP:	Personal Data Protection
PHC:	Primary Health Centre
PHR:	Personal Health Record
PM:	Prime Minister
PMJAY:	Pradhan Mantri Jan Arogya Yojna
PMSMA:	Pradhan Mantri Surakshit Matritva Abhiyan
PNDT:	Pre-Natal Diagnostic Techniques
R&D:	Research and Development
RCH:	Reproductive and Child Health
RMO:	Resident Medical Officer
Rx:	Prescription
Rxer:	Prescriber
SaaS:	Software as a Service
SDG:	Sustainable Development Goals
SKU:	Stock Keeping Unit
SLA:	Service Level Agreement
T2D:	Type 2 Diabetes
TB:	Tuberculosis
THC:	Tertiary Health Centre
TKR:	Total Knee Replacement
TPA:	Third Party Administrator
U5:	Under Five
UK:	United Kingdom
UN:	United Nations
UP:	Uttar Pradesh
UPI:	Unified Payments Interface
US:	United States
USD:	US Dollar
WHO:	World Health Organization

Preface

About this report

FICCI, in partnership with BCG, has written this report with an aim to highlight the various aspects of the revolution that the implementation of an open digital health ecosystem will bring in India's healthcare sector. With the honorable Prime Minister (PM) Sri Narendra Modi announcing the launch of National Digital Health Mission (NDHM) on 15th August 2020, this revolution is expected to become a reality soon.

This report details out the current challenges in the health ecosystem, key opportunities emerging from the implementation of a health ODE, and the risk and rewards for different stakeholders such as health tech players, health providers, payer groups / insurance companies, pharma players, and the Government. It also lays out the benefits that patients stand to gain. It concludes with sizing the economic potential and highlighting key risks that are required to be mitigated to reap the benefits.

This report has undertaken a collaborative approach to ensure that multiple perspectives across government bodies, private sector entities, developers, and the user community have been considered. It is the product of intensive primary research and discussions with representatives from all key healthcare stakeholders. This report also draws inspiration from the NDHM Strategy Overview document as released by the National Health Authority (NHA) in July 2020.

Using the report

This report is essential reading for all key stakeholders of India's healthcare ecosystem.

1. **For end users of the health services –** the patients, it lays out the vision of a new era of healthcare delivery in the country. It emphasizes how a health ODE can transform patients' experience by improving healthcare access, quality and affordability, which in turn will pave the way towards universal health coverage and improved health outcomes for the country.

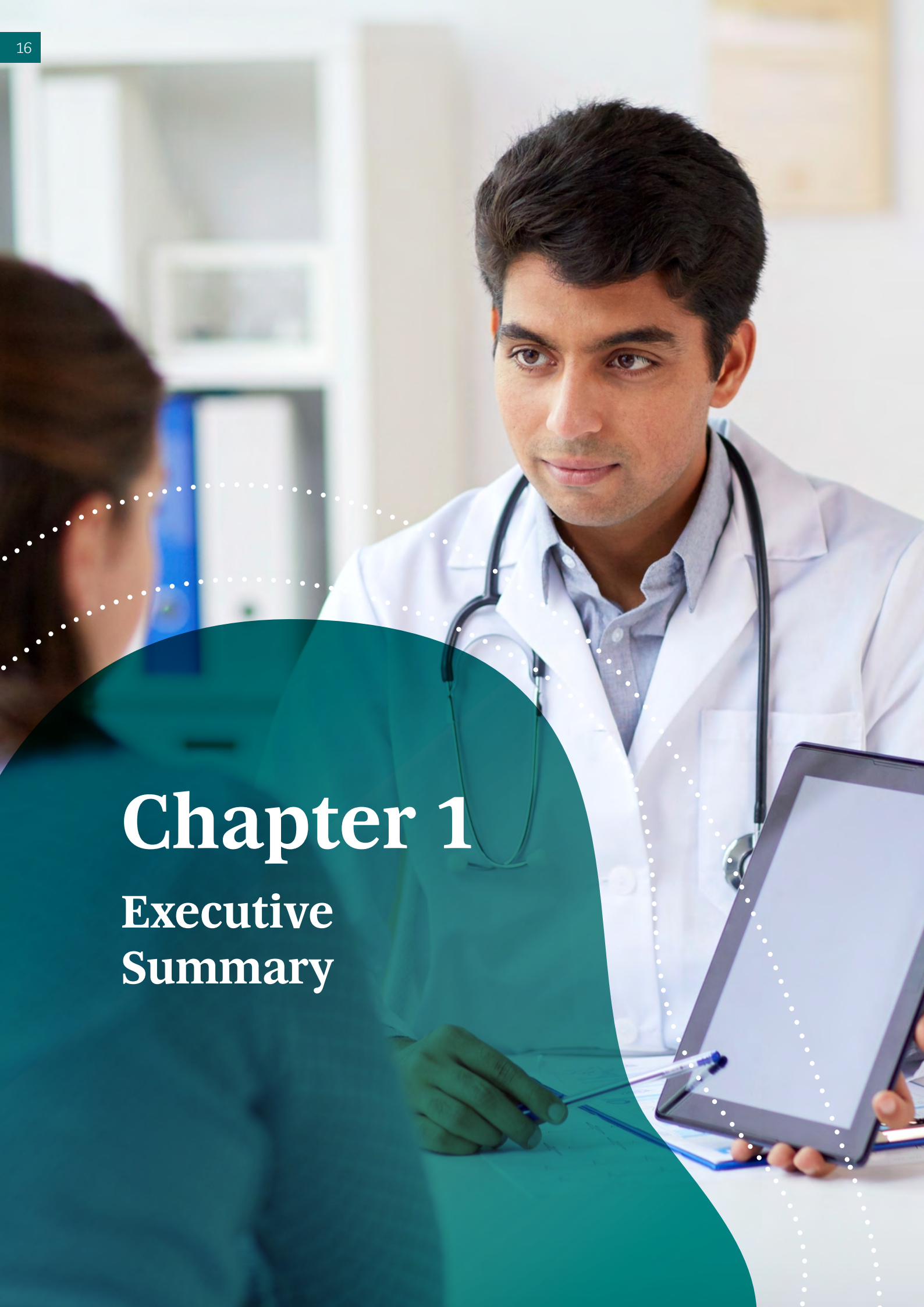
2. **For governments and policymakers,** it can serve as a guide for establishing the necessary regulatory framework, policies and processes that will be required to ensure the effective implementation of NDHM

3. **For healthcare market players** such as providers (public and private), payors, pharma companies, and health tech start-ups, it can serve as a toolkit as they prepare themselves to participate in the health ODE. Players can use this report to understand how the new ecosystem will shape the industry going forward. They can also get ideas on how to stay ahead of the curve and reap benefits from participating in the health ODE.

Outline of the Report

#	Chapter	Purpose
01	Executive Summary	Summarizes the implications of an open digital health ecosystem on all health stakeholders and recommends relevant action steps
02	COVID 19: The Trigger for Healthcare Transformation	Describes how COVID-19 has brought to the forefront opportunities to strengthen the healthcare infrastructure in India
03	Multiple challenges to overcome	Brings out how India has made significant improvements in health indicators in the last few decades but is still far from achieving universal health coverage
04	Unleashing the Digital Revolution	Provides insights into how open digital ecosystems hold the potential to transform industries
05	Building the Open Digital Health Ecosystem in India	Defines the six pillars of the National Digital Health Mission (NDHM) that will lay the foundation for an open digital health ecosystem in healthcare
06	Implications for Health Tech Start-ups[1]	Emphasizes the role of health tech players in driving the adoption of NDHM; lays out the potential market architectures that will emerge
07	Implications for Providers[2]	Draws insights on how NDHM will drive access to new demand pools, improved resource utilization, and reduced administrative overheads for providers. Further, it emphasizes a shift towards value-based care
08	Implications for Insurance Providers/Payors[3]	Lays out the role of the coverage and claims platform in driving a standardized digital claim process across the ecosystem
09	Implications for Pharma	Draws insights on market expansion and the pivotal role that digital can play in altering the operating models
10	Implications for Government	Lays out how the role of the government will need to expand to ensure the effective implementation of NDHM. Emphasizes the benefits to the government in its role as a health provider and a payer
11	Transforming Patient Lives	Explains how the implementation of an open digital health ecosystem can lead to democratized access, improved service quality, and affordable healthcare
12	Emerging Themes and Economic Opportunities	Enlists key emerging themes from the implementation of NDHM; estimates the economic and societal impact it can unlock across stakeholder groups
13	Key Challenges and Road Ahead	Describes foreseen risks and associated mitigation approaches; highlights the path forward for the implementation of NDHM

[1] Includes e-consultation platforms, e-pharmacies, e-diagnostics, e-ICUs etc.
[2] Includes mainly hospitals
[3] Includes health insurance players



Chapter 1

Executive Summary

Chapter 1: Executive Summary

Context

COVID-19 has brought to the forefront the need to strengthen healthcare infrastructure in India. It has also inspired promising disruptions and increased the acceptability of digital healthcare solutions as a viable alternative to traditional healthcare delivery models.

Highlights from recent surveys[1] conducted to understand adoption of digital health amongst clinicians & patients:

85%
Clinicians used teleconsultation and digital platforms during the lockdown

50%
Doctors found digital platforms to be an effective tool for patient interactions

80%
Tele-consultation services were from first time users

44%
Tele-consultations were from non-metro cities

The opportunity

Today, India is at the cusp of a 'leapfrogging' the barriers present in the current healthcare ecosystem. Digital technology can be a key enabler in this aspect. It will create an integrated health system that puts the patient at the center of all solutions to deliver accessible, comprehensive, high-quality, and affordable care. The Indian Government has already made significant progress in this journey – with initiatives such as the National Health Policy (NHP) (2017), National Health Stack (NHS) (2018), and National Digital Health Blueprint (NDHB) (2019). **In August 2020, the Honorable Prime Minister announced the launch of the National Digital Health Mission (NDHM) that aims to create an "open digital health ecosystem (health ODE)".** This will be a shared digital infrastructure that can be leveraged by both public and private enterprises to build and provide new, innovative, healthcare solutions. Its key building blocks include standardized health registries, a unique patient Identity (ID), federated health records, interoperability, and automatic claim settlement engines.

In the past, similar public digital infrastructure in financial services has revolutionized the sector.

Today, UPI is one of the most sophisticated, advanced, and financially inclusive payment platforms in the world, accounting for more volume and value of transactions than that of all credit cards and debit cards in India!

Key themes and Economic value

We believe that the health ODE, to be implemented by NDHM, will revolutionize the Indian health sector by making digital a core component of the operating models for all health sector players.

[1] Source: BCG survey of 800 physicians across metro and Tier 1 cities; How India accessed healthcare in the last 3 months Mar 1st – May 31st,2020

Five themes of the health ODE, that will drive healthcare transformation in India

1. **Information transparency:** Currently, one of the biggest roadblocks for quality care is the absence of reliable data repository, to help verify a health facility or a doctor. "Health registries" will act as the single source of truth for all stakeholders in the health ecosystem, increasing trust and credibility.

2. **Interoperability:** Today, care is siloed with patient history often being lost across disparate health data systems and this impacts care quality. Interoperability of health data systems will allow patients to share their digital health records across providers, thus making "coordinated care" a reality. Additionally, patients will be able to easily switch providers without losing continuity of care.

3. **Standardized claim processing:** Currently, every insurer uses its own claim processing platform. Going forward, there will be standardized e-objects (for example, e-claim form, discharge summary, etc.), and a common health claims exchange. This will allow for faster and cheaper settlement of claims – through auto adjudication and easier fraud prevention.

4. **Prescription digitization:** Digitization of a provider's treatment advice will ease claim filing and processing for providers and payers. Patients will request e-prescriptions to maintain longitudinal digital health records - and provide consent-based access to doctors and hospitals for better quality care.

5. **Playground for innovations:** All building blocks will be open and accessible by all entities to build new, innovative, solutions on top. This will pave the way for development of patient-centric innovations.

We anticipate that **over the next 10 years**, if implemented correctly, NDHB[1] can unlock **incremental economic value of over USD 200 billion** for the health sector.

With improved health outcomes there will be an increase in productivity which will lead to an additional benefit of USD 200-250 billion to India's GDP. This value will accrue as a result of three big shifts.

Shift 1: From episodic care to wellness-oriented care

Currently, the Indian health system is episodic and primarily focused on secondary and tertiary care. Care seeking is delayed due to poor access and affordability. This results in poor health outcomes - which is getting further exacerbated, given rising NCD prevalence. However, **we expect healthcare demand to increase in future.**

1. **Access will undergo a fundamental shift** with increased adoption of digital service delivery models such as e-consultation, e-pharmacy, e-diagnostics and e-ICU. This will especially increase demand for Out-Patient Department (OPD) care.

2. **Affordability will increase** given an increase in provider discoverability – thus increasing provide choice. Increase in competition, coupled with reduction in administrative costs will lead to price rationalization in the sector.

[1] National Digital Health Blueprint, India's health ODE to be implemented by National Digital Health Mission (NDHM)

3. **Patient trust will increase** due to health registries – which will increase overall demand and allow patients to select providers as per their needs/ preferences

4. **Diagnosis rates will increase for medical conditions.** Due to higher OPD and more "consumerism" (patient's self-involvement in their care) – which in turn will be driven by aspects like digital health records

5. **Health insurance products will undergo a paradigm shift.** IInsurers' business models will transform due to overall reduction in costs. Coordinated care, more strategic purchasing, and patient self-care will reduce medical expenses. Additionally, administrative costs will reduce due to standardized claim processing. This will catalyze a stronger shift to managed care, including the introduction of the next generation of insurance products, incld. OPD insurance

Shift 2: From volume-based to value-based healthcare

Currently, incentives across health stakeholders are misaligned. For example, the current provider business model rewards higher patient footfall – not higher quality health outcomes. Going forward, **we expect digital health to improve care quality significantly:**

1. **Patient behaviors will improve** as they are able to better access healthcare and get more involved in their wellness journey with access to longitudinal digital health records. Some payors might even increase financial incentives for such behaviors by gamifying insurance premiums.

2. **Care models will evolve.** Digital health records will allow caregivers to be better informed about patient context and enable coordination across providers along the care continuum. Analytics on aggregated and anonymized data will allow population wide co-relation between clinician advice and health outcomes. Over time, the aggregated data will also help in standardizing clinical protocols, improving care quality.

3. **Payors will reward providers that deliver higher quality care.** Given greater ubiquity of outcomes data, insurers (both government and private) will evaluate providers on both care quality and medical costs, i.e., on "healthcare value". As a result, insurers will steer patients towards providers with better quality (for example, via lower co-pays), thus making healthcare more evidence-driven and catalyzing innovations in clinical practices

Shift 3: From siloed systems to streamlined processes.

Currently, healthcare stakeholders use disparate health data systems that create inefficiencies in multi-stakeholder processes and interactions. These **processes and interactions will be streamlined significantly with significant cost savings for all players.**

1. **Providers' administrative systems-processes will simplify** driven by system interoperability and health registries –simplifying key processes such as doctor on-boarding, regulatory approvals, and payor empanelment.

2. **Claim filing and processing will be streamlined for both providers and payors** given standardized e-objects and claim processing

3. **Digital "ways of working" will reduce workforce costs and increase productivity.** This will be aided by digital tools (such as remote monitoring and e-consultations), associated redesign of clinical processes (such as tele-radiology), and updated business processes (such as pharma companies' commercialization model will start transitioning from physical to digital).

   Overall, these measures will result in significant cost savings for the entire healthcare ecosystem.

Impact on healthcare stakeholders

We believe that a health ODE will drastically change healthcare market dynamics, threatening existing business models. It calls for all healthcare stakeholders to understand their roles and implications on their businesses and to update their strategies accordingly.

Roles and implications for the Government

1. **The Central Government will play a critical role** in shaping the Health ODE's evolution including policies, standards, and the overall design of the systems and processes. It will ensure that all solutions are tethered to patient benefit (such as improved health outcomes and data privacy), while also lowering overall health system costs.

2. **State Governments will play a dual role**

   - Firstly, ensure high-fidelity roll-outs of the Health ODE (registration of patients and providers), and drive on the ground change management. (e.g: strengthening Health ODE narrative, stakeholder incentivization)
   - Secondly, identify implications of the Health ODE on its existing roles of a provider and an insurer. For instance, adopt the Health ODE as a provider– and leverage the ODE to improve healthcare qualityfor its citizens (e.g., fund population mgmt. models, higher reimbursement for high quality private providers)
   - Additionally, state governments will have to expedite seperation of its role as a provider, payor and regulator to avoid conflicts

Strategic imperative:
The Government will require a fundamental digital transformation both in its role as the Health ODE custodian and as a participant. This transformation will include improving the talent pool in government workforce, process redesign, and Information Technology (IT) systems overhaul.

Roles and implications for health tech start-ups

Health tech start-ups stand to benefit the most and are expected to drive the consumerism of healthcare with higher patient engagement. New players will emerge, and business models will undergo significant shifts.

1. **New class of intermediaries will emerge** to build the very foundation of the digital infrastructure such as health facility verifiers, consent managers, and health locker providers.

2. **New opportunities will arise to develop cutting-edge patient solutions** that challenge existing service delivery models, for instance, self-management Applications (apps) and Clinical Decision Support Systems (CDSS).

3. **Business models will evolve** from an "e-Commerce setup" (that includes private label brands and preferential listing of providers) to an "open market model" (that allows democratic access to any provider through any platform).

Strategic imperative:
Health tech players will have to re-visit their product market fit, operating models, and business models to identify new opportunities for top-line and bottom-line growth.

Roles and implications for providers

1. **New demand pools and market opportunities** will open-up with an increase in healthcare access (with e-OPD, e-ICU, etc.) and affordability.

2. However, the **"basis of competition" will change**. Provider choice and even reimbursement from payors, will be driven by "healthcare value" (i.e. better patient health outcomes and better patient experience).

3. **Operating models will evolve** both clinical (with increased usage of e-OPD, AI/ ML based clinical decision support system) as well as administrative – with Health registries and change in process of payor empanelment, claims settlement etc.

4. **Cost structures will improve** with administrative process efficiencies arising from digital ways-of-working.

Strategic imperative:
Providers will have to refresh their market access strategy, reassess their competitive landscape, innovate in care delivery models, and invest in operating model redesign.

Roles and implications for health insurers/payor groups

1. Overall, increased healthcare consumerism resulting from increased patients' involvement in their healthcare journey will provide an impetus for health insurance adoption and hence, **market growth.**

2. Significant **opportunity for innovations** will emerge in network design and products. For example, insurers will steer towards lower-cost and higher quality providers. New products such as OPD insurance and gamifying premium pricing linked to healthy patient behaviors will become possible.

3. **Margins will improve** due to a reduction in both medical expenses (rising from improved care quality and better care coordination) and administrative burden (rising from standardized claims platform).

Strategic imperative:
Payors will have to bolster and expedite their initiatives focusing on innovations and margin improvement.

Roles and implications for pharma

1. **The market will expand.** Currently, patient drop-off is about 50-60 percent from disease incidence to treatment in most chronic diseases (hypertension, diabetes, dyslipidemia, etc). With implementation of NDHB, we anticipate access and affordability to improve - resulting in reduced patient drop-off and robust volume growth for pharma companies.

2. **Commercial strategies will need to evolve,** including

   - From "in-person physician detailing" to data-driven, digital prescriber engagement.
   - Direct-patient engagement models for patient education and for offering innovative products to drive better medication adherence (via gamified nudges)

3. **Margins will see some pressure:** While operating costs will reduce due to a leaner field force, we expect some pricing pressure:

- With increased insurance penetration (public & private) and product evolution (OPD insurance cover), we expect payors to have much higher power in the value chain vs at present. This will accelerate shift towards unbranded generics – potentially creating margin pressure for Pharma companies

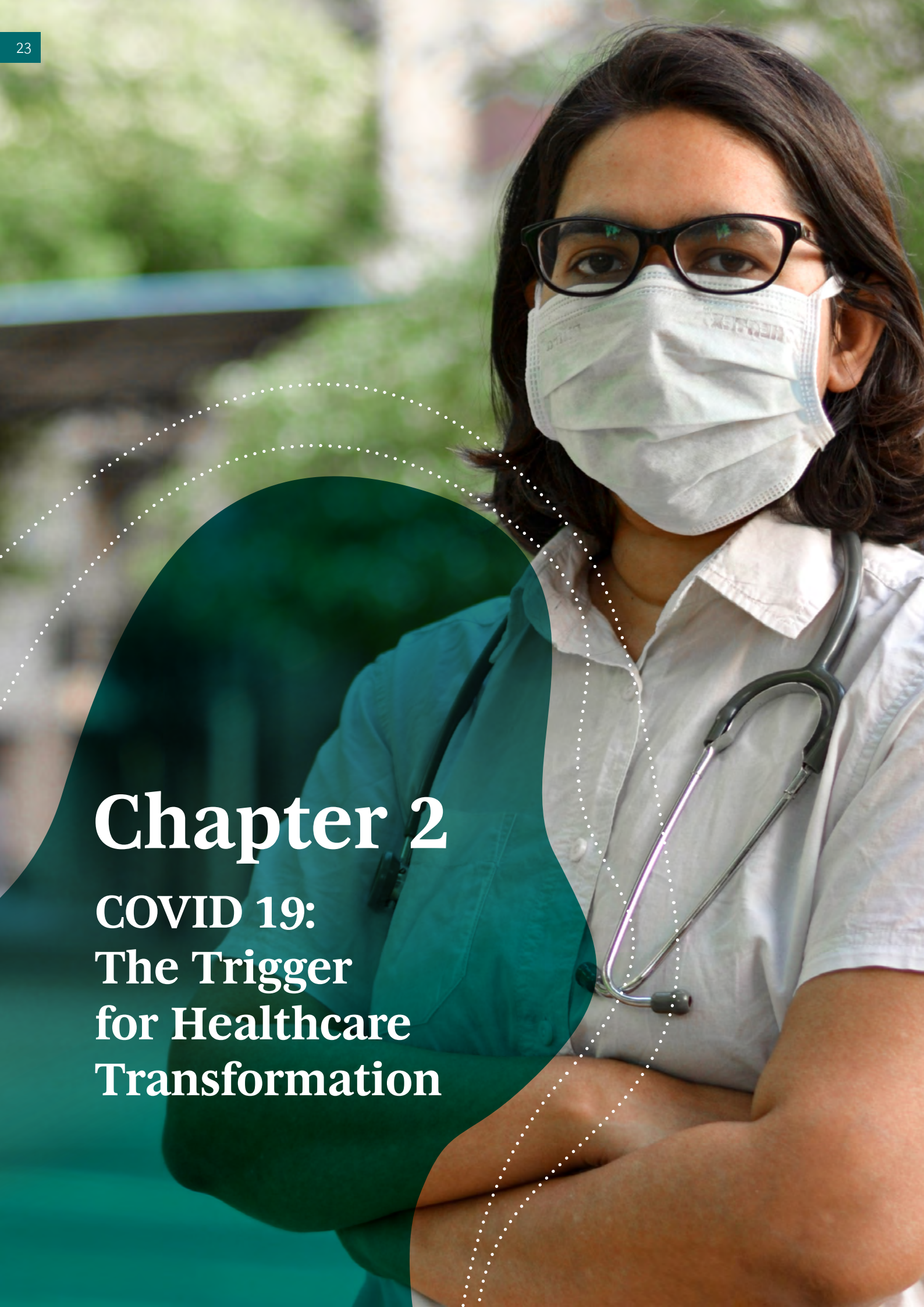
Strategic imperative:
Pharma players will need to transform their commercial models including digital engagement with both prescribers and patients and identify measures for margin preservation.

Key implications

A health ODE will accelerate India's journey towards universal health care and open multiple economic opportunities for all stakeholders. However, in order to make such an ecosystem a reality and to reap its benefits, all players will have to come together and make three concerted shifts, notably.

1. Shift in mindset from "siloed care delivery" to "collaborating and providing continuum of care to patients".
2. Update their business models and strategies to stay ahead of the curve.
3. Ensure an inclusive approach to allow for innovations that cater to all sections of society.

Additionally, key risks (such as the risks associated with data security and poor data quality) will have to be mitigated during the design phase itself to ensure success. Natural incentives will also have to be built-in for all stakeholders to adopt the digital platforms. **Once implemented, such an ecosystem will greatly empower patients by providing increased choice of service providers. This will lead to an unprecedented change in products and delivery models. Healthcare players will thrive or perish, depending on how quickly they adapt to the new environment.** Overall, this could lead to India leapfrogging its healthcare evolution curve.



Chapter 2

COVID 19: The Trigger for Healthcare Transformation

Chapter 2: COVID 19: The Trigger for Healthcare Transformation

COVID-19 has been a pandemic unlike any that the modern world has witnessed. With cases already touching 32 million globally,[4] **the pandemic has made countries across the globe realize the importance of universal health coverage and the need for strong public health systems**. Countries such as Canada, Denmark, and Germany were able to handle the pandemic more effectively due to the presence of a strong public health system, political decisiveness, and better testing infrastructure. On the other hand, countries such as Brazil, Mexico, and India where access and affordability for quality healthcare is still a privilege, have met with muted success in stemming the spread of the virus.

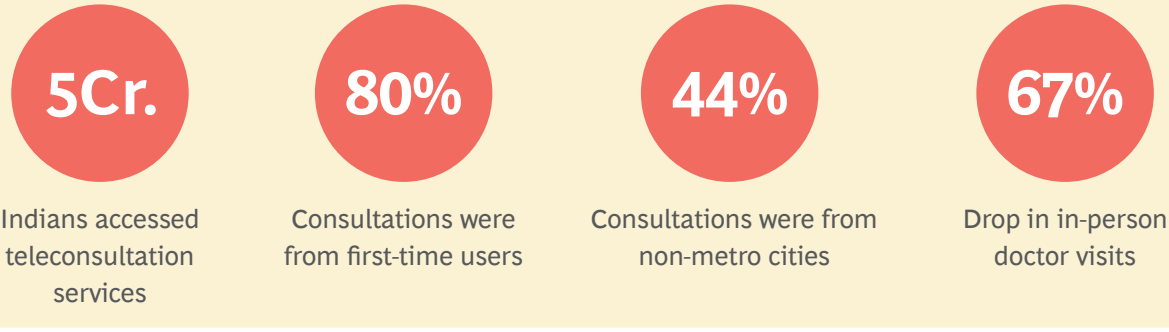
It's widely acknowledged that the prevailing health system in India performs poorly on multiple dimensions. India ranks 145th among 195 countries on the Healthcare Access and Quality Index (HAQ).[5] India's healthcare spending at 3.5 percent of Gross Domestic Product (GDP) is significantly lower than peers such as China (5 percent), Vietnam (5.5 percent), South Africa (8.1 percent), and Japan (10.9 percent).[6] The COVID-19 situation has laid bare these realities. **It has brought to the forefront the weak health infrastructure in the country, including lack of sufficient resources and quality services.**

The COVID-19 situation has also highlighted the importance of primary care. A robust primary healthcare system plays the role of a gatekeeper by triaging patients, thereby allowing better utilization of limited tertiary care resources. However, the healthcare system in India continues to be focused on episodic and tertiary care with limited incentives for primary care. This is despite the fact that the tertiary care capacity is scarce in India and that the disease burden from Non-Communicable Diseases (NCDs) that require comprehensive end-to-end care is increasing. In the current healthcare ecosystem i) patients tend to delay seeking clinical advice due to affordability and access challenges, ii) providers tend to focus on volume of care rather than value of care, and iii) insurance schemes largely cover only tertiary care procedures.

While COVID-19 has underscored the importance of improving the healthcare system in India and increasing the focus on preventive and primary care, its disruptive nature has also inspired promising innovation, notably,

Digital as a viable alternate model for health care delivery: The forced lockdown during the pandemic precipitated a rapid rise in digital practices among doctors, patients, as well as other stakeholders in the ecosystem. While the adoption of digital solutions is usually higher in metro and Tier 1 cities, the COVID-19 situation has expedited its adoption in non-metros as well.

Highlights from a recent report[7]



4. Source: Worldometer; Data as on 24th Sep 2020
5. Source: The Lancet: Measuring performance on the Healthcare Access and Quality Index for 195 countries and territories and selected sub-national locations; May 2018
6. Source: World Bank
7. Source: How India accessed healthcare in the last 3 months Mar 1st – May 31st, 2020

Apart from teleconsultation, digital models such as medicine delivery at home, diagnostic test booking, eICUs, and door-step sample collection have also seen a rapid rise. In the post-COVID-19 world, these digital solutions are expected to play a significant role in the healthcare sector. A recent BCG survey highlights that approximately 60-65 percent patients in metros and Tier 1 cities have started to prefer internet or telephone-based health consultations over in-person consultations. *[For more details on the survey – refer to Information Box 1 at the end of chapter 2].* This shift in preference can be attributed to reduced waiting time, easy access with no geographical limitation, and low infection risk. This in turn indicates an increasing acceptance of digital health models.

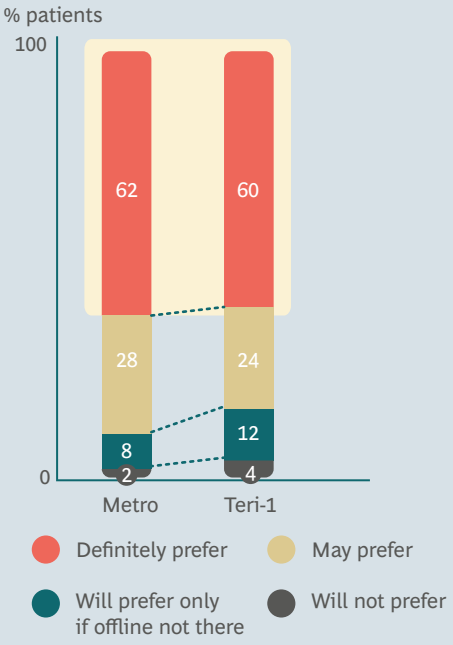
New operating models to solve healthcare problems: Previously, it was mainly the government and non-profit organizations who worked towards building public goods and solving for large-scale health problems, while the private entities mostly competed against each other for profit maximization. However, during the pandemic, we saw public and private entities come together to build public goods infrastructure. The Swasth alliance is a prime example of such a model where 100+ health ecosystem players such as hospitals, health-tech start-ups, pharmacies, public health organizations, and investment funds voluntarily came together in a coordinated effort to help strengthen India's healthcare infrastructure. In the medium to long-term, the Swasth alliance plans to work in close coordination with key industry stakeholders to help build public digital goods for the country. **Initiatives such as the Swasth alliance show that new collaborative working models for solving some of the most challenging healthcare problems can soon become a reality.** *[For more details on the Swasth alliance – refer to Information Box 2 at the end of the chapter 2].*

Today, India has the opportunity to capitalize upon the disruptions arising from the COVID-19 situation and trigger a fundamental transformation in its healthcare ecosystem.

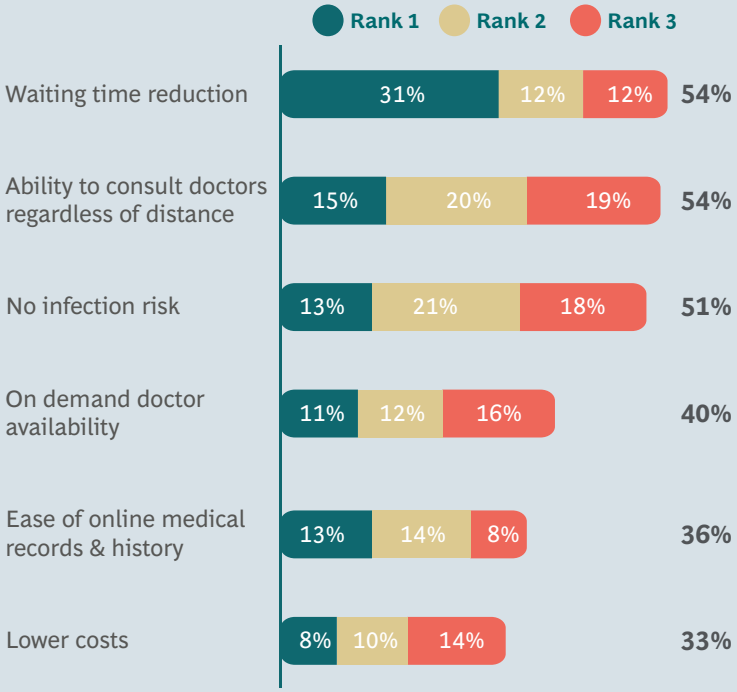
Information Box 1

BCG conducted a survey in August 2020 across 500+ respondents from metro and Tier I cities. Throughout the responses, we see an increased preference for digital channels for healthcare delivery, which is likely to continue in the post COVID-19 world as well.

~60%
respondents to prefer online consultations in the future[1]



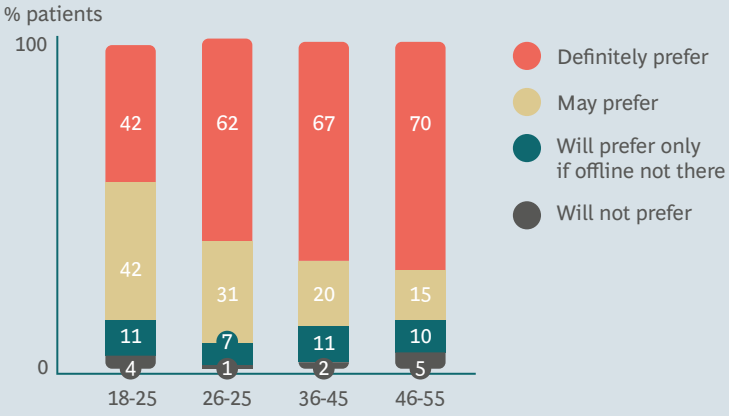
Reduced waiting time and easy accessibility
top benefits of using digital health solutions[2]



Patients with acute conditions have marginally higher preference for online consultations[1]



High preference for online consultations
across age groups[1]



Top factors that would increase patient likelihood to try doctor consultation[3]

- **43%** Faster appointments
- **40%** Availability of doctor choice
- **38%** Doctor qualification and rating
- **33%** Prescription and delivery integration
- **23%** Disease information

[1] If you face a similar condition again, how likely are you to prefer taking doctor consultation through digital for first consultation?
[2] What are the benefits of using internet or phone based doctor consultation?
[3] Please select top ideas which you feel would increase your likelihood to try doctor consultation through internet or digital mediums?

Information Box 2

The Swasth Digital Health Foundation

Swasth is a unique alliance of over hundred technology and healthcare players. It was setup with the aim to strengthen Indian healthcare infrastructure to deal with the ongoing COVID-19 crisis. Over the medium to long term, Swasth will drive healthcare inclusion in the country to improve health outcomes. Three key focus areas:

1. Building key components of the public digital infrastructure to drive access to quality and affordable health care for people across the country
2. Developing product platform and digital tool kits to support service providers
3. Support ecosystem players establish standards of care to foster trust and accelerate digital health adoption in India

Swasth is set up as a not for profit, section 8 company and will function as a self regulatory organization.

Swasth: Product platform is currently live and technology will be open sourced

100+ Organizations | 200+ Volunteers

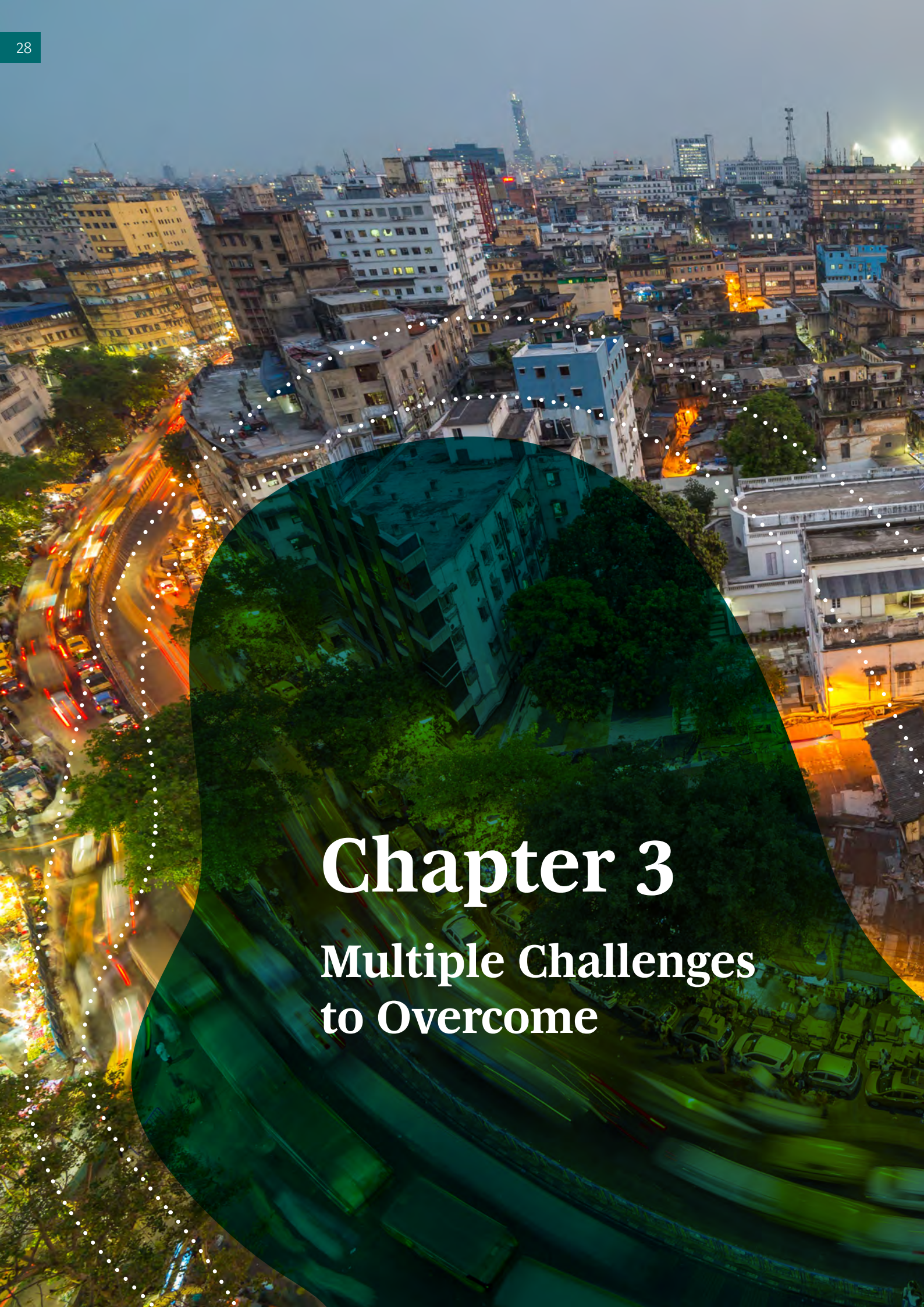
12 Weeks | 6 Products Live

- 50+ **Health-tech**
- 10+ **Hospitals**
- 10+ **Pharma**
- 15+ **Diagnostics**
- 5+ **Insurance**



- **Insurance e-objects**
- **Telemedicine gateway**
- **Multi specialty flows**

- **Teleconsultation** audio/video; free of cost
- **Medicines** 90%+ pincode coverage
- **Diagnostic labs** Order online, call to order
- **Remote Care Assistance** Standardized packages
- **Hospital Bed Availability** 600+ hospitals covered
- **Mental Health** Crisis helpline, online therapy



Chapter 3

Multiple Challenges to Overcome

Chapter 3: Multiple Challenges to Overcome

Over the last three decades, the Indian government has made good progress in providing essential healthcare services to the population which has resulted in improved health indicators. For example, the average life expectancy at birth has increased from 58 to 69 years. Disability Adjusted Life Years (DALY) per 100,000 has decreased by 43 percent.[8] India has primarily focused on improving maternal and childcare and controlling specific diseases through interventional programs. This is evident from the significant improvement seen in maternal and child health indicators such as a decrease in Maternal Mortality Ratio (MMR) from 410 to 130, decrease in under 5 (years) mortality ratio from 112 to 42, decrease in Infant Mortality Ratio (IMR) from 80 to 30, and an increase in full immunization coverage from 36 percent to 62 percent.[8] There has also been a significant drop in disease incidence such as polio, tuberculosis, malaria, and HIV.

However, India still has a long way to go in achieving broad-based healthcare improvements. As depicted in exhibit 1, India's health outcomes are still much lower when compared to Organization for Economic Cooperation and Development (OECD) countries and suffer from high disparity across urban-rural and different states of the country.

Exhibit 1 | India has much Lower Health Outcomes Compared with OECD Countries and High Sub-national Disparity



India's health outcomes are lagging compared to OECD

OECD Avg.	India	Health Status
80	69	Life expectancy at birth
4	30	Infant mortality rate
5	42	Under 5 mortality rate
18	130	Maternal mortality rate
94%	85%	DTP3 coverage



Disparity in outcomes across the country

Urban Rural gap examples

- IMR in urban at **29 vs 46** in rural
- Under **5** mortality in urban at **34 vs 56** in rural

Disparity across states examples

- IMR in Kerala at **12** vs UP at **46**
- Life expectancy at birth in Delhi at **73 vs 64** in Madhya Pradesh

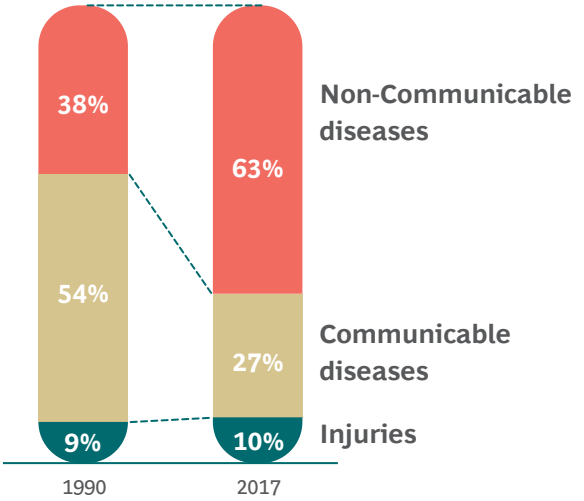
Sources: IHME, National Health Profile 2018, OECD Statistics

Over the last three decades, India has experienced an epidemiological shift with the contribution of Non-Communicable Diseases (NCDs) to overall disease burden increasing from 38 percent to 63 percent.[9] As depicted in Exhibit 2, Four NCDs – cardiovascular diseases, chronic respiratory diseases, cancer, and diabetes account for approximately 85 percent of total deaths from NCDs.[10] In most cases, these diseases can be prevented if there is timely detection, appropriate care is provided, and corresponding lifestyle changes are adopted. Additionally, these diseases require continuous care and supervision. For example, diabetic patients need to get their blood glucose level checked regularly and follow specific diet and physical activity plans to control disease progression.

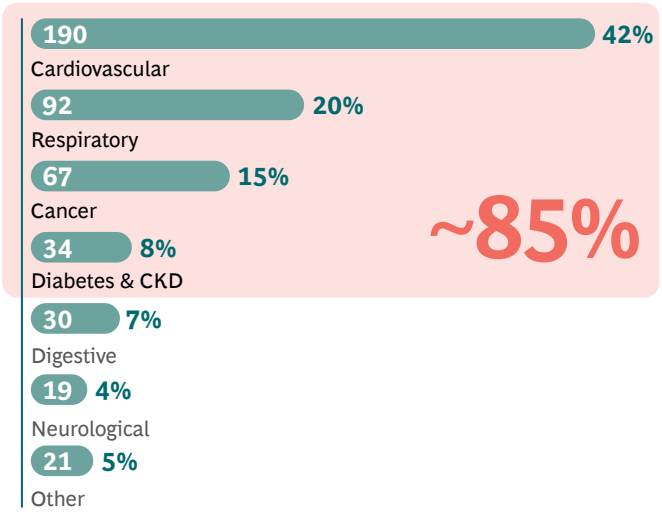
[8] Source: World Health Organization, Institute for Health Metrics and Evaluation, National Health Profile- 2019, National Family Health Survey;
[9] Source: Institute for Health Metrics & Evaluation (IHME)
[10] Source: Institute for Health Metrics & Evaluation (IHME)

Exhibit 2 | India's Health Profile is Undergoing an Epidemiology Shift

Contribution of non communicable diseases to total disease burden has increased from 38% to 62%



4 NCDs contribute to ~85% of NCD related deaths



Sources: India Health of the Nation's States report 2017
Note: Communicable diseases includes HIV/AIDS & tuberculosis, Diarrhea, lower respiratory & other common infectious diseases, Neglected tropical diseases and malaria, maternal disorders, neonatal disorders, nutritional deficiencies, other communicable, maternal, neonatal and nutritional diseases; CKD: Chronic Kidney Disease

Despite this, India's health delivery system continues to focus on episodic care with most patients avoiding routine health check-ups and visiting health facilities only when they either experience severe discomfort or co-morbid symptoms start to appear. Additionally, lack of well-defined treatment pathways and limited focus on treatment adherence for chronic care patients often leads to accelerated disease progression and the need for tertiary care treatment which is both limited and expensive.

The Government of India's (GoI) recently launched scheme of Ayushman Bharat is expected to increase the focus on comprehensive end-to-end care through the creation of approximately 1.5 lakh Health and Wellness Centers (HWCs). These HWCs will deliver an expanded range of services that go beyond maternal and child health services to include care for NCDs, palliative and rehabilitative care, mental health services, etc. However, this scheme will primarily target the rural and sub-urban section of the society. The urban segment will still require interventions to shift from episodic care to comprehensive care.

Additionally, as a country, India will need to overcome three big challenges to overhaul the current healthcare system.

- **Limited access**
- **High variance in quality of care**
- **Limited affordability for the less affluent population**

Limited access

The Indian government has built a three-tiered public health system to provide free health facilities to its citizens. The infrastructure today consists of approximately 1.5 lakh Sub-Centers (SCs), around 30,000 Primary Health Centers (PHCs), approximately 7000 Community Health Centers (CHCs) and around 2500 Tertiary Health Centers (THCs) or District Hospitals.[10] Most of India's rural and sub-urban population relies on this physical infrastructure to meet their healthcare needs.

However, due to the prevalence of large infrastructural gaps as compared to global benchmarks, access to the health system continues to be a challenge. For example, India has 1.3 beds per 1000 population as against the WHO minimum norm of 3.5. Further, the country has only 0.69 doctors per 1000 population as against WHO recommended 1.0 and an average of 3.4 in OECD countries.[11]

Moreover, the stark inequity in distribution of resources between urban and rural areas magnifies the prevailing challenges. Almost 65 percent of India's population that resides in rural India has access to only 30 percent of the total available health infrastructure – consisting of around 25 percent dispensaries, approximately 40 percent hospitals, and only 20 percent doctors and 3 percent specialists. In addition, over 30 percent of the rural Indian population does not have access to an 'operational' first point of care within a 5 km radius of their residence.[13] In some cases, the unequal distribution extends beyond the urban-rural divide and is also visible across states. For example, states such as Assam, Goa, Kerala, Sikkim, and Meghalaya have a greater bed availability with a ratio of 1 bed to 1000 patients while states such as Bihar and Andhra Pradesh have one bed for over 8,000 people and 4,000 people,[14] respectively.

Consequently, people are forced to travel long distances to access healthcare. A recent estimate highlights that over 40 percent of the population in India has to commute to distant locations to access health treatments.[15] Due to poor access, patients often tend to delay routine check-ups or avoid treatment, resulting in the late detection of health conditions or no treatment in early stages.

High variance in quality of care

Almost 122 Indians per 100,000 die due to poor quality care each year. This is much higher when compared to other countries such as Brazil (74), Russia (91), China (46), and South Africa (93). Even our neighbors Pakistan (119), Nepal (93), Bangladesh (57), and Sri Lanka (51)[16] fare much better than us in this aspect. **While India has taken initiatives to improve access to healthcare through various public health schemes,[17] the quality of care remains low due to poor quality health infrastructure, unskilled staff, and limited coordination among Healthcare Service Providers (HSPs).** For example, only 11 percent of sub-centers and 13 percent of PHCs are functioning in accordance with the Indian Public Health Standards (IPHS) guidelines.[18] In Uttar Pradesh, during a typical child birth process, facility-based birth attendants were found to perform only 40 percent of the tasks mentioned on the WHO's safe childbirth checklist.[16] Furthermore, limited

[11] Source: India infrastructure research report 2019, press research
[12] Source: Press Releases, WHO, OECD Statistics, KPMG-OPPI report on healthcare access initiatives
[13] Source: IMS - Understanding Healthcare Access in India
[14] Source: Central Bureau of Health Intelligence (CBHI) 2017
[15] Source: Rural Health Statistics 2014-15
[16] Source: The Lancet: Mortality due to low quality health systems in the universal health coverage era: a systemic analysis of amenable deaths in 137 countries, Sep 2018
[17] For example, Janani Suraksha Yojna (JSY) and Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA) have increased institutional deliveries from 38.7% in 2005-06 to 78.9% in 2015-16 (NFHS 4); The next NFHS survey results expected to come out in 2021-22
[18] Source: Rural Health Statistics, 2017

coordination amongst the different levels (primary, secondary and tertiary) of facilities leads to sub-optimal referrals, hampering continuum of care and overburdening the THCs. A study carried out in Maharashtra revealed that 50 percent of the diseases being treated at THCs ideally should have been treated at PHCs.[19]

Limited affordability for the less affluent population

Historically, out-of-pocket (OOP) expenditure has been a major source of financing healthcare in India. It still contributes to 70 percent of all healthcare spending. No surprise then that 3-7 percent of the country's population is pushed into poverty every year merely due to unexpected healthcare outlays.[20] This situation is particularly pressing for the rural population. Due to limited access to quality healthcare in rural areas a large proportion of the population is forced to rely on private providers or commute long distances, incurring high expenses that they can ill-afford. This usually results in patients delaying medical advice. Consequently, financial constraint is the biggest reason for not seeking medical advice for ailments, resulting in sub-optimal health outcomes.[22]

The Indian government has taken multiple initiatives to expand financial access to the masses. The most recent one being the Ayushman Bharat Scheme, launched in 2018. It aims to provide an annual insurance cover of Rs. 5 lakh per family to 40 percent of India's poorest population across urban and rural areas. The central government is also exploring to expand it to a section of middle-class population in the future.

However, shortcomings in financial access continue to persist. Approximately 55 percent of the population is currently not covered for in-patient department (IPD) expenses. Most policies, including the Ayushman Bharat Scheme, do not cover for any Out-Patient-Department (OPD) expenses which account for 60 percent of OOP expenses on healthcare[21]. Additionally, several diseases (rare and otherwise) such as sickle cell anemia, mental disorders, autoimmune conditions, etc., are currently not covered under these programs.

All these challenges reaffirm the need to fundamentally re-imagine India's healthcare delivery system. India today has the opportunity to leverage the disruptive innovations arising from the COVID-19 crisis to do this re-imagination.

For this to happen, all actors, public and private, need to collaborate and utilize each other's expertise to develop models that address these challenges. Technology and the subsequent digital revolution in the healthcare ecosystem can enable these actors to converge and efficiently collaborate to realize the common goal of universal health coverage. It can help drive an integrated health system that puts the patient at the center to deliver quality services at a reasonable cost.

[19] Source: Rural Health Statistics, 2017

[20] Source: Potharaju HR, Kabra SG. Prescription audit of outpatient attendees of secondary level government hospitals in Maharashtra. Indian J Pharmacol.

[21] NSS, National Health Accounts, Household health expenditure survey in India

[22] Source: Press releases, National Health Accounts 2015-16, BCG Analysis; Additional details in the Appendix 2.6



Chapter 4

Unleashing the Digital Revolution

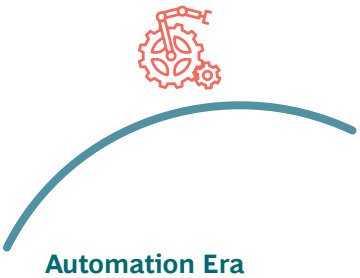
Chapter 4: Unleashing the Digital Revolution

Exhibit 3 | We are Witnessing a Paradigm Shift in Indian Healthcare



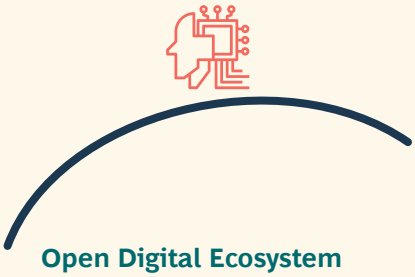
Computerization Era

- **Computerization** of discrete processes: bringing things offline→online



Automation Era

- End-to-end **digitization** of services through disparate systems



Open Digital Ecosystem (ODE) Era

- Creation of open, scalable & interoperable tech infrastructure
- Provides "digital commons" for user-centric, private innovation to build over it

With covid-19 as trigger, India has an opportune time to push for a health ODE

The Indian healthcare ecosystem has leveraged technology in various ways in the past. As illustrated in Exhibit 3, we believe this latest shift – the move to creating an Open Digital Ecosystem (ODE), has the potential to fundamentally transform the way people consume and pay for healthcare. Below, we map the Indian healthcare ecosystem's journey across the three digital eras.

The 1.0 Computerization era represents the earliest use of Information and Communication Technology (ICT) in the healthcare ecosystem when discrete offline processes were converted to online mode. An example of this care delivery model is the digital recording of aggregated care delivery by health facilities. While the health facilities digitally reported an aggregated figure on the number of patients served in a month, patient-wise details were still recorded offline.

The 2.0 Automation era saw the end-to-end digitization of services, albeit through disparate systems. Each system optimized for its own needs with little or no interaction with other systems. Each provider had its own set of nomenclature and format for data storage. For example, private hospitals had their own private hospital management information systems (HMIS) while the public health facilities used government portals such as the Reproductive and Child Health (RCH) portal and the Health Management Information System (HMIS) for recording health care delivery information. However, there were no means for patients to move or share information across these systems. This resulted in data silos, information asymmetry, and duplication of effort, resources, and time. Additionally, in this era, only a handful of actors were able to make a digital shift.

The 3.0 Open Digital Ecosystem (ODE) era represents a fundamental change in the way the government can leverage technology for public care delivery and enable private sector innovation. It entails the creation of shared public digital infrastructure that can be leveraged by both public and private players to deploy new

solutions that enhance the end-user experience. It calls for a shift away from standalone systems to open and interoperable digital platforms, enabling a more participative and collaborative approach.

An analogy to understand the ODE concept

A good analogy to understand the ODE concept is the physical Infrastructure of cities. Building "commons" is done by the government through public funding and engagement. This includes the construction of roads, drainage systems, parks, and mass transit systems. If built and governed well, this is the "platform" on which public and private entities will innovate to create a vibrant ecosystem of activities that make up our urban life. Similarly, in ODEs, "digital commons" are created; while enabling interoperability between siloed systems so that innovators can build solutions on top.

As illustrated in Exhibit 4, **several path-breaking ODEs have seen rapid adoption in India:** The Unified Payments Interface (UPI) in the financial services space; the National Digital Infrastructure for Teachers called DIKSHA; the National Urban Innovation Stack (NUIS) which is enabling the efficient provision of municipal services. Further, a digital ecosystem for agriculture is currently being designed by an inter-ministerial committee. These ecosystems open new service opportunities for existing players and enable the introduction of new intermediaries to drive consumer centric innovation. We have seen the impact that these ODEs can potentially create from examples such as UPI.

India's Unified Payments Interface (UPI): Example of an ODE

UPI laid down a common infrastructure which allows presence-less, paperless, and cashless transactions, enabling a seamless payment experience for individuals, businesses, and the government. While different banking systems continue to have their own individual data systems, the infrastructure laid out by UPI helped create a standardized and federated communication exchange mechanism leading to a unified payments digital ecosystem.

ODEs such as these are not engaged in providing direct services to the users. Instead, they create the technology infrastructure that can be used by different stakeholders to provide multiple use cases and benefits to consumers. While UPI enabled streamlined transactions for the banks and consumers it also allowed third party payment applications such as Phone Pe and Google Pay to build products focused on core user needs. The government was also able to digitalize payments for its services, thereby allowing individuals better access to government schemes and policies. It created a system of aligned incentives which drove public good through the equal participation of public and private entities.

Today, UPI is one of the most sophisticated, advanced, and financially inclusive payment platforms in the world, accounting for more volume and value of transactions than credit cards and debit cards in India.

Exhibit 4 | Digital Platforms with ODE Characteristics

Node	Accountable Institution	Description	Current Status
India Stack Operate Phase	UIDAI, NPCI, MeitY[1]	Enables the government and businesses to deliver presenceless (Aadhaar Authentication), paperless (eKYC, eSign, DigiLocker) and cashless (UPI) services	• High adoption across government, businesses and individuals • ~850 million eKYC transactions and 10.82 billion Aadhar Authentications between July 2019 to May 2020 • ~1.3 billion UPI transactions monthly (INR ~2.2 trillion value)
DIKSHA Operate Phase	MHRD and NCTE[2]	Knowledge-sharing platform for teachers to access, create and share course-related content and teacher training modules, and for students to access learning material	• Roll-out initiated in all states and UTs, with high adoption in a few, e.g. Tamil Nadu and Maharashtra • In the process of enhancing content on platform, adding features like data-driven content planning
National Urban Innovation Stack (NUIS) Operate Phase	MoHUA and NIUA[3]	Enables urban transformation through a set of cloud-based services e.g. traffic management, grievance redressal	• Pune Smart City to use IUDX for the first pilot urban data exchange. • National Urban Learning Platform (NULP), built on NUIS, to be launched in 2 cities (pilot, 2019) Citizen-Centric Smart Governance adopted across several municipalities.
IndEA Digital Ecosystem for Agriculture (IDEA) Design / Build Phase	MoAFW[4]	Data exchange of farm and farmer related data, i.e. soil, weather, land records to provide farmers with seamless access to government benefits, customized information, input and output marketplace and formal-sector credit	• Task force set up under MoAFW to build the IDEA 'green print' (similar to NDHB)

Sources: NPCI statistics; Aadhaar dashboard; Ministry of Electronics and Information Technology, Government of India. (2020). Strategy for National Open Digital Ecosystems; Ministry of Health and Family Welfare. (2019). National Digital Health Blueprint.
[1] Unique identity Authority of India, National Payments Corporation of India, and Ministry of Electronics and Information and Technology
[2] Ministry of Human Resource Development, and National Council for Teacher Education
[3] Ministry of Housing and Urban Affairs, and National Institute of Urban Affairs
[4] Ministry of Agriculture and Farmers' Welfare

[19] Copenhagen Solutions Lab. (n.d.). Data Platforms. Retrieved from https://cphsolutionslab.dk/en/what-we-do/data-platforme/open-data.

If we explore international examples, then **several countries such as Denmark, Singapore, Australia, and Estonia have adopted an ODE approach to create shared digital infrastructure for the delivery of services.**

Example of ODE in Denmark

Open Data DK is an online platform that aims to ensure that data from a number of governments, regional, and municipal agencies across Denmark can be accessed by a wide community of users and builders.[24] The purpose is two-fold:

- To create transparency in public administration and
- To enable a network of individuals and businesses to build a range of innovative solutions and use cases in traffic management, healthcare, recreation, etc.

Within the healthcare sector, the Danish Health Data Network provides a digital backbone for the entire health ecosystem. This ecosystem connects various stakeholders such as pathology labs, pharmacies, general practitioners, public and private hospitals, specialists, and government health agencies across all levels. It establishes communication standards and provides services that can be used by any and all Information Technology (IT) providers in the Danish health sector. This has resulted in the creation of a secure national infrastructure that can be used by all healthcare stakeholders for exchanging data, transmitting images, and interacting with a common public eHealth portal – which consists of all health databases. This digitization helped Denmark's health ecosystem improve system efficiencies and provide higher quality care to patients, in turn improving the country's health outcomes. For example, the mortality rate and average length of stay in hospitals saw a rapid decline.[25]

On similar lines to the existing ODEs, a health ODE can be a significant step towards achieving a citizen-centric healthcare system in India. It can bring a fundamental transformation in healthcare offerings and open a range of market opportunities for all healthcare stakeholders.

We enlist select benefits that the healthcare ecosystem stands to gain with a health ODE.

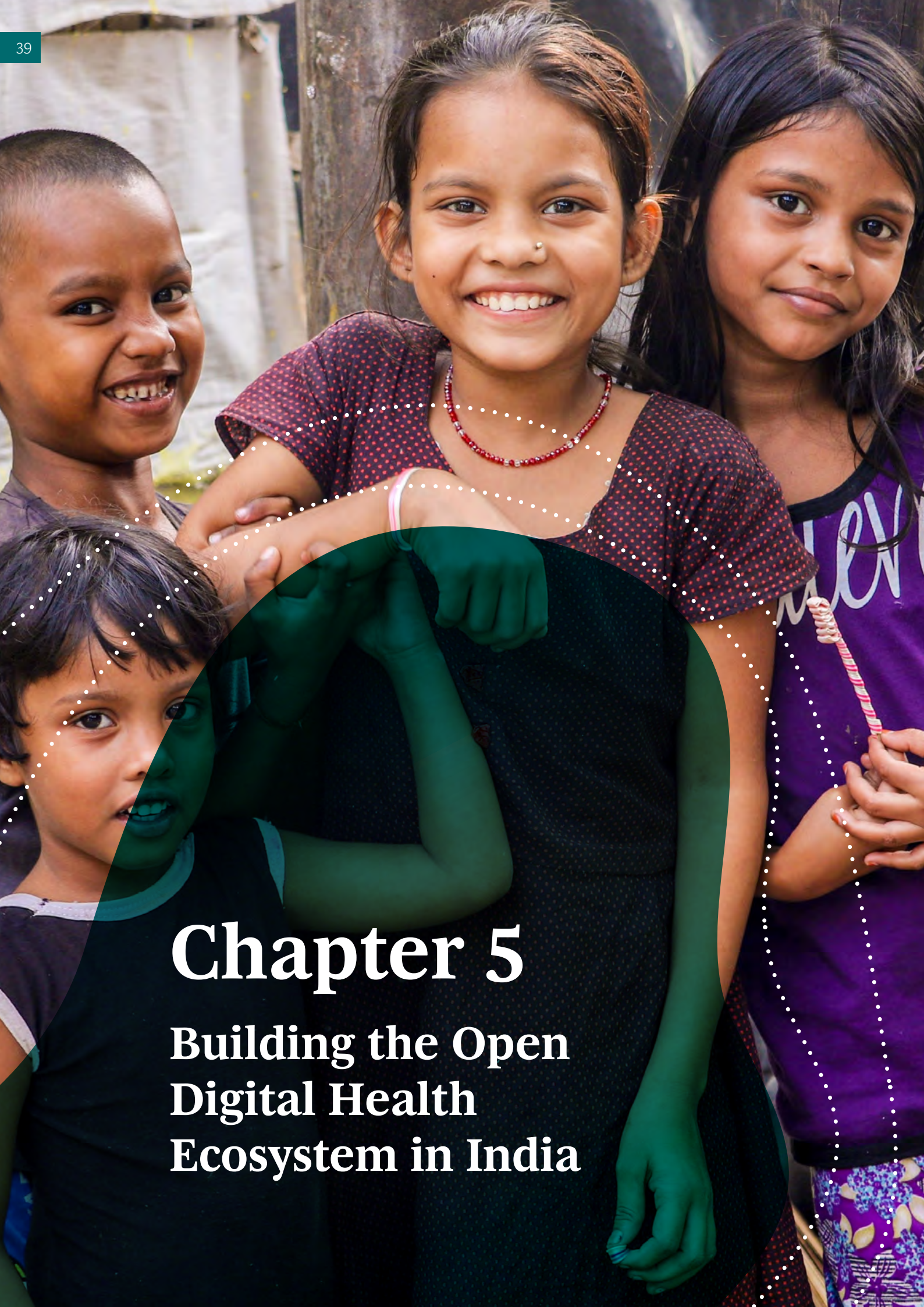
Increase in efficiencies: "Digital commons" that get created will allow for seamless exchange of information among different stakeholders. It will help increase transparency and reliability of information that will get exchanged among the players. It will also reduce administrative burdens that arise from the use of disparate data systems that don't talk to each other.

Easier collaboration: With all stakeholders using data systems that follow the principals of a common digital architecture, it will become easier for ecosystem players to collaborate and develop enhanced offerings for users. For example, if the health insurer and the health provider use health data systems that are interoperable, it will enable the health insurers to develop insurance products where premiums are linked to health outcomes of the patients.

[24] Copenhagen Solutions Lab. (n.d.). Data Platforms. Retrieved from https://cphsolutionslab.dk/en/what-we-do/data-platforme/open-data.
[25] Source: Press research

- **Enhanced offerings to patients:** The open and accessible digital health infrastructure will pave the way for emergence of new players or new products that focus on specific patient needs. For example, such products will become a reality that appropriately match patients with the providers depending upon the patient's requirements and the provider's capabilities.

- **Improved implementation of government schemes:** The government will be able to effectively implement various health schemes. For example, the data that gets generated when stakeholders adopt digital practices will enable analytics to understand health outcomes across demographics of population. It will in turn help the government in effectively targeting its schemes.



Chapter 5

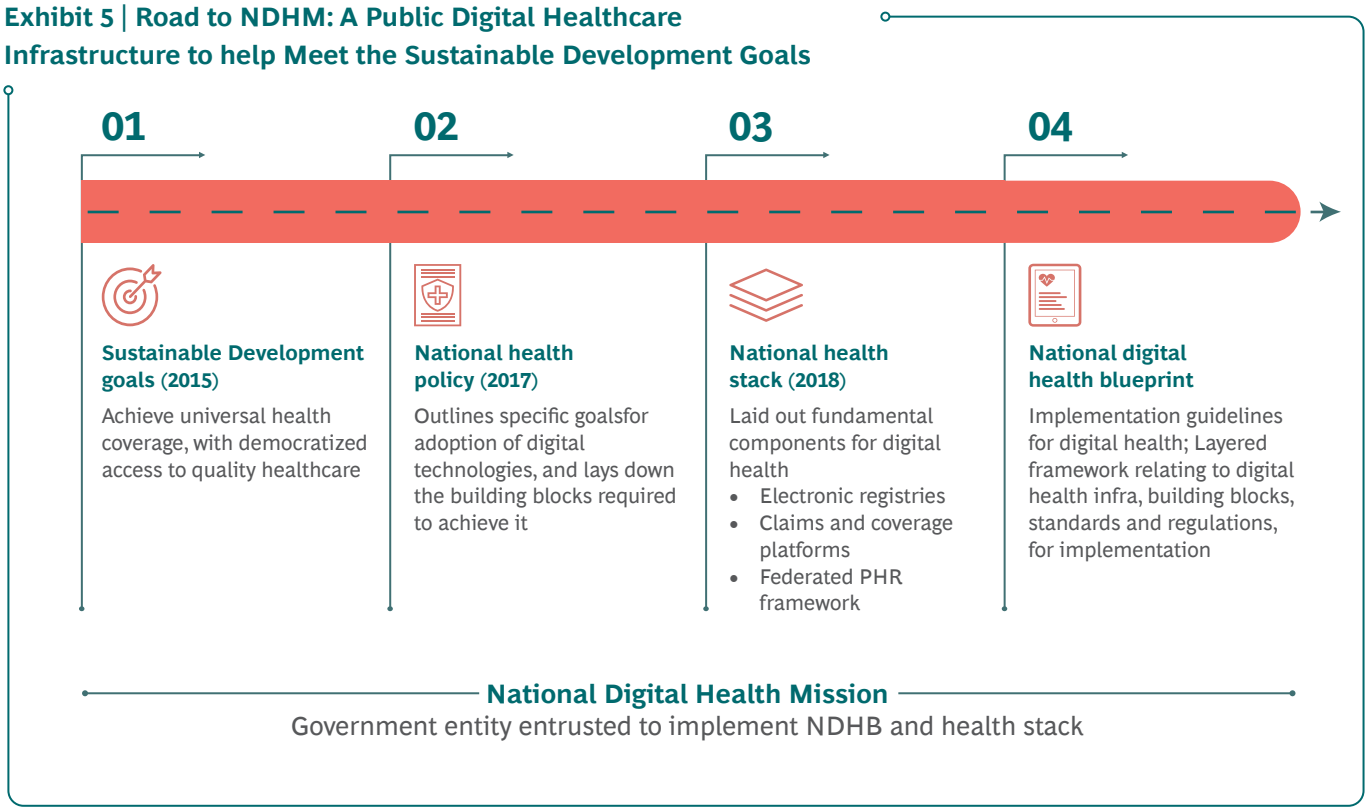
Building the Open Digital Health Ecosystem in India

Chapter 5: Building the Open Digital Health Ecosystem in India

As described in exhibit 5, **the government has laid out the principles for building an open digital health ecosystem (health ODE) in India.**

- The seeds for such a health ODE were sown at the Sustainable Development Summit in 2015. India, along with other United Nations (UN) Member States adopted the 2030 Agenda for Sustainable Development which includes the target of achieving universal health coverage by 2030.
- This was followed by the National Health Policy (NHP) in 2017 that recognized the key role that digitalization can play in improving healthcare delivery in India. It envisaged the creation of a digital health ecosystem that serves the need of all healthcare stakeholders and improves efficiency, transparency, and patient experience.
- In 2018, Niti Aayog presented the idea of a "National Health Stack" that is based on principles similar to India Stack. It called for the creation of a set of building blocks or "common public goods" for the development of diverse solutions in healthcare.
- Based on Niti Aayog's recommendation, the government drafted a report in 2019 titled, 'National Digital Health Blueprint (NDHB)'. It laid out the architectural framework for a comprehensive, integrated, and nationwide digital health ecosystem. With the PM announcing the NDHM on 15th August 2020, we are not far from the moment when a health ODE in India becomes a reality. NDHM will take forward the implementation of NDHB and establish a health ODE in India.

Exhibit 5 | Road to NDHM: A Public Digital Healthcare Infrastructure to help Meet the Sustainable Development Goals



Similar to how UPI and the India Stack paved the way for creating a cashless economy and improved financial inclusion, we believe that a health ODE, implemented by NDHM, will drive healthcare inclusion and create benefits for all players in the ecosystem.

There will be three components of the health ODE that will guide its creation, implementation, and day-to-day functionality.

Digital Platforms: These platforms will facilitate co-creation for building healthcare solutions for the healthcare community. They will further consist of three components:

- The underlying technology infrastructure such as data exchanges, data sources, etc.,
- A set of tools such as open Application Program Interfaces (APIs), standards and protocols, etc., that will enable the optimal use of this technology infrastructure.
- End-user solutions that will be created by leveraging the technology infrastructure and publicly available tools. Examples of these solutions include Applications (apps) that connect patients with doctors.

Community: It will consist of three types of stakeholders:

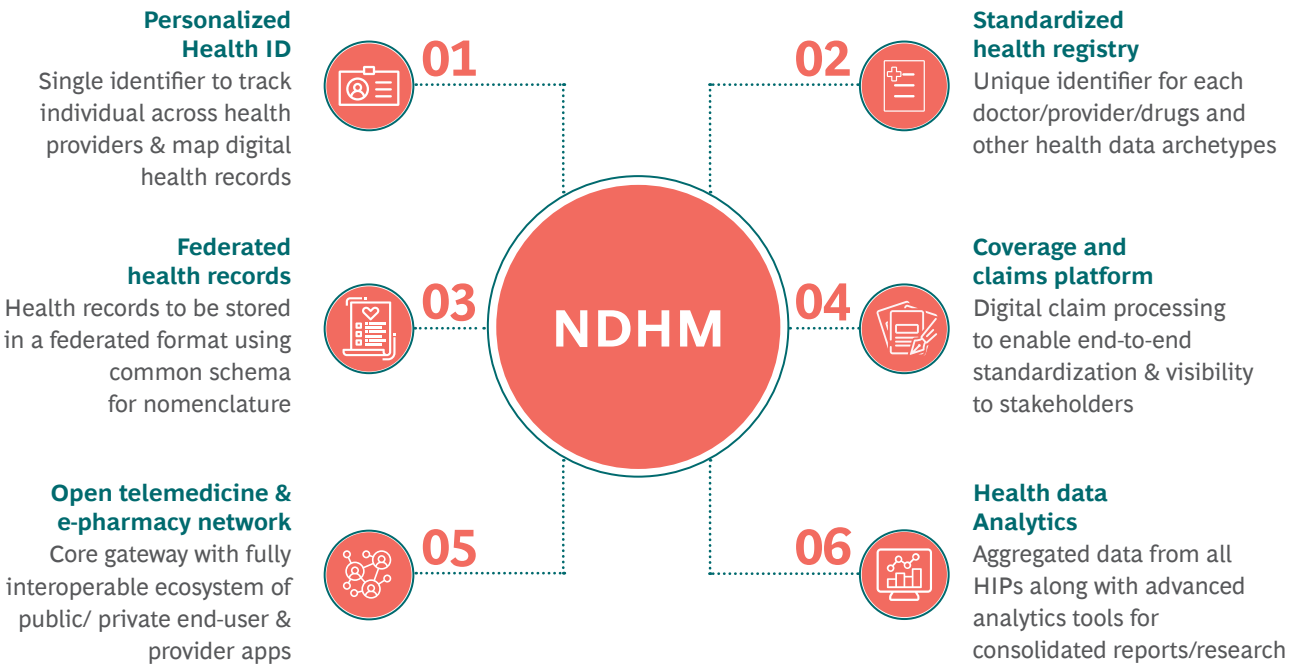
- The builders that will build the digital platforms and further leverage it to create new user-centric solutions.
- The end-users who will use these solutions to deliver or avail health services.
- The facilitators that will be responsible for financing, governance, research, etc.

Governance: A set of laws and rules that will govern the ecosystem and ensure data privacy, fair and equitable access, and accountability of all stakeholders. These laws will also naturally incentivize the community to adopt the digital platforms.

We will now discuss the different building blocks of the underlying technology infrastructure of the digital platforms that will enable an integrated digital health ecosystem in India. As enlisted in Exhibit 6, **there are six pillars upon which the NDHM's digital health architecture rests.**

1. Personalized health identity (ID)
2. Standardized health registries
3. Federated health records
4. Coverage and claims platform
5. Open telemedicine and e-pharmacy network
6. Health data analytics

Exhibit 6 | NDHM Digital Health Architecture Rests on Six Pillars



Sources: NDHM Strategy Overview, July 2020.

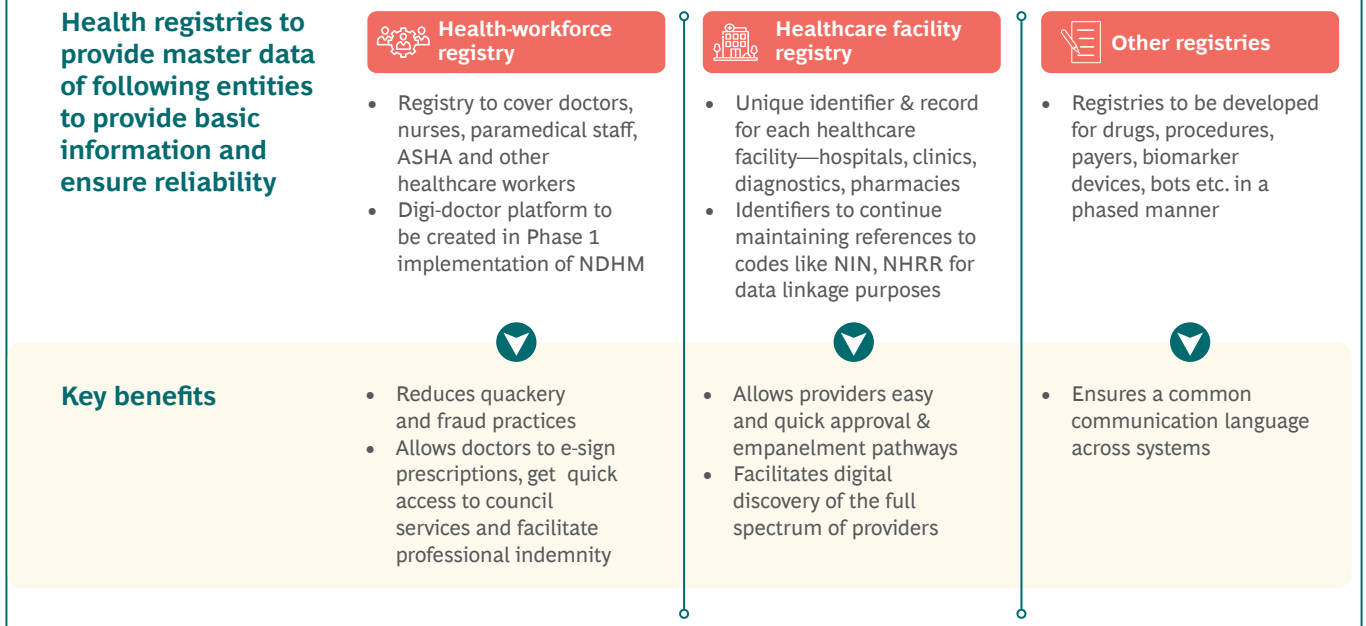
1 Personalized Health ID

A personal health ID allows for immediate and easy identification of the care receiver. Today, a person has multiple IDs across different diagnostic centers, providers, and other healthcare touchpoints. The creation of a universal ID will allow the patient to be identified across disparate data systems, thereby enabling an end-to-end view of the patient's health. It will also act as a conduit for identifying beneficiaries for different health programs and policies, facilitating the improved implementation of these programs.

2 Standardized Health Registry

Currently, India does not have a reliable master data for identifying health facilities, healthcare workers, drugs, procedures etc. The healthcare workers and health facilities need to register with individual state councils for regulatory approvals and other services. Additionally, the absence of a central registry means that when the doctors move across states or get associated with a new provider, the provider has to validate and verify the details across disparate systems that don't talk to each other. As depicted in Exhibit 7, **we believe that standardized health registries will facilitate the creation of a master data set across all the different stakeholders in the ecosystem (such as doctors, hospitals, labs, pharmacies, insurance providers, etc.), and introduce a common vocabulary across drugs, procedures, reagents, and other consumables.** Existing databases at the center and state level (for example, ROHINI registry for hospitals, doctor registries with state medical councils, etc.), can be leveraged to build these registries, instead of creating them from ground up. These registries will significantly reduce the inefficiencies caused due to lack of reliable and interoperable information. Concerns around dated and low-quality data will be addressed by incentivizing the stakeholders to maintain updated information and building the necessary safeguards for data validation. For example, self-maintainability of data will be ensured with the registries enabling the providers and health workforce convenient access to services such as regulatory approvals, government services, and empanelment. Similar registries for procedures and drugs will allow for a common vocabulary across providers and geographies ensuring information transparency. Overall, open access to the data in these registries will lead to a single source of truth for the ecosystem, thereby building trust and credibility in the system.

Exhibit 7 | Electronic Registries to be Developed for Healthcare Entities



Sources: NDHM Strategy Overview, July 2020.

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Federated Health Records

Personal Health Records (PHR) enable a holistic view of the patient's health history and allow for its consented access across multiple health stakeholders. This framework, laid down under NDHM, relies on two building blocks:

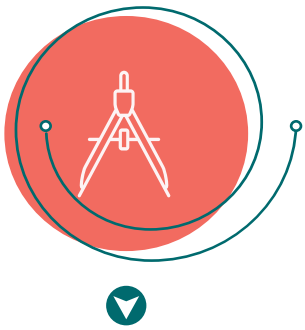
- **Registries to identify and log the source of the data and**
- **A health identifier to identify the owner of the data.**

Additionally, it lays down a standardized set of guidelines and protocols for the ecosystem players to function as Health Information Users (HIUs), Health Information Providers (HIPs), or even as health information repositories to effectively manage the personal health records. The platform also follows a federated structure which will facilitate the seamless exchange of data amongst disparate health data systems with minimal changes to the existing health record mechanisms. Tagging of the unique personal health ID to the different IDs across systems will create a comprehensive view of the health records linked to a particular ID.

The open APIs built on top of existing health data systems and new intermediaries in the form of Software as a Service (SaaS) providers will drive the implementation of this framework and pave the way for the interoperability of health records. Another class of intermediaries known as consent managers (similar to the one used for UPI) are also expected to emerge. These consent managers will help route the data flow such that patient consent is recorded, and the subsequent transaction is logged. An additional advantage of interoperability will be that the patients will be able to access services across providers while maintaining a single view of their health records. Exhibit 8 highlights the key features of this federated personal health record framework.

This feature will create immense value for patients. **By giving consent to the provider to access their historical health records patients will be able to receive improved health service quality from the provider.** We believe that patients should finance this digitization as they stand to benefit the most from the electronic storage of their medical records. By charging the patients a nominal fee for providing a digital record basis the standard guidelines, providers can partially recover the cost of upgrading their digital capabilities and become a part of this federated framework.

Exhibit 8 | Features of Personal Health Record Framework



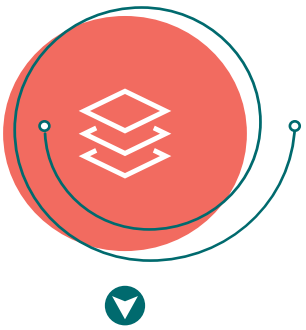
Federated Architecture

Real-time accumulation of digital health records fromvarious sources (eg. hospitals, clinics, labs etc)



Patient Privacy Protection

Obtain consent digitally through Consent Managers



Schema-Level Standardisation

Minimal change to data formats of existing health records

Sources: : iSPIRT.

4 **Coverage and Claims Platform**

Currently, different insurers and Third-party Administrators (TPAs) have different claim processing forms and data requirements. With the implementation of the health ODE by NDHM, a common standardized e-claim form will be established that will capture the minimum data required for claim processing. If adopted by both private and public insurers and the payor groups, it can help streamline the claim process, allowing for the faster and cheaper settlement of claims and subsequently, reduced administrative burden for TPAs and providers. **A standard e-claim form along with standardized e-discharge reports facilitated by the PHR framework as described above, will allow for a quick and efficient means to initiate claims, validate patient details, and process claims. Furthermore, a standard policy mark-up language adopted by insurers to specify policy details in a machine-readable format will aid auto-adjudication and fraud prevention.** New intermediaries in the form of health claims platforms will help drive this standardization across insurers and providers. It will also enable the monitoring of claims Key Performance Indicators (KPIs) for the overall improvement of system processes. The health claims platform along with the health registry will provide multiple benefits.

- Route claims to the appropriate insurer
- Allow providers access to the full breadth of insurers and TPAs
- Facilitate easy empanelment of insurers and TPAs
- Provide hospitals / patients with visibility on the claim status
- Enable real time monitoring to drive minimum Service Level Agreements (SLAs) for the overall claim process

Key components under NDHM which will drive these benefits have been enlisted in Exhibit 9.

Exhibit 9 | NDHM will Help Simplify Health Claims Processing & Provider Empanelment

Key Initiatives To Facilitate Standardized Processing & Reduce Overall System Costs

- **Common Health Claims platform** to validate requests, route to appropriate party, guarantee payment & gathers real-time data
- **Standard e-claim, e-discharge/key forms** to initiate claims for any public or private insurance organization
- **Overlay on existing system:** Hospitals, Insurance/TPAs can choose any compatible software or plugin to meet requirements
  - Hospitals to have seamless process for insurance claims along with clear visibility on claim status
  - Insurance/TPAs to benefit from innovations in auto adjudication, FWA prevention
- **Standard e-facility form to simplify** & digitize provider empanelment process
- **Policy Markup Language** to enable predictability of contracts & facilitate real-time auto adjudication/settlements

Sources: IRDAI NHA JWG 2019 report on common IT platform for claims processing.

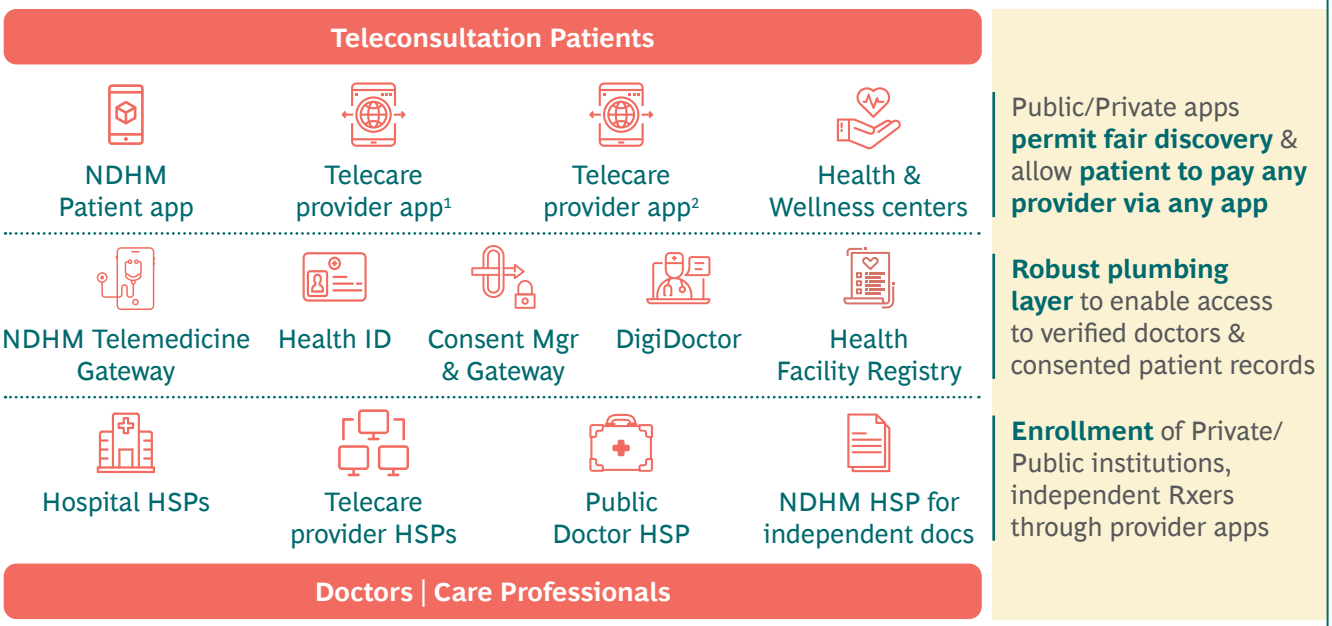
5 Open Telemedicine and E-Pharmacy Network

A health ODE will enable a more inclusive framework for digital health services such as telemedicine platforms. It will ensure that every doctor who wishes to provide teleconsultation has an opportunity to participate and be discovered by patients seeking care. The interoperability feature will allow patients to seamlessly move between end-user apps along with their historical health records.

The telemedicine gateway, as described under NDHM, will bring this process to life. It will provide a set of open APIs and specifications upon which patient-centric solutions will be built by innovators to allow discovery, search, appointment, modifications, and fulfillment of various health services related to telehealth. When patients request for telehealth services through any of their chosen apps, the telemedicine gateway will relay the search request to HSP platforms. Provider platforms will be able to respond with their intent of servicing that request and other parameters (price, rating, specialization, etc.), offered by the various health providers on their platform. The gateway will then relay the responses back to the patient apps. The gateway will also take care of end point registries, key management, tokenization, etc. Upon the completion of this process, patient apps will be able to connect directly with the HSP for the service without having to go through the gateway.

With the centralized registries providing a digital ID and the ability to e-sign, any provider or practitioner will be able to access a digital platform to provide teleconsultation services. The gateway will also develop metrics that will help monitor the quality of care across teleconsultations and ensure that patients can find the right quality of care. **With full interoperability at play, telemedicine platforms will compete on stitching enhanced end-to-end experiences for the users and providing better clinical care.** Exhibit 10 details how the telemedicine network has been visualized as part of the health ODE to be implemented by NDHM.

Exhibit 10 | Telehealth Systems Visualized as Part of the Open Digital Ecosystem



Sources: NDHM Strategy Overview, July 2020.

6 **Health Data Analytics**

Over the medium to long-term, as the ecosystem starts adopting digital platforms for care delivery, there will be significant amount of data generated which previously was limited and available only in silos. **NDHM's envisioned health data analytics platform will allow studies on the aggregated and anonymized data sets that can in turn be leveraged in several ways.**

- Firstly, it will enable the creation of improved policies and better disease control programs.
- Secondly, it will allow for improved monitoring of clinical and non-clinical operational KPIs, thereby ensuring accountability across stakeholders.
- Thirdly, it will create new opportunities for research and clinical advancements based on Indian demographics for which so far, we have primarily relied on western countries.

The advent of a health ODE will have immense implications upon all stakeholders in the healthcare sector. We foresee potential threats to some of the existing business models and strategies, the creation of new opportunities, market expansion with the entry of new players, as well as a change in the roles and dynamics of all stakeholders.

We describe these implications in detail in the individual stakeholder sections that follow.





Chapter 6

Implications for Health Tech Start-ups

Chapter 6: Implications for Health Tech Start-ups

Chapter Summary

With the onset of COVID-19, we have seen increased adoption of digital platforms among doctors and patients. This has given a new impetus to the numerous health tech startups in the country, who had so far been struggling to capture a meaningful market share in the healthcare sector. Today, health tech players face significant profitability challenges and concerns around trust and acceptability. In our view, the Open Digital Health Ecosystem (health ODE) being implemented by the National Digital Health Mission (NDHM) will change the dynamics of market plays substantially.

We believe that health tech companies stand to gain the most and will help drive market expansion and consumerism in the industry. Companies that are able to timely pivot their business models, will be able to gain from the new opportunities that emerge to turn profitable. This will be driven by three factors.

- A new class of intermediaries will emerge to build the very foundation of the digital infrastructure. Examples include health facility verifiers, consent managers, health locker providers etc. They will enable the uptake of digital practices in the ecosystem and enable the disparate data systems to communicate with each other.

- New opportunities will arise to develop cutting-edge patient solutions that challenge existing service delivery models. Examples include self-health management apps, clinical decision support systems, gamified nudges to drive prescription adherence etc.

- We believe that winning business models will change. Today, most health tech players have an e-commerce set-up that thrives on selling of private label brands and preferential listing of providers. We believe an “open market model” will emerge where patients can access any provider through any platform. For the platforms to differentiate themselves, they will need to look at customer centric concierge solutions that handholds the patient across the disease journey for single disease or multiple comorbidities.

In this chapter, we start with laying out the current landscape of the health tech start-up industry. This is then followed by how a health ODE will create different opportunities for the players in the ecosystem. Finally, we end with describing the new market plays that will emerge, potentially requiring existing players to update their business models.

A. New impetus for a sector still trying to find its due in the healthcare space

Teleconsultations in India started appearing in 1999. However, two decades later, up until March 2020, the industry was yet to see any regulations to legitimize the practice. Further, care givers and care receivers had multiple apprehensions on the efficacy of digital platforms for providing care. Come the COVID-19 crisis, as social restrictions became necessary, telemedicine has finally started to become mainstream.

In March 2020 India announced the telemedicine guidelines for the first time laying out the contours for digital care and providing the much-needed recognition of telemedicine as a viable alternative. [For details on the telemedicine guidelines, refer to the Information Box 3 at the end of chapter 6]. E-pharmacies also saw themselves being counted as part of essential services allowed to operate during the nationwide lockdown. **These regulatory changes have brought a new impetus to the industry as most leading health tech start-ups**

3L

Consultation completed in a short span of 6 months on e-Sanjeevani, Health Ministry's telemedicine platform"

reported over 300 to 500 percent increase in patient traffic. Between March 2020 and May 2020, about 5 crore Indians accessed tele-consultation services. 80% of them were first time users and 44% of tele-consultations were from non-metro cities.[25] Additionally, the Health Ministry launched the e-Sanjeevani platform in April 2020 which completed over three lakh consultations in a short span of six months.[26] We also saw state government across the country launching their helpline numbers and partnering with health-tech players to provide effective digital health solutions to their citizens, be it e-consultations, remote-monitoring or assisting diagnostic capabilities, eICUs etc. These digital services proved to be a boon in containing the spread of COVID-19 while simultaneously enabling provisions for non-COVID-19 essential healthcare.

There has been a significant increase in the acceptability of digital health platforms, which is likely to continue in the future. According to a recent BCG survey, approximately 60-65% patients across metro and Tier 1 cities said that they will continue to prefer digital medium for accessing care even in the post COVID-19 world. [For detailed survey refer info box 1 at the end of chapter 2].

Similar trends are visible on the provider side as well. So far, doctors in India had been apprehensive of teleconsultation platforms. In a supply constrained environment where clinics were already filled with patients, there was little incentive to adopt digital channels for delivering care. However, the COVID-19 crisis has changed that landscape.

Highlights from a recent BCG survey of 800 physicians across specialties in metro and tier 1 cities

85%

Clinicians used teleconsultation and digital platforms during the lockdown

65%

Doctors said that they will continue using digital platforms in post COVID-19 world

50%

Doctors found digital platforms to be an effective tool for patient interactions

[25]Source: How India accessed healthcare in the last 3 months Mar 1st – May 31st 2020

[26]Source: Press release, MoHFW, 08 September 2020

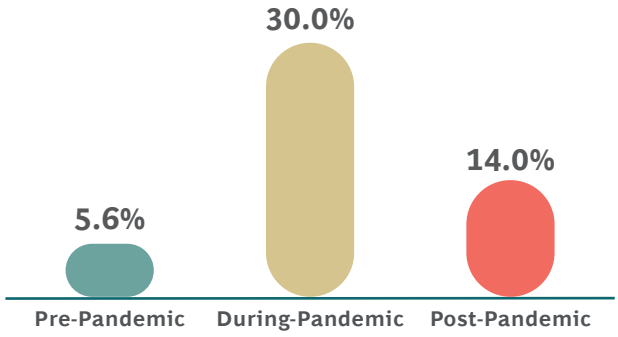
Exhibit 11 | Significant Traction being Observed with Doctors & End Users due to COVID-19

~100% demand uptick observed by Indian eHealth players during Covid19

- **100%** Demand increase for medicines category — PharmEasy
- **100%** Week on week growth in avg. daily users — practo
- **120%** Increase for consultations & diagnostics — MedLife
- **60%** Increase in doctor consultations — lybrate

~50% of the uptick likely to continue post COVID

Y-Y Growth in Monthly active users for telemedicine platforms in China



Majority of patients to continue using Telemedicine due to various benefits

~80+% patients in Metro and **~50+%** patients in Tier 1 cities showed high comfort in using online consultations and remote diagnostics post pandemic

Patients realizing inherent telemedicine and remote diagnostics benefits during Covid19:

- Inherent benefits like waiting time reduction, on-demand doctor availability and removal of distance barrier driving the preference (Note: Infection risk found to be lower than these three reasons)

Key parameters while choosing a platform:

- Patients look out for platforms which provide a clear view on doctor qualification, access to renowned doctors and fast appointments

Sources: App Annie, Research2Guidance, BCG analysis.
Note: BCG conducted survey in June 2020 covering 400 respondents.

The telemedicine guidelines announced by the Ministry of Health and Family Welfare in March 2020, followed by announcement by the Insurance Regulatory and Development Authority of India (IRDAI) allowing insurance providers to reimburse for care provided via digital channels, have boosted the viability of digital healthcare in India. The new guidelines create a strong foundation for scaling telemedicine services, providing India the opportunity to become the global telemedicine hub.

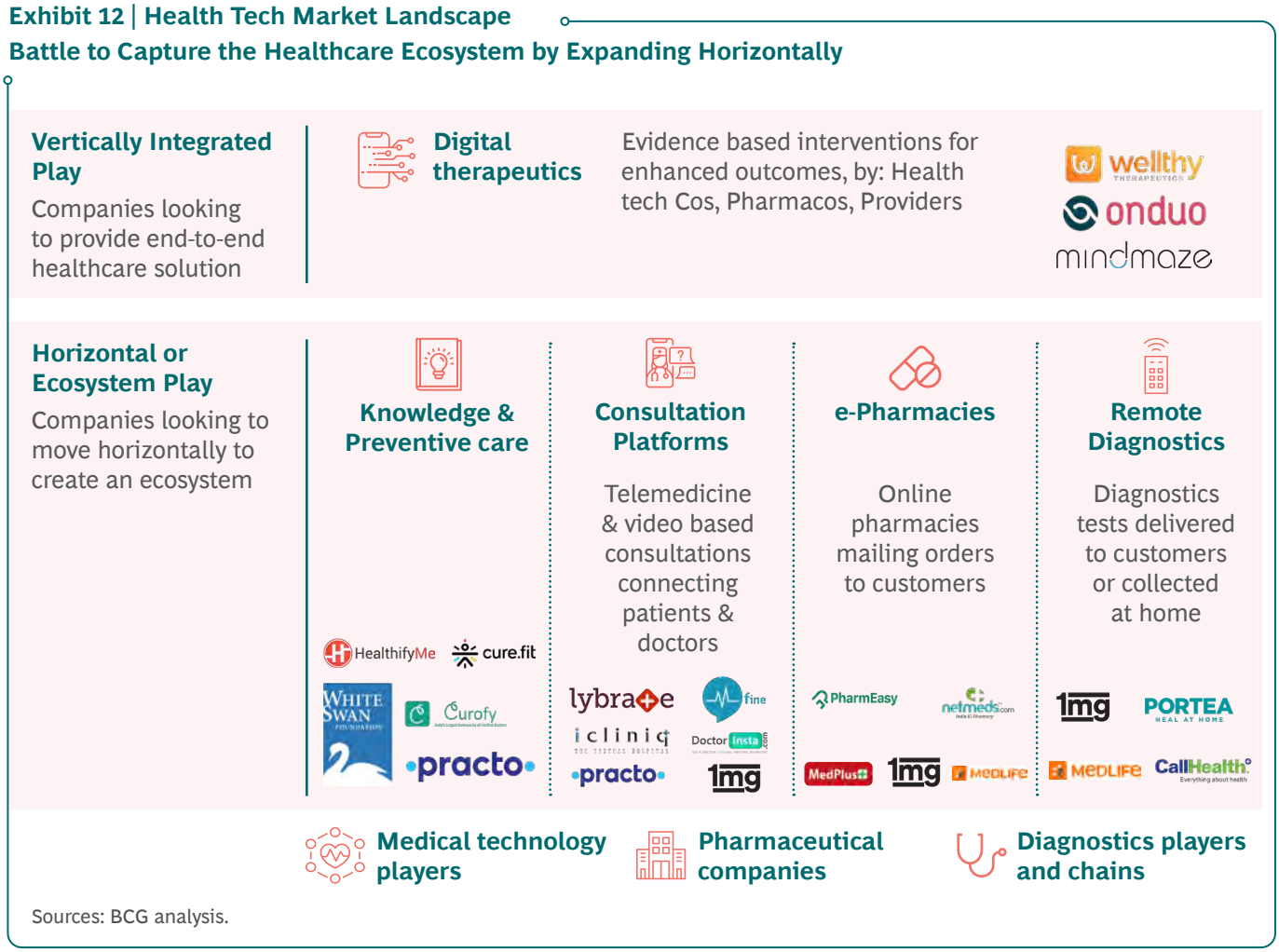
"With the announcement of the National Digital Health Mission (NDHM) and subsequent creation of a health ODE, we will see the health tech sector becoming mainstream for delivering and accessing health services. The health tech start-ups will help drive greater access for care, creating new business models and service offerings."

B. The Landscape Today

The last few years have seen a burst in health tech start-ups largely investing in business to consumer (B2C) solutions. These health tech start-ups today account for approximately 5% of the total healthcare industry in India. As highlighted in exhibit 12, we have seen broadly two kinds of plays emerge.

- Most leading players have tried to capture market share by expanding horizontally and providing the full suite of services to patients across the treatment journey, providing a range of services like e-consultations, e-pharmacy, e-diagnostics and others.
- On the other hand, there are also companies which have focused on a vertically integrated play – focusing on a specific disease category and building all related services around it.

Exhibit 12 | Health Tech Market Landscape
Battle to Capture the Healthcare Ecosystem by Expanding Horizontally

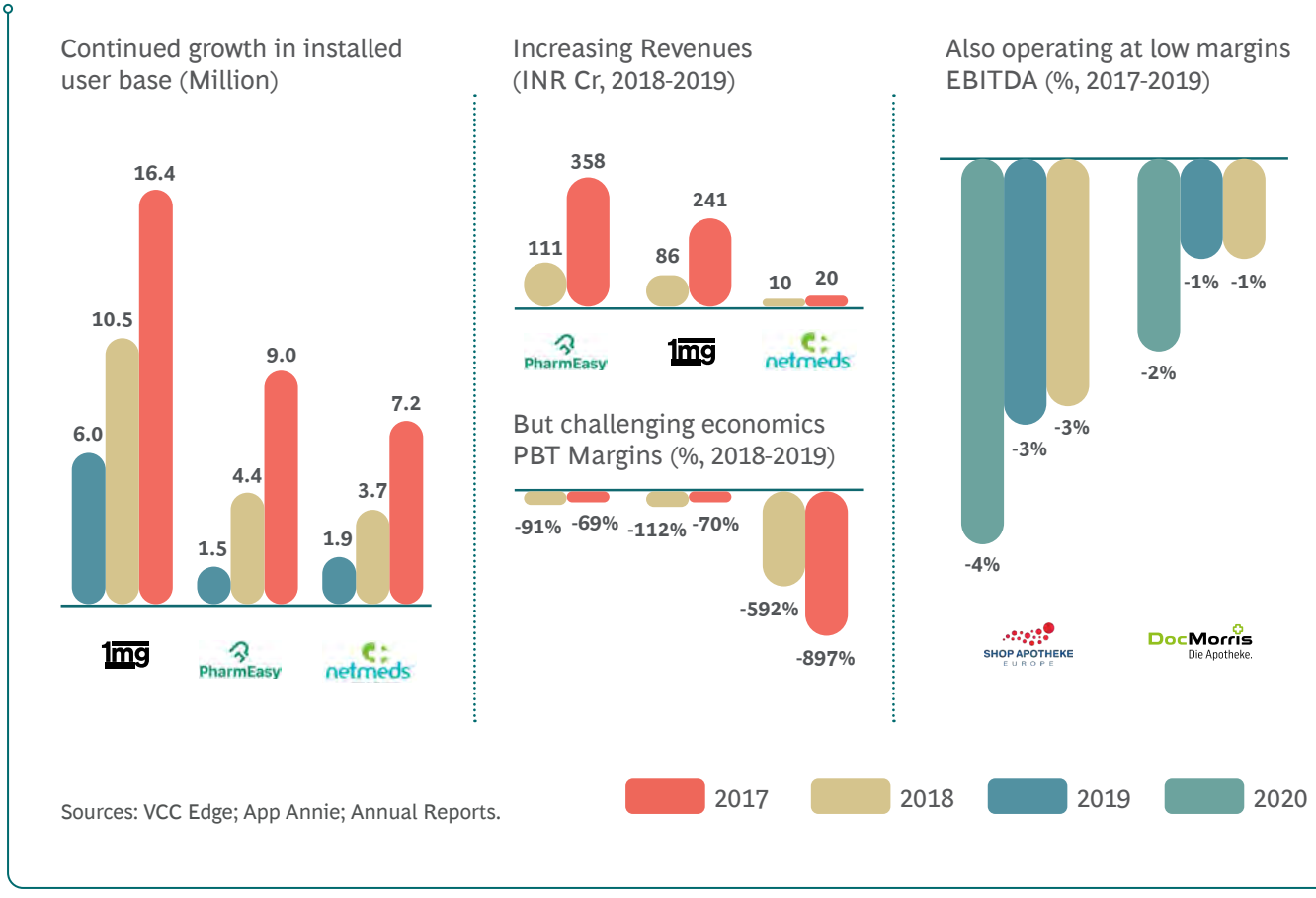


Sources: BCG analysis.

E-pharmacy and fitness & wellness have emerged as burgeoning sectors in the last decade with about 20 companies operating in each. However, profitability has been a challenge, even for leading players. Refer to exhibit 13 for more details. Cash burn has been common in this industry, given the race to scale, and steep discounts being offered to drive adoption. In addition, concerns around trust (fear of fake doctors, counterfeit medicines, biased push of products/services), customer support issues (timely and effective delivery of care, grievance redressal), language barriers and access issues are some of the hurdles that still exist.

So far health tech start-ups have largely operated in siloed systems – each player fighting its own battle for verifying and onboarding doctors as well as for gaining trust of the patients. This leads to a tedious process and repetitions across systems. Moreover, currently, patients have limited ability to move across user systems due to lack of easy information flow across the various digital systems.

Exhibit 13 | Increasing Penetration but Continued Monetization and Profitability Challenges in India and Globally



Sources: VCC Edge; App Annie; Annual Reports.

C. Changing dynamics and new opportunities

Instead of a monolithic architecture which limits interoperability across different players operating on different software, a health ODE will build Open Application Program Interfaces (API) based public digital infrastructure that will facilitate seamless movement of the demand and supply side users across the different platforms/players. In our view, the Open API, micro services based architecture proposed by NDHB is cutting edge and will drive market expansion for health tech start-ups while improving health outcomes in the country.

The key features of this open API architecture include,

- **Universal digital inclusion:** It ensures that every stakeholder who wishes to provide digital services has an opportunity to participate and be discovered by patients. With the standardized health registries providing a digital identity for practitioners and providers, it will be easier for them to get enlisted on to the digital platforms enabling improved discoverability.

- **Interoperability:** It decouples the healthcare service provider (HSP) platforms and the end user apps (EUA) by creating a health gateway in between. It facilitates different HSP platforms and EUAs on disparate software to interact with each other via a set of open APIs. Patients and Doctors will be able to continue using the software of their choice to seek or provide care while at the same time getting access to the full ecosystem. Individual HSPs will be able to connect to the health gateway, be exposed to all EUAs and access demand from multiple sources. The patients will be able to seamlessly move across platforms, enabling access to a comprehensive set of providers.

These features will result in multiple advantages for the health tech start-ups, notably,

- **Improved clinical effectiveness:** Doctors will be able to see patient medical history, access diagnostic reports of tests they recommended with patient consent. Doctors will be able to issue digitally signed e-prescriptions to patients which will become part of the patient personal health record. The federated health record framework of NDHB will be used to enable this capability. Furthermore, we believe that with all digital health services flowing through the gateway, there will be better oversight on quality and operational Service Level Agreements (SLAs) to drive overall upliftment of service experience.

- **Trust and Credibility:** Adoption of digital health standards for secure exchange of health information among participants and transparency provided by standardized health registries will drive improved trust and credibility in the ecosystem. Ensuring only verified service providers can offer services will help build assurance for patients to adopt health tech solutions. Moreover, digital will also enable quick and convenient grievance redressal for stakeholders, further improving their experience of using health tech solutions.

- **Innovation conducive environment:** The open API architecture will lay the foundation for health tech start-ups to participate and innovate in the healthcare market. In our opinion, new health tech start-ups and new models of care delivery will emerge. For example, health tech start-ups will be able to create clinical decision support systems, apply data validated triaging systems and innovate across the patient journey.

  Additionally, we believe that health tech start-ups will also play a critical role in

  - enabling all key stakeholders including providers, payors and doctors to adopt usage of e-objects and
  - ensuring patients can conveniently access healthcare services across any of the service providers and at the same time have access to transparent information on these providers.

A new class of intermediaries will emerge to drive adoption of standardized digital practices across the ecosystem.

- **Health facility verifiers:** Health facility verifiers will aid verification of providers and ensure that up to date and validated information is maintained in the registries

- **Health Information Providers and Health Information Users:** Each stakeholder that the patient gets in touch with, is a health information provider given that they generate health data for the patient. Each health information provider sometimes will also need to function as a health information user in order to access past records of the patient for providing them appropriate care. For example, doctors/ hospitals will act as both health information provider and health information user. Today, India has a long tail of healthcare providers who have traditionally operated without digital interventions. Even for the providers which have shifted to Hospital Information Management Systems (HIMS), there will be a need to drive standardization for allowing disparate HIMS to communicate with each other. We believe that apart from the current HIMS providers upgrading to the open API standards, a new bunch of technology providers will also emerge facilitating offline health providers to function as health information users and health information providers. This will entail digitalization of the offline billing and record keeping systems and distributing plug and play applications for online players to meet the open API specifications.

- **Patient Health Record (PHR) Access/Health Locker providers:** For the creation and use of personal health records across multiple health providers, there will be a need to create health information repositories and offer patients a unified portal for accessing information from these health repositories. We believe a new bunch of technology providers will emerge to provide for such processes.

- **Consent management providers:** Consent management providers will facilitate consent raise and approval mechanism for data sharing among the health information users, health information providers and the health information repositories.

- **Clinical Decision Support Systems:** Clinical decision support systems will emerge that utilize health data analytics to driving standardization of treatment protocols and pathways for health providers.

- **Claims platforms:** Claims platforms will drive standardization of information flows through machine readable data formats across payors and providers allowing for easy empanelment and claim processing.

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With such intermediaries allowing for standardization across ecosystem players and facilitating seamless movement of information, it will enable "innovations at the edge", expanding offerings across the patient journey.

Preventive care

We believe that multiple digital solutions will emerge that will help the patients in preventive care. Some of these will also be self-health management solutions. For instance,

- Health information portals providing reliable information on health conditions, increasing patient awareness and knowledge. This will enable the patients to be proactively involved in their wellness journey.
- Mobile solutions to monitor and track vitals such as blood pressure, blood glucose etc. The information from these apps will flow into the patient's personal health record. Ability to remotely share these health records with providers will enable remote monitoring. This will challenge traditional care delivery models like in-person health check-ups.
- Leveraging machine learning and Artificial Intelligence (AI) to identify aberrations, enabling proactive flagging of care requirements and lifestyle corrections needed. Possibility of an easier and earlier diagnosis of medical conditions by usage of such solution will attract high demand from customers.

Primary care

We believe that multiple digital solutions will emerge that will help in improved delivery of primary care. For example,

- Apps that do accurate demand-supply matching between patients and providers depending upon patients' needs and providers' capability. This will ensure that every patient in the country doesn't end up at a tertiary care center.
- App and web based last mile delivery of medicines. Such solutions will challenge traditional retail channels that currently capture a majority share in retail sales.
- Gamified nudges to drive treatment adherence. Such solutions will start gaining preference among the customers, as these will help in better patient health management. These will also have an upper edge in capturing the incremental market size gains arising from increase in treatment adherence among patients.
- Technology (AI/sensor) enabled diagnostics support to providers for improved clinical decision making. Such solutions will also pave the way towards standardization of clinical protocols, improving the quality of care delivery.

Secondary care and tertiary care

We believe that multiple digital solutions will emerge that will help both the providers and the patients in the secondary and tertiary care aspect. For example,

- eICU systems enable handling of intensive care cases in rural and underserved areas (which lack such facilities or specialized professionals) by creating a virtual connect with a reputed hospital (command center) situated in metro/ tier 1 cities. The technology allows 24-hour flow of vital facts such as pulse rate, temperature, heartbeat, breath flow apart from a connected monitor, ventilator and audio-visual technology to raise alarm, conduct surgeries, medical treatments or emergency procedures
- Genome based testing enabling precision medicine for critical and rare disease treatment like cancer, Parkinson's, etc. With ecosystem stakeholders increasing their usage of digital platforms, it will become possible to use the data generated for determining clinical effectiveness of various tests in different clinical settings.
- Innovative insurance products that link premiums to patient health outcomes. Such products will have a higher chance of gaining attraction among the population, challenging the traditional products



Post hospitalization event care

We believe that post-preventive care will become much more common through digital solutions. For example,

- Providers will be able to leverage mobile solutions to track the patient's chronic disease condition and adherence to lifestyle advice. Such Solutions can also have escalating mechanism for exigency situations.
- Providers will also be able to manage patients post hospitalization event. They will be able to effectively leverage community groups to ensure cohesive post-treatment awareness.
- Solutions that drive patient behavior through gamified nudges, reminders for follow up consults and testing, will gain popularity among patients in order to better manage their health

Altogether, we foresee nineteen potential plays across the health delivery value chain becoming viable for health tech start-ups in immediate term. These potential plays can also be envisioned as new sub-sectors for health tech start-ups to play in and which had seen limited focus so far. We lay out the description of these sub-sectors, along with competition intensity, sector maturity and entry barriers in exhibit 14.

In our opinion, key white spaces in the industry will be electronic health record providers, healthcare information management system providers, clinical decision support systems, chronic disease management and health indicator tracking solutions. As the industry adopts to the NDHB guidelines, electronic health record providers will see a huge uptick in their business. They will enable the ecosystem to adhere to the NDHB specifications and to function as health information users and providers. On the consumer front, we are also likely to see a lot more focus on devices which allow for continuous tracking of health vitals. These records will form part of the overall patient health record, providing them necessary triggers and nudges for proactive care. These health tracking devices, electronic health records combined with AI and Machine Learning (ML) technologies will not only pave the way for efficient chronic disease management but will also lead to the emergence of efficient clinical decision support systems.

Exhibit 14 | Emerging Areas of Play for Health Tech Players

Sub-Sector	Description	Competition Intensity	Sector Maturity	Entry Barriers
Discovery and booking mgmt.	Online platform to search, list and book healthcare services	▲	▲	▼
Food and Nutrition	Healthy meals; Supplements/alternate food with physiological benefits	–	–	▼
Sports and Wellness	Recreational sporting activities and fitness applications; DIY or instructor led modules	–	–	–
E-pharmacy and diagnostics	App and web based last mile delivery platforms for medicines	▲	▲	▼
Chronic disease management	Leverages devices to track chronic diseases and offer lifestyle advice	–	–	–
Health indicator tracking	Connected devices/mobile solutions to manage and track activity levels	–	–	–
Digital content & engagement	Digital solutions like health information portals and content based engagement apps	–	▲	▼
Integrated insurance offering	Insurance product backed with data analytics for value based health services	▼	▼	–
Telemedicine	Remote consultation and diagnostics solutions	▼	▲	▼
Home Healthcare	Healthcare service providers at home; includes geriatric care and post operative care	▼	–	–
Digital Medicine	Digital solutions that can be clinically prescribed as treatment for neurological disorders	▼	▼	▲
Online edu-skilling	Digital content for continuous skilling of medical professionals (including AR/VR solutions)	▼	–	▲
Genomics	Genomic based precision medicine for critical and rare disease treatment	▼	–	▲
Clinical Decision Support	Technology enabled diagnostics support for decision making across specific disease groups	▼	▼	–
Healthcare Information Mgmt.	Software and advanced analytics solutions to manage non-clinical operations	▲	▲	–
Electronic Health Record	Integrated patient record management platforms for hospitals and clinics	–	–	▼
Payer Information/ Solution	Technology solutions for payers to optimize their claims and manage data to track patients	–	▼	▼
Bioinformatics & Drug delivery	Data driven solutions to accelerate drug discovery and aid bio-pharma research	▼	▼	▲
Clinical trials management	Identification and management of patient base for clinical trials by pharma companies	▼	▼	▲

Sources: BCG analysis.

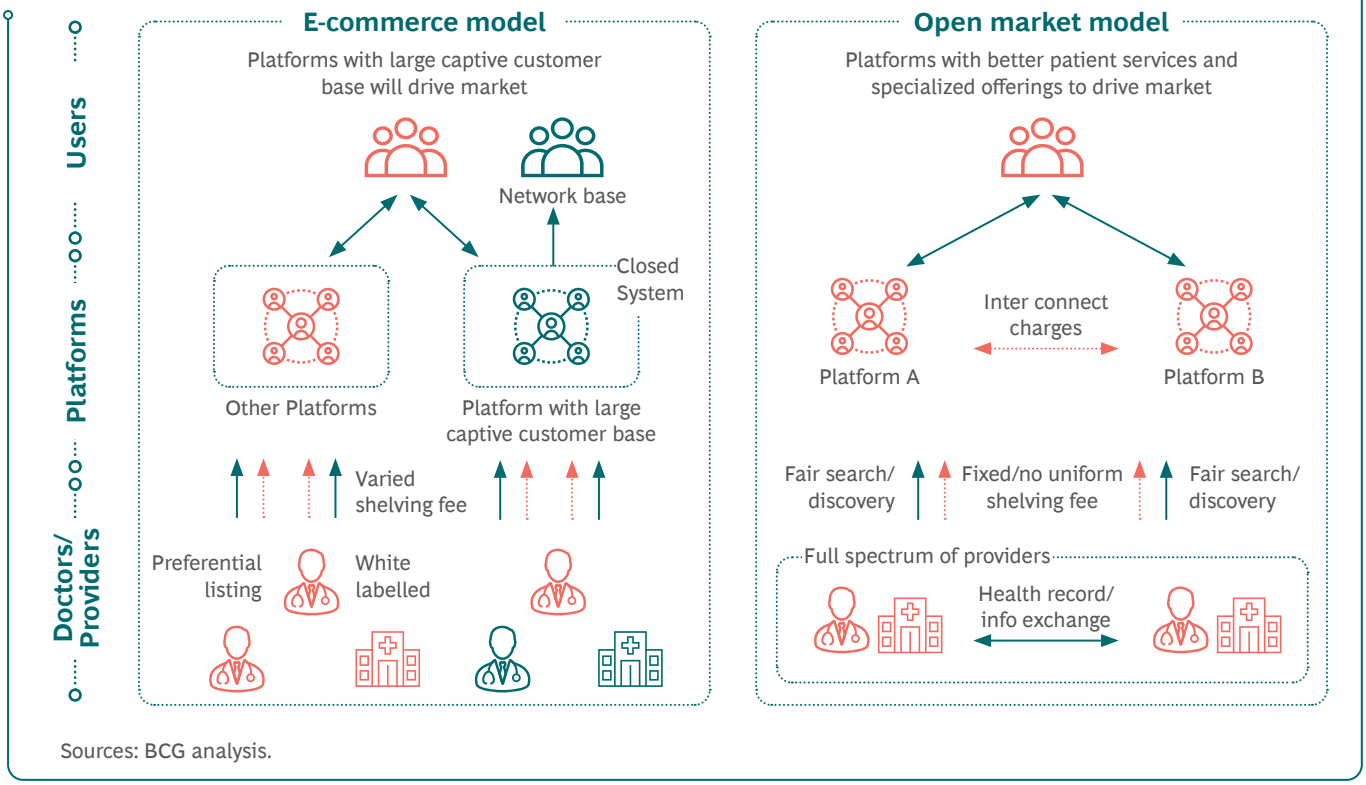
D. Imperatives for Ecosystem Play

As described earlier, the health tech start-ups have largely focused on B2C solutions. Most of them follow an e-commerce model currently. In this model, aggregator platforms provide patients with a wide range of options to choose from including their own bundled offering. Providers are preferentially listed basis the shelving fees that they pay to the platform. As a result, the platform enjoys disproportionate power.

As the health ODE matures, we believe an "open market model" will also emerge. In this model there is no preferential listing of a provider as a uniform shelving fee is charged and there is no incentive for a platform to up-list or down-list any potential provider. Hence, for the platforms to differentiate themselves, they will need to look at customer centric concierge solutions that handholds the patient across the disease journey for single disease or multiple comorbidities.

We explain in exhibit 15 how the two models work. We also provide a detailed description of the two models below

Exhibit 15 | Two Market Plays for Health Tech Players in B2C Space



Sources: BCG analysis.

E-commerce model: In the e-commerce model, aggregator platforms tend to compete on the basis of network size i.e. number of patients and providers on the platform. Given the race to attract larger customer pools, there is greater focus on expanding horizontally providing the full breadth of services across the ecosystem to create a captive customer base, while ensuring profitability. It requires constant addition of new services to retain customers. We have seen global examples of this play such as Ping An Good Doctor in China. These platforms typically charge varied shelving fee from providers, leading to potentially biased search and discovery by patients. It also leads to providers fighting for improved visibility on the platform. Over time, the platforms tend to promote their own/white labelled products, which compete with the already existing providers.

In this model, aggregator platforms tend to hold disproportionate power which can potentially lead to multiple adverse outcomes for the ecosystem. It creates a biased playing field for providers with deep

pockets, limiting opportunities for smaller players. It creates high entry barriers for new players as players thrive on network effect – hence only those who have large captive customer and supply bases have a potential right to win. This has been a "winner take all model" in other sectors. In healthcare too, it can potentially give rise to monopolistic plays and limit overall benefits to the ecosystem.

Open Market Model: In an open market model with the EUA and HSPs decoupled, patients can access any provider through any EUA. All EUAs have access to the full spectrum of providers. The aggregator platforms list all the providers and the patients can take informed decision on their provider choice basis parameters such as price, clinical outcomes, etc. Hence, this model enables fair search and discovery of providers on the back of charging uniform shelving fee from the providers. This new dynamic creates a level playing field for digital platforms resulting in platforms competing on creating better end to end user experiences, innovating for differentiated services and providing improved clinical outcomes for their patient pools.

In the open market model, we believe that health tech start-ups will need to focus on expanding vertically, to create a niche for themselves. For example, we might see players pivoting focus on specific disease groups like diabetes, cancer, etc and providing end to end support for proactive screening, diagnosis, disease management and post treatment support. Players such as Onduo, Vitra Health and WellDoc in US are some of the examples that have benefitted from a vertical play.

We detail in exhibit 16 the key implications for various health ecosystem stakeholders across the two market plays.

Exhibit 16 | Key Imperative for Stakeholders Across the Two Plays

	E-COMMERCE MODEL	OPEN MARKET MODEL
Doctors/ Providers	• Associate with platforms with largest network • Shelving fee for discoverability; limited innovation • High costs for customer acquisition costs • Reach limited by platform network • High switching cost to move b/w platforms (cold start)	• Associate with platforms with better service experience/ fulfilment • Uniform/no shelving fee; compete basis clinical care/ specialization • Reduced costs for customer acquisition and improved discoverability • Expansive reach across platforms • Low/minimal switching cost; easy interoperability across platforms
Platforms	• Compete basis network size and number of transactions • Promote white labelled products/ preferential listing • Limited entry barrier for large network players • Limited incentive to exchange info across platforms	• Differentiate on service, quality; move towards specialization • Revenue model unclear; only opportunity advertising and cross sell and fee charges for health record exchange opportunities • New entrants would need to compete on service quality • Incentivized to explore new demand pools; and innovate use cases
Users	• Seamless integration across single provider • Potential biased search and discovery for users – can impact clinical quality and pricing • High switching costs to move across platform	• Seamless movement across platforms; positive impact on pricing and clinical care • Low information asymmetry across platforms

Sources: NDHM Strategy Overview, July 2020.

Information Box 3

In Response to COVID-19 - Guidelines have been Modified Globally to Drive Adoption of Telemedicine

Australia	**Allowed healthcare practitioners to extend telehealth services** *(including video conferencing) to patients for general consults, chronic disease management and mental health treatment*
Canada	**Virtual access to providers to be scaled for a pan-Canadian approach;** *expedited cross territory license issue mechanism for physicians; eased out consult frequency limitations*
France	*Allowed* **reimbursement of tele/video consultations** *for patients with COVID-19 symptoms or confirmed with COVID-19 in addition to other indications*
Germany	**Published a list of free and trusted telemedicine services** *(including costs, reimbursement policy, functionality and prices) that can be easily integrated into a doctor's practice*
New Zealand	**Liberalized use of virtual healthcare technology;** *strong focus on patient information confidentiality*
Singapore	*Singapore government* **allowed patients to get reimbursement for video consultations** *for seven chronic diseases*
South Korea	**Revoked permanent ban;** *has allowed telemedicine temporarily, until the COVID outbreak ends*
UK	*NHS* **directed GPs to switch to digital consultations** – replacing patient visits with phone, video, text or online consults
USA	*Has* **allowed the use of telemedicine services for all beneficiaries of fee-for-service Medicare;** *eased out restrictions on use of HIPAA non-compliant private communication technologies*
Japan	**Expanded the reach of telemedicine** *amidst the Covid-19 pandemic by listing 10,000 clinics offering the service. While the traditional stance has been to mandate 1st consults through face-to-face interactions, this has also been relaxed*
INDIA	**Allowed registered medical practitioners to do patient consultations via video/audio/text** *Caregivers, health workers & RMP's allowed to connect with other RMP's for medical advice* *RMPs are allowed to prescribe defined set of medicines via telemedicine platforms (permissible medicine lists[1]: List O, List A & List B*

Sources: : Press Releases; Department of Health and Human Services – US; Press Releases; Ministry of Health, Labour and Welfare – Japan; JMIR; Canadian Medical Association; L'assurance maladie – France; Health Innovation Hub – Germany; Korea Herald
Sources: Telemedicine guidelines, MoHFW, Mar 25, 2020.
[1] List O: OTC medicines (e.g. paracetamol, ORS solutions, cough lozenges, etc.); List A: Ointments/drops OR refill for chronic illnesses - After first video consultation only; List B: Add-on for chronic medications – follow up consultations only.

Information Box 3

While the Guidelines are a Welcome Step, Multiple Areas need Strengthening for Telemedicine to Become a Viable Alternative



Communication platforms permitted for telemedicine - *(Audio, Video, Chat, mail, fax)*

Definition span of healthcare practitioner - *inclusion of paramedics and allied professionals*

Paramedics and allied providers not included

List of medications permitted - *parity between online and physical Rxing*

Limited medications; restrictions on non-video

Clarity on how guidelines will be enforced - *enforcement laws – penalties, redressal etc.*

Enforcement laws for telemed to be articulated

Data and Technology standards *norms for data privacy - regulations and enforcement*

OPD Reimbursements for telemedicine - *insurance coverage for telemedicine and telehealth*

OPD and telemed not covered in most policies

Sources: Telemedicine Practice Guidelines – MoHFW; State Telehealth Laws - Center for Connected Health Policy; GMC; Regulatory approaches to telemedicine – Europe Economics; National Telemedicine Guidelines of Singapore; NHS Website; Telemedicine Toolkit - American Health Information Management Association; Telemedicine Company Websites.

Information Box 3

13 Recommendations to Strengthen the Guidelines Further



Online and Offline Parity

To ensure telemedicine is a viable alternative to in-person care

1. Expand list of permitted medications
2. Guidelines on Board/ special consults
3. Guidelines on certifying caregiver
4. Follow-up consults to be clearly defined
5. Telemedicine coordinator/ facilitator to be part of health worker-RMP flow

Expanding Access

Minimize healthcare inequity and barriers to access

6. Increase healthcare practitioner span
7. Inclusion of telemedicine in insurance
8. Use of remote instruments and technology
9. Patient consent for Telemedicine centers
10. Distribution of medicines for hinterland

Compliance & Sustainability

Tackle compliance issues and ensure long term sustainability

11. National registry for RMPs
12. Reporting of non-compliance
13. Guidelines for internal audit process

Sources: Industry interviews, BCG analysis.



Chapter 7

Implications for Providers

Chapter 7: Implications for Providers

Chapter Summary

Hospital industry in India accounts for approximately 50 to 60 percent of the revenue pool of the overall healthcare ecosystem – however, given the capital-intensive nature of business, and high input costs most players operate at very low margins. Even leading players have an average EBITDA margin of 5 to 8 percent. As result, we have seen limited expansion of tertiary care facilities in the recent past and a disproportionate focus on driving immediate profitability to sustain the business. With the implementation of an Open Digital Health Ecosystem (health ODE), we expect healthcare providers to benefit in 4 ways:

- Providers will have access to new demand pools as new digital delivery models will help improve patient access. Additionally, with OPD insurance becoming a viable product, we expect macro demand to remain robust for all providers. Hospitals will be able to extend their Out-Patient Department (OPD) services beyond current physical catchments by easily plugging in to the proposed NDHM tele - consultation network.

- We expect health ODE to improve utilization of physical infrastructure and manpower productivity. Digital will enable hospitals to offer dynamic pricing enabling them to modulate occupancy levels and drive improved unit economics. Doctors will further benefit from improved productivity with digital enabling them to serve more patients, in lesser time with higher clinical effectiveness.

- The basis of competition will change as providers will start to increase focus on delivering comprehensive value-based care vs focusing on immediate profitability. The Patient Health Record (PHR) framework as defined under the NDHM, will allow providers to have easy consent-based access to historic patient health records enabling faster and more accurate diagnosis. Hospitals will now be able to support patients through the continuum of care, handholding them in the post hospitalization phase as well. Further, best practices derived from aggregated and anonymized health data will allow for creation of industry wide standardized treatment protocols and guidelines allowing for improved clinical effectiveness.

- Lastly, hospitals will be able to drive improved margins as result of reduced administrative cost, higher utilization and increased demand. The standardized health registries will create unique digital identity for all stakeholders enabling operational ease on multiple fronts such as doctor on-boarding and regulatory approvals. Further the national claims engine will drive lower claim processing costs and faster payment turnaround – improving cash flows for providers.

In this chapter, we start with laying out the current hospital market landscape and highlight the existing challenges that hospitals face. We then explain how a heath ODE will positively impact hospital operations and open new opportunities for them. Finally, we lay out how hospitals can transition to a value-based model of care delivery and the key imperatives going forward.

A. Today: The plight of low operating margins and volume battles

The hospital sector has recorded annual growth of 12-14%[27] over the last 5 years. We expect this growth trajectory to continue, driven by secular trends: changing disease burden towards lifestyle diseases, improved patients' ability to pay, and rising medical tourism are all positive contributors to growth. That said, there has been little supply addition in the last three years despite the hospital beds to population ratio being lower in India than the global average and the WHO recommended standards.[28]

Setting up a hospital is not an easy process. It requires a high capital expenditure of 1-1.5 crore per bed, 2-3 years[29] of construction period and multiple regulatory licenses and approvals such as pollution clearance, clearance from Atomic Energy Regulatory Board (AERB)[30], drug/pharmacy licenses, Pre-natal Diagnostic Techniques (PNDT) certificate and medical waste management, etc.

Once the hospital is setup, achieving operational breakeven can take many years. Each hospital has to fight its own volume battle through empanelment with insurance providers (which come at 30%-40% discount to the cash pricing and has longer payback periods stretching up to 30 to 60 days[31]), investing in advanced technologies (often hospitals unnecessarily invest in robotic surgery and other high-end equipment to attract clinicians as well as patients), and building a reputation for themselves with the local doctor network.

In the absence of clear indications on clinical outcomes, patients tend to rely on word of mouth recommendations and availability of 'star' physicians to choose providers. This leads to providers paying disproportionately high salaries and incentives to these 'star' doctors to retain them. It is no surprise that manpower cost in a typical hospital can be as high as 40-50% of the revenue generated.[32] **With rents, wages and other operational costs on the rise and hospital chains losing their grasp over pricing, which is increasingly getting susceptible to regulations, most providers have struggled to maintain margins leaving hardly any funds for expansion.** Refer to exhibit 17 for details. As a result, hospitals tend to focus more on tertiary care procedures which typically have high contribution margins. They also seek methods for margin expansion such as opaque packages with additional billing, and disaggregating service charges (for example, room charges over time have been split into room, nursing, resident medical officer (RMO), diet and other charges).

[27] FY14-FY18 CAGR; source: India Hospital Sector Report, ICRA, September 2018

[28] Press releases, National Health Profile (2018), MoFW ebook (2014-18)

[29] Industry interactions

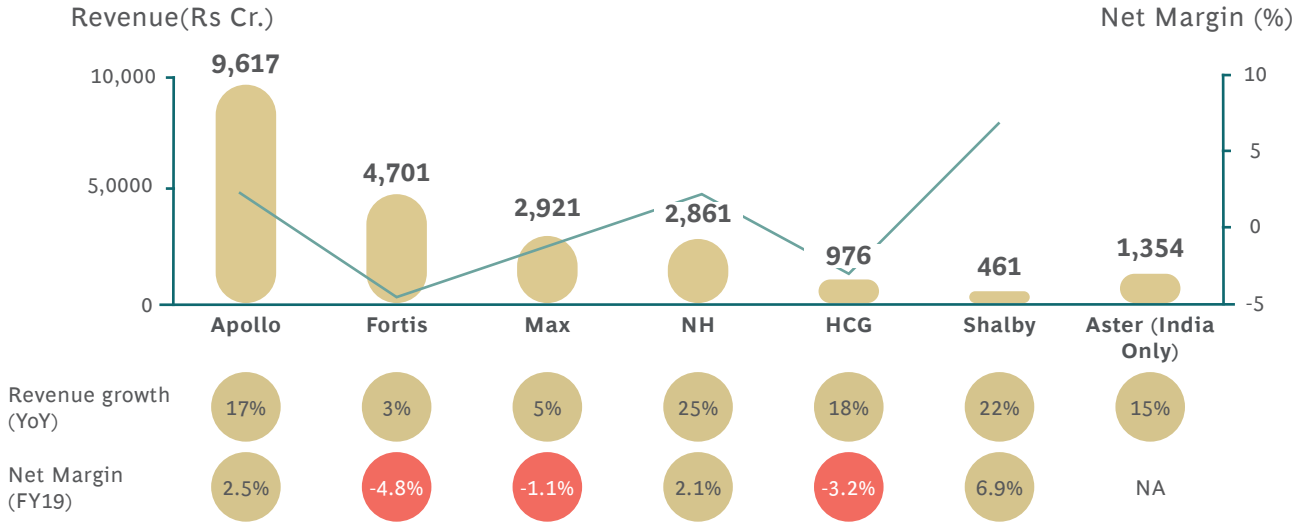
[30] It is mandatory for all users/owners of medical diagnostic x-ray equipment to obtain License/Registration from AERB for Operation of the equipment as per Atomic Energy (Radiation Protection) Rules 2004

[31] Industry interactions

[32] Company filings (quarterly and annual); Investor presentations; Press releases

Exhibit 17 | Most top Providers Display Healthy Topline Growth, while Operating Margins Continue to be in Single Digit

Leading Indian Hospitals – Revenue And Net Margins (FY'19)



*Many of these have turned negative in the last few months owing to the COVID crisis

Sources: Decision Resource Group.
Note: All numbers in mn cases for 2019.

While 10% of the hospital sector is served by organized players and chains, the remaining 90% is highly fragmented and unorganized. In this unorganized part of the sector, **large variances in practices and protocols are seen, and limited visibility exists for clinical quality**. The tariff nomenclature also varies significantly across providers. For example, while on the face of it, hospitals provide packages for total knee replacement (TKR) at comparable prices, there are significant variations observed in the number of hospitalization days covered and the pharmacy/ consumable limit contained in the two. This creates high information dissonance for the patients leading to decreased trust in the health system.

The other challenge has been around the lack of access to patient's comprehensive health records. There are over 500 software providers who provide Hospital Information Management System (HIMS) software to the hospitals. Yet the adoption percentage of electronic health records in India is in single digit, driven by the fragmentation and low digital penetration in the industry. This is in stark contrast to the adoption percentage of electronic health records in other countries like China (96%), Brazil (92%), France (85%), and Russia (93%).[33] Moreover, there is no way in the current system for patients to collate digital health records created across providers. **Patients end up maintaining these records in physical files, which often get misplaced, resulting in partial information being given to the provider. This in turn leads to repeated testing and consultations for arriving at a definite clinical diagnosis.**

As a result of the challenges discussed above, providers end up optimizing for the local optima which incentivizes for immediate financial gains through focus on procedure volumes and inflationary pricing. This in turn leads to providers not being focused on patient-centric solutions and improving patient health outcomes.

[33] Indian Journal of Science and Technology: EHR Adoption in India: Potential and Challenges, September 2016

B. Digital 3.0: Digital identity, interoperable systems and longitudinal health records

The advent of open digital health ecosystem will lead to a paradigm shift in the way healthcare is delivered by providers. It will provide multifold benefits to providers, notably,

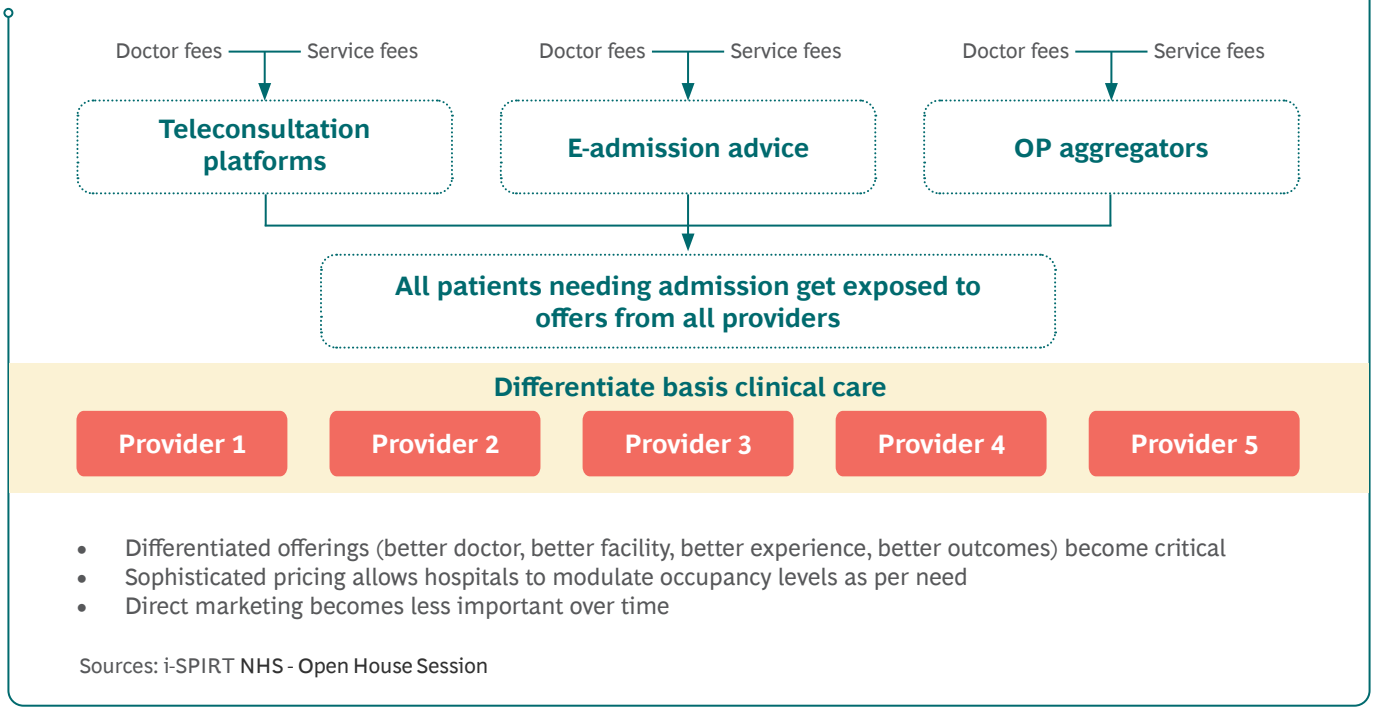
- **Unlocking new demand**
- **Better resource utilization**
- **Improved clinical effectiveness**
- **Reduced administrative burden**

Unlocking new demand

Approximately, 90% of the revenue of hospitals comes from treating inpatient demand (IPD).[34] However, hospitals have to fight their own OPD battle to ensure they create large enough a lead flow for IPD conversions. Given the low penetration of digital channels for providers, the immediate 'OPD catchment' currently is limited by physical touch points. Providers are investing significant time and resources to reach out to prospective patients.

A health ODE will create a digital identity for all providers, enabling them to participate and provide their services through digital platforms. The telemedicine gateway (as described in chapter 5) will enable the providers to plug into the gateway and get exposed to aggregated demand pools.

Exhibit 18 | A Common Digital Infrastructure Shifts the OPD Burden from Hospitals To Digital Platforms Allowing etter Resource Utilization



- Differentiated offerings (better doctor, better facility, better experience, better outcomes) become critical
- Sophisticated pricing allows hospitals to modulate occupancy levels as per need
- Direct marketing becomes less important over time

Sources: i-SPIRT NHS - Open House Session

[34] Industry interactions, company filings

Currently, there is no insurance coverage for OPD care given the high claim processing costs for the payors. The claims and analytics platform (as described in chapter 5) will reduce these costs significantly, making it viable for insurance players (both private and government) to offer OPD care insurance. This will result in a significant uptick in patient volumes and **increase the access to primary care and narrow the disease incidence to treatment funnel.**

Better resource utilization

Today, most hospitals in a specific location tend to index their pricing to their immediate "catchment competition". Conjecture-based adjustments are typically made on the basis of availability of 'star' doctors or the hospital's brand reputation. Moreover, while hospitals tend to maintain fixed prices for services, hospitals with low occupancy can potentially provide the last few unoccupied beds at a much lower price. It will also help them offset some of their fixed cost resulting in better margins. However, there is no conduit to enable such dynamic pricing today. Going forward, digital platforms powered by the open e-telemedicine network will enable fair search and discovery of providers for the patients. Patients will be able to take informed decisions on their choice of provider basis transparent parameters such as pricing, clinical efficacy, and others. It will also lead to providers charging rationalized and dynamic prices basis the clinical efficacy of the procedures, in order to acquire or retain target customers. **Hospitals will potentially be able to offer differential pricing basis occupancy, resulting in better utilization of facilities.**

With patients now exposed to accurate information across the full spectrum of providers and their clinical outcomes, value-based care will play a much larger role than brand/ availability of 'star' doctors to retain and acquire customers. Patients will be able to make informed decisions as they will have information transparency on the tradeoffs between clinical outcomes, pricing and other decision parameters. We believe this will lead to providers striving for better clinical outcomes and better treatment experience over any other parameter.

Improved clinical effectiveness

Unlike physical records, (that can often be misplaced and are unorganized), electronic records enable longitudinal view of patient health history. The PHR framework proposed under NDHB will enable physicians to access historic digital health records subject to patient consent. **This will facilitate more informed diagnosis and appropriate treatment regime while reducing the requirement of repeated testing.** Setups such as this also provides hospitals the opportunity to strengthen the patient-caregiver relationship by providing continuum of care beyond hospitalization events. Hospitals will be able to support the patients through the post hospitalization phase via active tracking of vitals, nudges for improved lifestyle choice, reminders for follow-up visits and handling exigencies in extreme cases.

Additionally, the analytics on aggregated and anonymized data from patient health records will allow for the emergence of robust clinical decision support systems to assist health providers in clinical decision making. It will also lead to emergence of improved triaging solutions. This will have multiple second level implications for providers, such as,

- Emergence of standardized treatment protocols, improving the minimum service quality across providers
- Emergence of algorithms that do efficient demand supply matching, enabling matching of appropriate provider to the patient basis need
- Ability to provide timely and appropriate diagnosis and cost-effective treatment solutions

Reduced administrative burden:

A health ODE will open up multiple opportunities to reduce administrative burden for the providers, such as for,

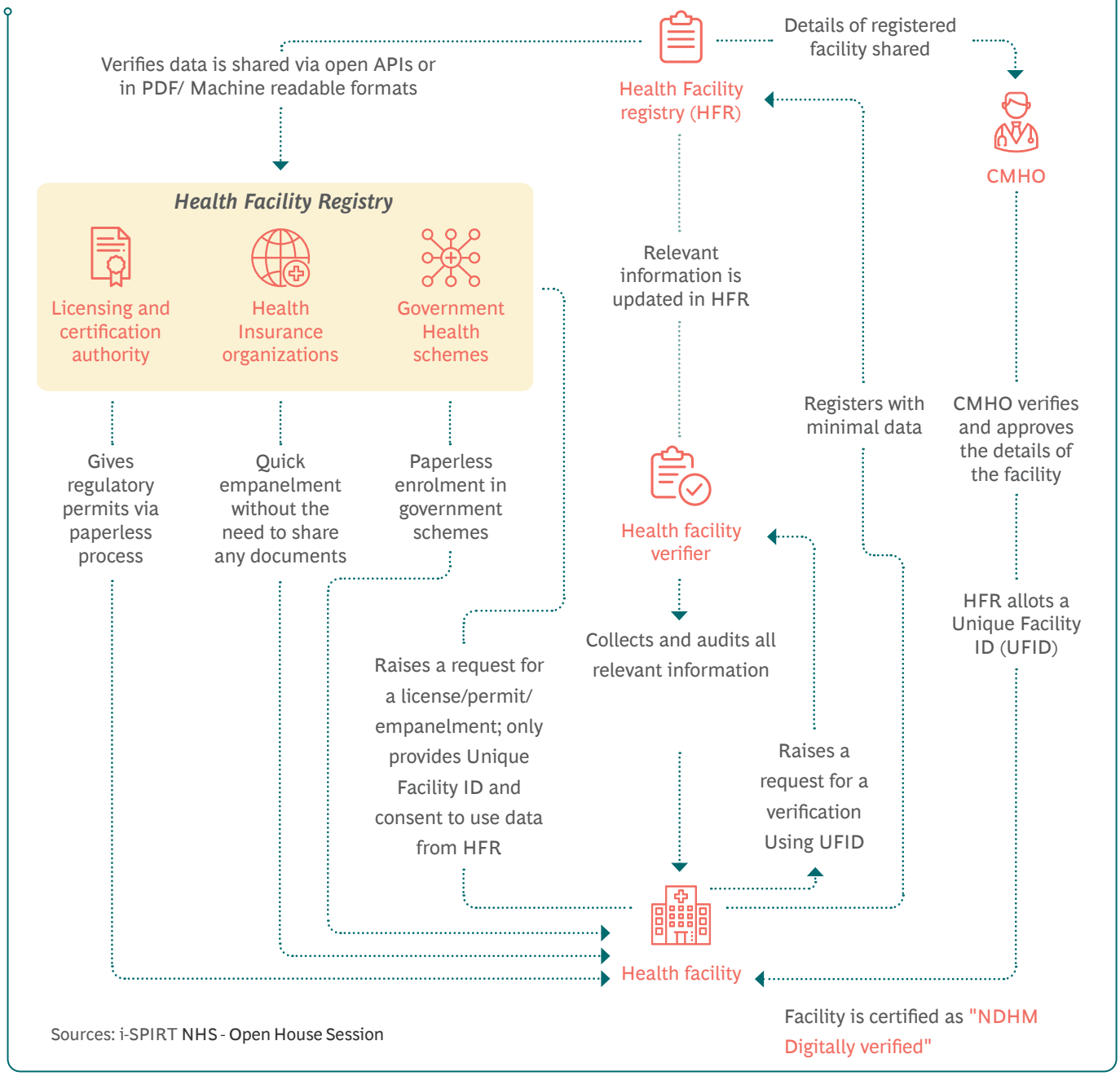
- **Doctor on-boarding: Today, doctors are registered across individual state councils.** There is also limited focus on incorporating updates from additional qualifications, training and certifications obtained by doctors during practice. This leads to significant administrative burden for the providers in sourcing the right doctors for their hospitals and adding specific specialty expertise in their service offerings. **The health ODE as envisioned by NDHB lays out the concept of health registries, which will be a single source of truth for all health workforce including doctors.** The doctors will be incentivized to maintain their updated information in their respective health registry, as it will enable them to access state medical council services, have a valid digital signature and attain professional indemnity with ease. **This same repository will be leveraged by providers to validate health workforce credentials, enabling easier onboarding of the health workforce. It will also help reduce quackery and fraud practices.**

- **Regulatory approvals and renewals:** Similar to the doctor registry, a centralized health facility registry will simplify administrative overheads for providers. **Instead of liaising with multiple regulatory representatives and maintaining multiple physical statutory documents, the process of regulatory approvals will start getting automated through the data maintained in the health facility registry.** The healthcare facility registry will contain comprehensive record for each healthcare facility in the country, accessible via a unique identifier. It will enable paperless empanelment to government schemes and private insurers by allowing a standardized e-facility record to be shared from the registry basis consent from the provider. **The registry will also enable providers to e-sign agreements, claim forms and payment related documents.** The facility registry will be available in a standard machine-readable format and will offer a set of open Application Program Interfaces (APIs) for individual applications to query, add, update and verify the data present in the health registry . Refer to exhibit 19 for detailed information flows. In order to make this process a reality, a new set of intermediaries or the health registry verifiers will be needed. The health facility registry verifier will collect and audit all the relevant information before updating the health facility registry. By design providers will be automatically incentivized to keep the registry up to date, given the administrative ease arising from its applicability.

- **Insurance claim processing: Today, hospitals have a time-consuming and manual process for having claims processed.** There is multiple back and forth of documents and processes vary across insurance providers. Different insurers have different data requirements and processes for claim filing. As a result, it becomes extremely challenging for providers to have end to end visibility on the claim process. With the claim process being mostly manual (automation largely to the extent of scanning documents), it takes anywhere between 30 days to 60 days for the claims to get processed, stretching short-term capital requirements for the provider.

- **The coverage and claims platform as part of the health ODE will standardize claim processing.** It will drive standardization of e-objects (claim forms, discharge summaries) across insurers, and all claims will be routed via central claims platform using these standard e-objects. It will also enable increased visibility on performance across pre-defined Key Performance Indicators (KPIs) of insurers, driving faster claim processing by insurers. In turn, **this will result in improved cash flows for the providers.**

Exhibit 19 | Digitals Systems to Reduce Administrative Burden on Hospital Operations

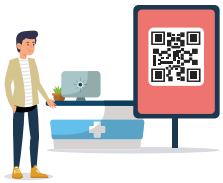


Sources: i-SPIRT NHS - Open House Session

As depicted in exhibit 20, this will transform the patient journey and patients will be able to get enhanced services from providers. A patient walking into a hospital will now experience a much faster turnaround time and get access to potentially better clinical care (with easy availability of historic medical records). As the ecosystem matures and there is improved visibility into the operational parameters and clinical outcomes of each provider, we anticipate that the basis of competition will also change. **Providers that are able to offer end to end patient care that is affordable, high quality and differentiated will have a better right to win.**

Exhibit 20 | Re-imagining the Hospital Experience with NDHM

1



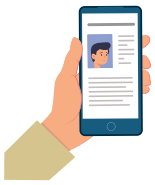
Patient walks up to a Hospital. He sees a Health ID QR code on the registration desk

2



They pull out their smartphone, launches PHR app and scans the QR code

3



The Hospital instantly gets accurate info about the patient including Health ID, Name, Age, Gender, Mobile.—No waiting!!

4



The Hospital sends a consent request to the patient requesting access their medical history

5



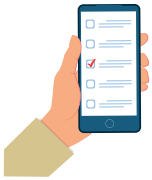
Patient chooses what data to share with the hospital and for how long the hospital can have access

6



Consulting doctor has full medical history of the patient available when they walk into the chamber

7



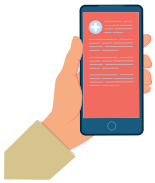
For insurance requirement, patient gets on the health claim platform – gets to see complete list of insurers – chooses most suitable one; single tap for pre-auth

8



Post treatment & before leaving the premises, patient gets a notification that their medical reports are ready

9



The doctor's treatment plan and prescription show up on their mobile & medical history is never lost

10



Patient provides consent to insurer for access to medical records; instant claim approval and payment transferred

Sources: BCG analysis.



08

Implications for Insurance Providers/ Payors

Chapter 8: Implications for Insurance Providers/Payors

Chapter Summary:

Currently, 63 percent of healthcare in India is financed through out-of-pocket (OOP expenditure. The health insurance penetration is low and limited largely to in-Patient Department (IPD) coverage. Given the high claim processing costs (including cost of detecting fraud) outpatient coverage is not an economically viable product for health insurers in India. In addition, the current process for adjudicating claims has multiple problems - there is high reliance on manual data entry / scanning, every insurer and provider uses their own claim object (discharge summary, claims form etc. and operates on disparate technology platform. This has resulted in average claim processing time to be more than 30 days. Going forward, with the implementation of the Open Digital Health Ecosystem (health ODE) we expect two major shifts for insurance players that will drive rapid penetration of health insurance in the country.

- We anticipate that claim processing will greatly simplify with the creation of a national digital claims engine. Standardized e-objects such as e-claim form, e-discharge summary along with standardized health registries will reduce cost of claim processing significantlyand improve margins for payors. This will also result in much faster turn-around times (instantaneous in many cases) and will improve the ability of insurers to detect and control frauds. Further, a common health claims engine, will simplify the process for payors to empanel and contract with providers (across public and private sector) on disparate technology platforms via a network of open APIs (Application Program Interfaces).

- Reduction in claim processing costs, faster turnaround time and better fraud detection will open a plethora of opportunities for insurers to launch new offerings and products. For example, Out-Patient Department (OPD) insurance will become viable. Innovative products where premiums are linked to patient health behavior will emerge. Insurers will be able to price premiums more accurately and customize basis patient behavior. This will lead to increased demand for health insurance and an overall expansion of the market.

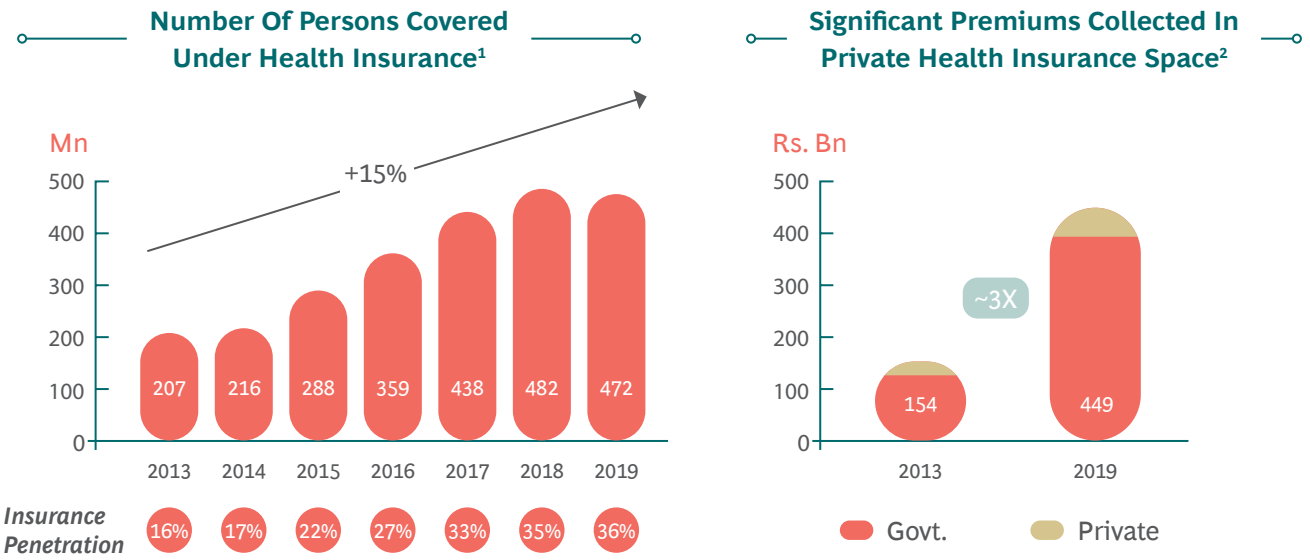
As a result, we estimate that the share of private insurers in healthcare spending will increase from the current 5 percent to about 8-10 percent over the next 10 years, decreasing the share of OOP expenditure.

In this chapter, we begin by laying out the current challenges faced by health insurance players in India. We then explain how a health ODE will impact the industry operations, paving the way for new opportunities. We conclude with suggestions on what insurance players can do to reap the benefits from new opportunities.

A. Today: Disparate data, multiple back and forth and high claim processing cost

Insurance is a vital cog in the healthcare ecosystem and necessary to ensure healthcare affordability. As illustrated in exhibit 21, this sector has seen tremendous growth in the last decade led largely by the increase in private insurance. A total of 18 million health insurance claims were processed in 2018-19 as reported by IRDAI. The announcement of PMJAY under Ayushman Bharat has further added impetus, extending secondary and tertiary care coverage to the bottom of the pyramid. However, as depicted in exhibit 22, **the claim processing today is a time-consuming process with high manual interventions leading to multiple challenges for the stakeholders involved.**

Exhibit 21 | Private Health Insurance Covers ~24% of Insured Population; and Contributes ~90% of Insurance Premium in 2019



Sources: IRDA annual reports.
1 Excluding Personal accident & travel domestic/ abroad insurance business.
2 Includes group insurance schemes (excluding govt sponsored schemes RSBY), Individual family floater, Individual other than family floater.
3 Including RSBY.

Below we detail some of these challenges.

- Most hospitals in India today don't have a Hospital Information Management System (HIMS) or the ability to generate digital records. Even if they do, the tariff nomenclature is inconsistent across these systems, leading to high inefficiencies when it comes to claim processing. Providers struggle with physical copies and manual data entry of records to raise a claim request, while insurers/ Third Party Administrators (TPAs) spend additional time and resources in identifying the relevant data points from the documents submitted and in scanning them to digitize records. This typically involves multiple rounds of discussions and back and forth between the two entities.

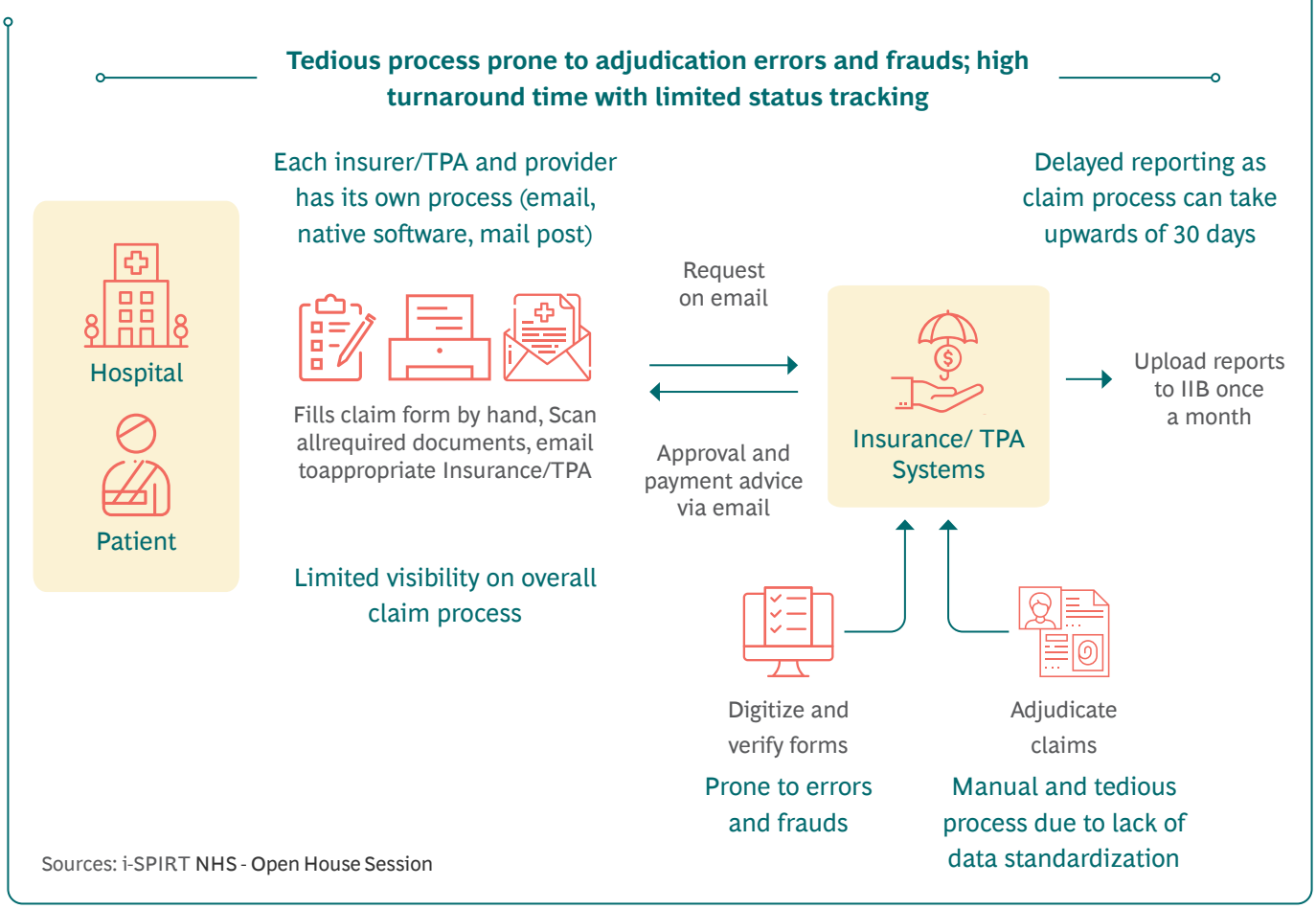
- To add to the complexity, each insurer/TPA has their own format of the claim form. It further increases administrative burden for providers in terms of managing different forms and keeping a track of where they are in the claim process.

- As far as insurers and TPAs are concerned, they are forced to go through a manual adjudication process which is prone to errors, impacting the turnaround time and limiting fraud detection.

[35] Industry interactions

Due to these challenges, the claim settlement process takes anywhere between 30 to 60 days from the claim being raised to the provider getting paid for it.[35]

Exhibit 22 | Health Claims Processing in India Today



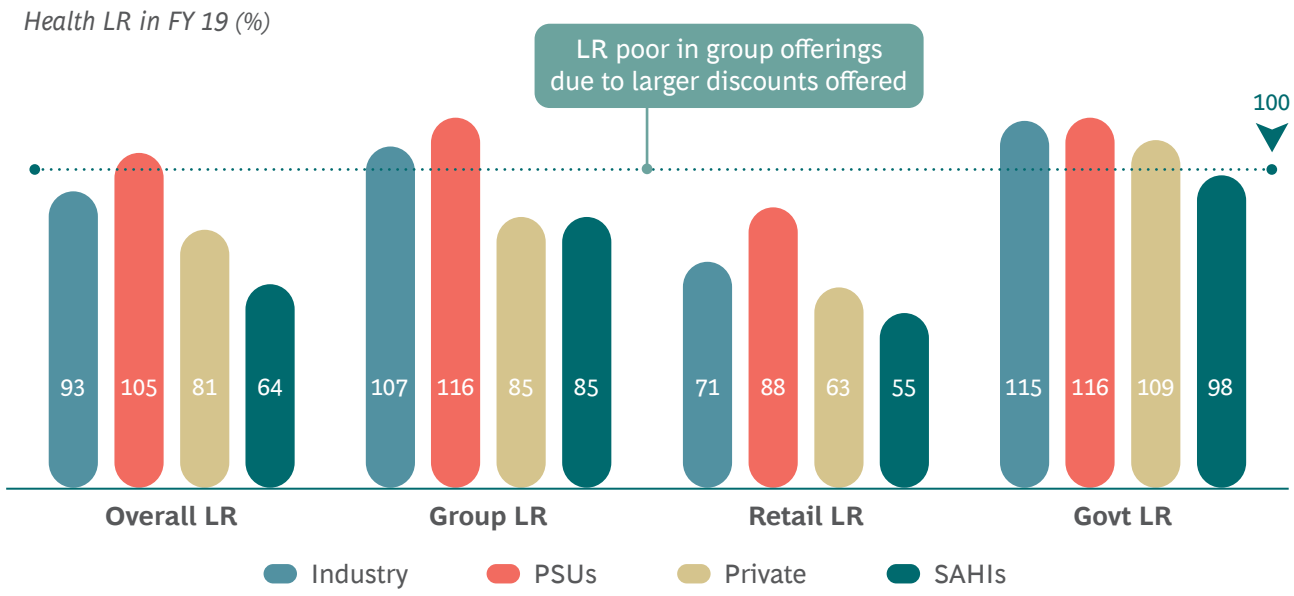
Sources: i-SPIRT NHS - Open House Session

Additionally, this complex and largely manual process adds significantly to the claim processing cost. Today, average claim processing cost in India is ~INR 500[36], rendering coverage for outpatient care and economically unviable. In addition, loss ratio across different insurers is not very healthy and further, 15% of the total health claims in the industry are fraudulent, resulting in the health insurance industry losing approximately Rs. 600- Rs. 800 crores annually - please refer to exhibit 23 for details.[37]

The industry needs to move to more scalable and digital solutions to reduce cost, increase reach and improve overall profitability. Multiple attempts at this have been taken in the past. FICCI, as the nodal agency for Ministry of Health and Family Welfare, GoI, coordinated the development of National Standard Treatment Guidelines for twenty specialties and covering nearly 280 conditions, to help promote standardization in clinical practice and ensure more predictable quality outcomes. The final guidelines were notified by the government in 2013 under the Clinical Establishment Act. Although these guidelines have been expanded and updated by the government, they have yet not been implemented across all the providers (public and private), which is imperative for the digital framework to be successful. In more recent times, post the announcement of the National Digital Health Mission (NDHM) and the release of the IRDAI NHA joint working group recommendation report in September 2019, a group of private insurance companies, TPAs and providers have come together under the banner of Swasth Digital Health Foundation to define standardized e-objects that can be leveraged by all payer groups across private and public sectors

[35]Industry interactions
[36]Industry interactions
[37]Insurance Institute of India, press release

Exhibit 23 | Loss Ratio Poor for PSUS and for all Players in Group Offerings; SAHIs have the Healthiest LR



Sources: IRDAI, General Insurance Council, Public disclosures, BCG analysis.
[1]LR stands for Loss ratio, expressed as a % of Net Incurred claims over Net Earned premium.

B. Digital 3.0: Common digital services for simplified claim processing

The health ODE under the National Digital Health Blueprint (NDHB) recommends standardizing the claim process across the disparate data systems of various payors and providers. It entails a digital intermediary (national claims engine) and standardized e-objects to ensure that there is seamless communication and data flow across the stakeholders.

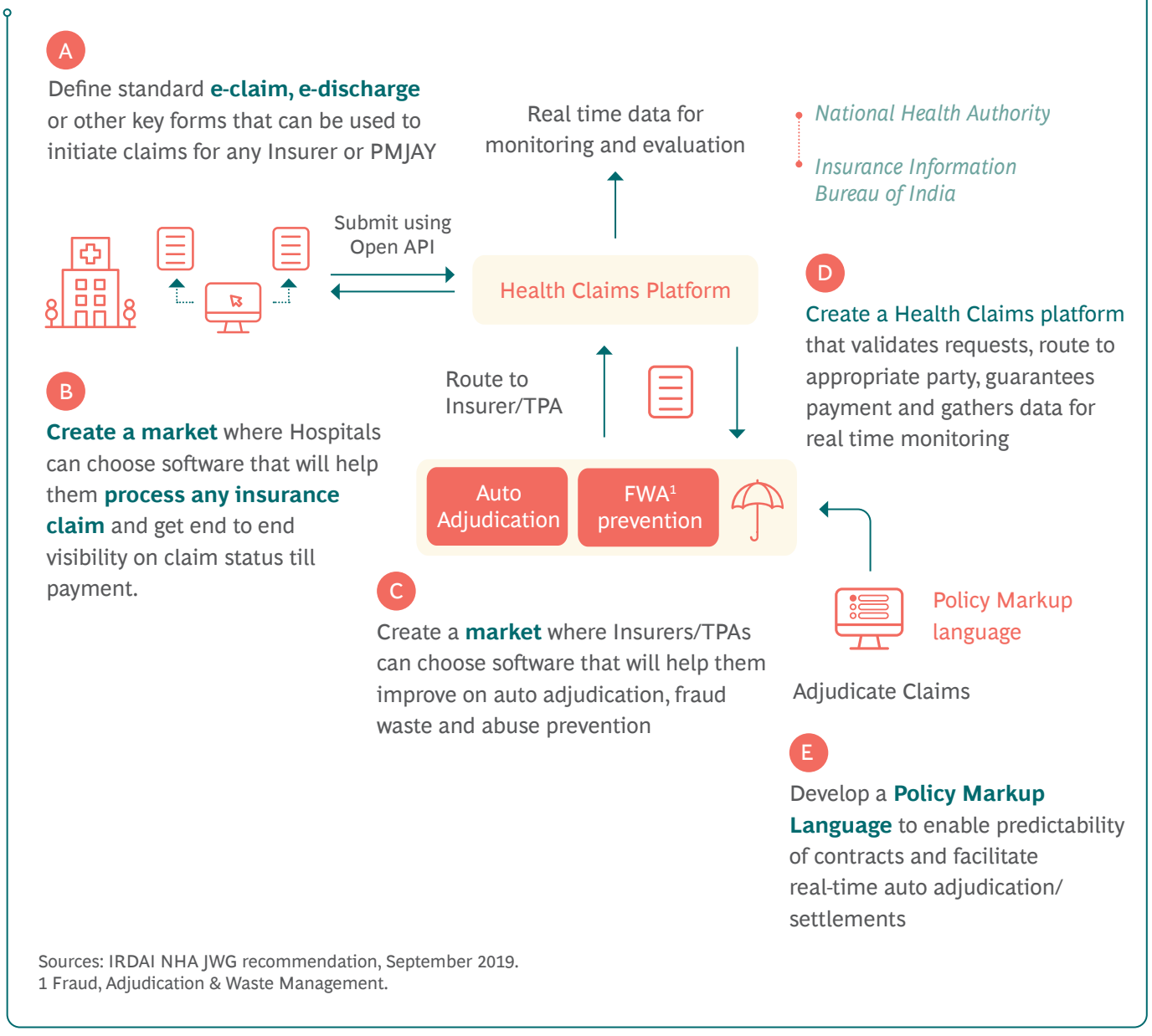
The key elements of the technology stack that will drive this system are the following:

- **Open Application Program Interfaces (APIs) and standards** available at no/minimal cost which can be adopted by any ecosystem player for claim processing and for back and forth information exchange with any stakeholder
- **Unique digital identity** for insurer, patients and providers allowing for secure authentication, digital contract management and fraud prevention.
- Standard policy markup language **for payors to describe key elements of their policy, allowing for easier and automatic validation of covered elements.**
- **Adoption of common e-objects** which captures the necessary data fields required for claim processing across insurers (public and private), reducing administrative burden for providers and simplifying the claim filing process.
- **Ability for providers to generate digital health records** of patients using a standardized tariff nomenclature and in a machine-readable format, making it easier for auto adjudication.
- **A health claims platform** to route all the claims, allowing for real time monitoring of Key Performance Indicators (KPIs) of payors

- **An analytics engine** allowing analytics on aggregated and anonymized non-personal data, enabling development of improved policies and risk models for payors.

As depicted in exhibit 24, **with the implementation of the principles highlighted in NDHB, a new and more efficient flow for claim filing and processing will emerge.** It will have providers preparing the e-claims form based on a common tariff nomenclature as per agreed standards and submitting it to the health claims platform. The health claims platform will provide standardized digital services via open APIs for claim processing. It will help validate the incoming e-claim, route it to the appropriate payor for processing and collect minimal data for real time reporting to IRDA for monitoring and evaluation. All communication between the payor and provider will be routed through the health claims platform allowing for non-repudiability and building trust in the process. Furthermore, given the health claims platform will be working with both the providers and payors, it will enable easier empanelment between the payor and the provider and allow for new intermediaries that support in digitization of providers and payors to thrive.

Exhibit 24 | Common Digital Services to Simplify Claims Processing



Sources: IRDAI NHA JWG recommendation, September 2019.
1 Fraud, Adjudication & Waste Management.

However, this will require significant efforts from both the payor and provider front to come together and align on a common set of protocols and standards which can drive functioning of such health claims platform.

C. Future: Operational efficiency through faster claim processing and easy fraud prevention

We believe that this new claim process spells multiple benefits for the insurance players, notably,

- **Quicker and cheaper claim processing**
- **Expanded coverage through innovative products**
- **Fraud prevention and better risk models**

Quicker and cheaper claim processing:

With the entire claims process being paperless and codified in machine readable data formats, it will enable faster and cost-effective validation of claims. Quicker turnaround times for payments and end to end visibility in the process will help reduce significant administrative burden for both providers and insurers driving improved unit economics. Further, with a common vocabulary in use across the ecosystem, insurers will be able to drive significant cost reduction in the adjudication process.

Expanded coverage through innovative products:

As discussed in the above sub-sections, the high claim process cost (upwards of INR 500) makes it unviable for payors to offer OPD coverage as an insurance product. With the national claims engine and a robust registry infrastructure, the claim processing cost and time will potentially reduce manifolds. This opens opportunities for insurance companies to provide new products such as OPD cover. Additionally, with insurers now having better view on claim analytics and consent-based access to personal health records of patients, they will be able to price premiums more accurately incentivizing for better health outcomes.

Multiple insurance systems across the globe have deployed such innovative offerings. While some have provided people with incentives to improve their health through gym memberships, discounts on healthy foods, and other awards based on the achievement of personal health goals, others have rewarded their members through lowered annual premiums, free travel, and other perks. Electronic health records allowing for longitudinal view of patient history will facilitate introduction of such products in India as well, driving better health outcomes for the country . The current share of private insurers in healthcare spending stands at approximately 5 percent. **We anticipate that with the increased system efficiencies allowing for cost effective and innovative insurance products, share of private insurers in healthcare spending should improve to about 10 percent over the next 10 years. Further, with the Ayushman Bharat scheme now getting extended to a large population base - it will drive improved appetite for private health policies as well**.

Fraud prevention and better risk models:

We believe that consented access to patient health data and a digital identity for all stakeholders allowing for easy authentication will lead to the development of robust fraud, waste and abuse prevention systems. Additionally, analytics on aggregated and anonymized data will allow insurers to develop better risk models leading to innovative product offerings across disease groups. Improved risk models will also drive more accurate premium pricing and niche pricing models basis specific health parameters.



Chapter 9

Implications for Pharma

Chapter 9: Implications for Pharma

Chapter Summary

Today, most players in the Indian pharma industry have average gross margins of 65-70% with an EBITDA of 25-30% and have been consistently growing at 10-11% over last 20 years. Going forward, we foresee four key implications of the Open Digital Health Ecosystem (health ODE) for pharma players.

- Macro demand will be robust driven by higher awareness on health, increased access and affordability of care. Disease incidence to diagnosis funnel will become narrower across therapeutic areas driving robust volume growth for pharma companies.

- Digital will be a core part of the new operating model. Newer innovative digital techniques will be deployed to engage doctors and drive prescription growth. We also expect direct to patient models to emerge driving better adherence of therapies and improved clinical outcomes. Pharma companies will have to be agile in making this transition towards digital, otherwise they risk losing market share and value pool to other entrants in the ecosystem.

- We expect pricing pressure to increase with increasing power of payers and creation of a standard drug registry and industry wide prescriptions protocols. Over time, we will see a potential shift towards lower cost generic-generics. Scale economies will be crucial, and basis of competition will start moving towards cost vis-à-vis brand

- As the prescriptions gets digitized across the industry, substantial amount of high-quality health data will be generated. Judicious use of such aggregated and anonymized data will help expedite clinical trials and research. Over the next two decades India can potentially emerge as a global research and development hub in addition to being the manufacturing hub that it already is

In this chapter, we start with describing the current pharma landscape, including its complex and unique dynamics. We then lay out the four key implications that a health ODE will have on the pharma industry, including what the pharma players can do to benefit from the new ecosystem.



A. Current landscape

The Indian Pharma industry has more than 2000 registered players in the organized sector. Top 17 companies have 51% market share followed by a long tail of players who have strong regional play . The market is dominated with branded generics (68% of Rx volumes) followed by generic generics (28% of Rx volumes). Increased regulatory oversight and margin capping on pharma products have added significant burden on the margins of pharma companies. 24% of all pharma products currently sold in India are under price control. In addition, Indian pharma companies have a vast untapped market to serve - given the significant drop off in the patient funnel from disease incidence to treatment. As the ecosystem starts moving towards digital, we expect the current operating models to be significantly challenged and new entrants will try and capture value pools that pharma companies have traditionally owned. There will be a potential re-balancing of power and players that are better suited to compete in the digital world will have a better right to win.

B. Key themes that will emerge with the implementation of the health ODE

With creation of the public digital infrastructure by NDHM, we see emergence of four themes for pharma companies.

Robust demand will continue to drive volume growth

Digital will be a core part of the operating model

Rebalancing of power in the value chain will lead to margin pressure

Higher focus on R&D for innovation will become a possibility

Robust demand will continue drive volume growth

As depicted in exhibit 25, **today we see high drop offs in the patient funnel from disease incidence to treatment.** Even for disease such as hypertension and diabetes, which are chronic diseases with high potential of aggravating to tertiary care events (if not controlled early), we see the incidence to diagnosis funnel having a drop off of 50-60%, and diagnosis to treatment funnel having a drop off of 18-37%.

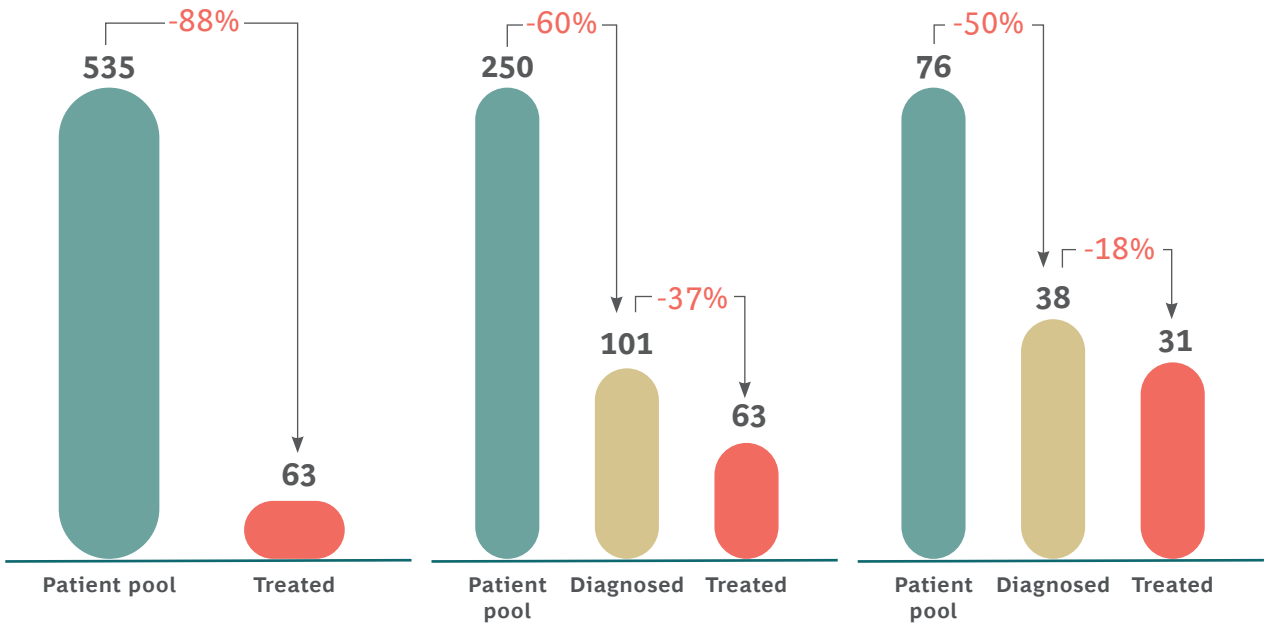
With the rise of digital platforms, healthcare accessibility will improve. Further, with the national claims exchange and standard e-objects as discussed in chapter 8, outpatient care insurance products will become viable for payors. This is likely to drive higher focus on preventive and primary care among patients and we anticipate that patients will start becoming more involved in their treatment journey and start seeking early clinical advice. Macro demand will be robust as the disease incidence to diagnosed gap gets bridged through better access and affordability. The market will expand for pharma companies bringing in new demand pools which till date had relied on informal alternative forms of treatment. We anticipate that annual volumes will incrementally grow by 200 to 250 basis points over the next decade as the health ODE gets implemented by NDHM across the country.

[38] AIOCD Database

[39] BMI; Marketline; BCG analysis

[40] AIOCD; NPPA; Press search; BCG experts; BCG analysis

Exhibit 25 | Patient Funnel: Dyslipidemia, Hypertension and T2D



Sources: Decision Resource Group.
Note: All numbers in mn cases for 2019.

Digital will be a core part of the operating model

Pharma companies have thrived on their ability to build relations with prescribers with a large feet on the street and their ability to promote brands inside the doctor's clinics. As prescribers start adopting digital platforms, we believe in-person detailing strategies will need to evolve – digital engagement using a data driven approach will be critical to drive engagement with prescribers. Newer innovative techniques of using digital will need to be deployed to capture attention of the doctor. Three key imperatives for pharma companies:

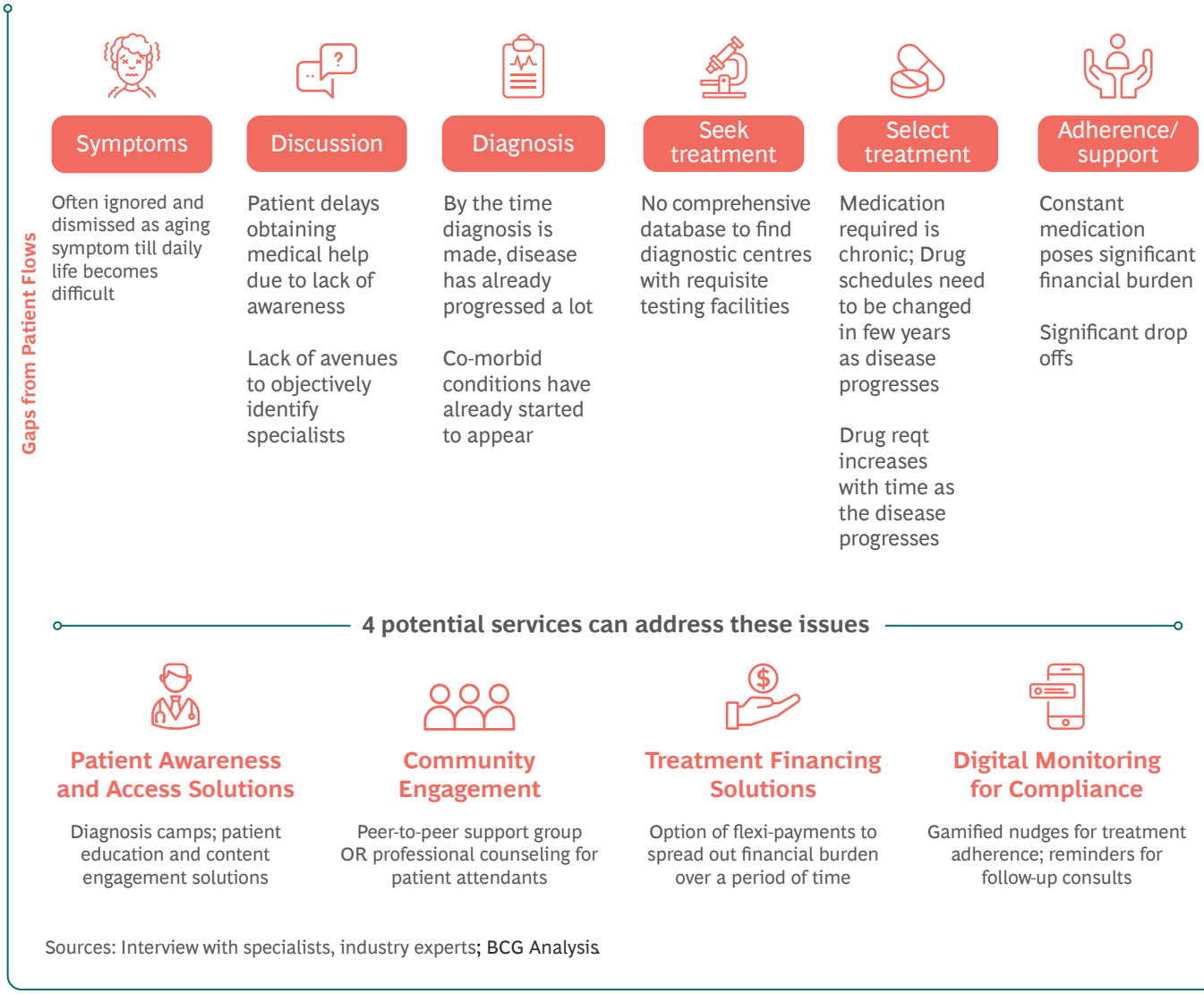
- Existing marketing strategy will need to be augmented with digital to create differentiated 'phygital' engagement plans. Companies will have to start investing in analytics to map 360-degree view of prescriber needs and leverage such data to create effective and personalized engagement strategies.

- Pharma companies will need to create their own proprietary digital engagement platforms that support field force interaction with prescribers. These proprietary digital platforms should have content personalized at the individual doctor level, allow for peer group discussions/ KOL (Key Opinion Leaders) connects and online certifications/CMEs from reputed associations. In our opinion, such a digital platform will strengthen field force-doctor relationship and ensure that there is effective and relevant engagement.

- Beyond the pill initiatives: We expect direct to patient models to emerge as new digital delivery models will make it economically viable for pharma companies to directly connect with their patient base, across chronic and acute therapies. Pharma companies can consider engaging with their patients and prescribers through an integrated patient consultation platform, which will not only help build brand affinity among the prescribers, but also allow for integrated patient solutions. **For instance, pharma companies can provide prescribers with a platform that can be white labelled under the doctor name. This will be a substantial value add for doctors as it will allow them to give a**

differentiated offering to their patients and improve overall patient satisfaction and therapy adherence (via gamified nudges and refill reminders). This will improve overall clinical outcomes and will benefit the patient and the doctor community at large.

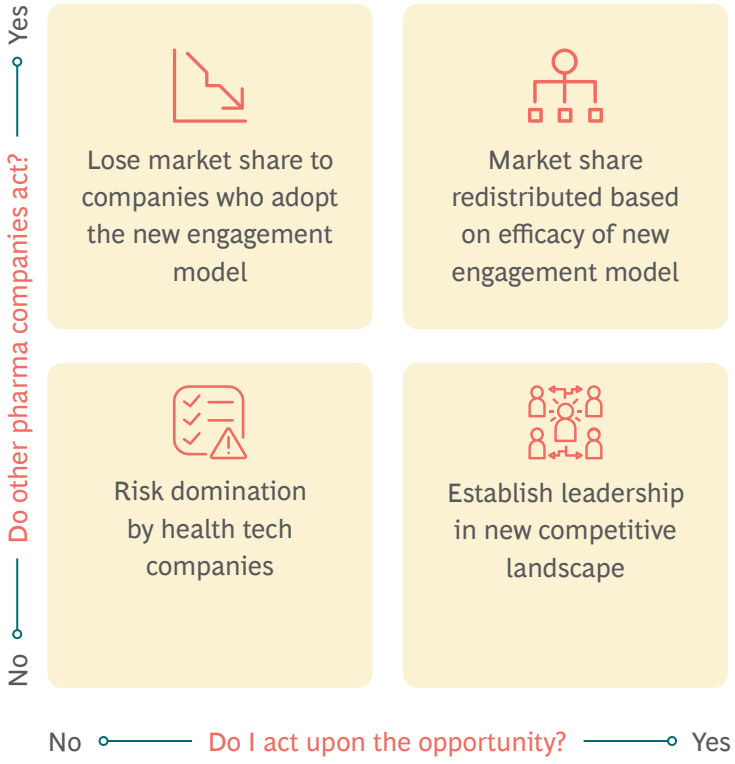
Exhibit 26 | Creating 'Pill+' Differentiation Through Value Added Services in Contrast to Drug Alone Will Drive Patient Stickiness



Sources: Interview with specialists, industry experts; BCG Analysis

We believe that pharma companies that can adapt their marketing strategies to include digital as a core part of their tool kit, will have better competitive advantage. For details refer to exhibit 27. Additionally, increased adoption of digital for prescriber engagement will lead to reduction in field force cost and optimize marketing spend (with increased information transparency). Anonymized data generated from these digital engagement platforms will create significant unlock and provide actionable insights into doctor-patient behavior beyond field reported information. Information at a brand, molecule level will be available to allow for creation of sharper marketing strategies.

Exhibit 27 | Embracing the New Digital Engagement Model Logical Option for Pharma Companies



Digital penetration and online consultations will grow

- Most doctors & patients comfortable with tele-health; 70% drop in physical OPD visits; Traffic originating from 2000 towns
- Health tech players saw a 100% increase in adoption in last 4 months; 3X increase in number of sessions for each user

Time to market important

- Several health tech companies trying to find ways to capture market
- Important to provide integrated experience driving Rxer and patient engagement

Need to be ahead of the curve

- Most pharma companies thinking incrementally
- Existing offerings are "one size fits all"; scope for "n=1" personalization

Sources: BCG Analysis

Rebalancing of power in the value chain will drive margin pressure

- With significantly lower costs of production and a robust manufacturing network in the country, pharma companies today have average gross margins of 65 to 70 percent and an average EBITDA margin of 25 to 30 percent[41]. In addition, there is strong dependence on physical channels for distributing drugs and the channel (stockist and retailer) currently has a healthy margin of approximately 25 to 30 percent[42] for holding inventory and providing credit.

- **Digital will potentially enable new channel disruptions allowing health tech startups to play a much bigger role in the overall value chain.** We believe that the current tussle seen between e-pharmacies and the chemist bodies representing traditional retail channels is just a precursor of the true disruption that is about to follow. It is no surprise to see companies with access to large captive customer base such as Amazon and Reliance already making moves to capture a share of the pie. As digital platforms become mainstream, we believe that the pharma companies potentially risk losing the control they traditionally have had on physical prescriptions and on the physical channel - unless they re-invent.

[41] Industry interactions, company filings
[42] Industry interactions, BCG analysis

We believe that health tech start-ups will gain importance and could potentially be in a better position to command value unless pharma companies alter their current commercialization model. **It will be imperative for pharma companies to make digital a core part of their go-to-market model to stay ahead of the curve and avoid new entrants from capturing existing value pools.**

- **We also expect the power of payors in the value chain to grow and this will potentially create pressure on margins for pharma companies.** A national claims exchange will significantly reduce cost of claim processing and make OPD insurance a viable product (as explained in chapter 8). We anticipate OPD insurance penetration (private, public and government) to rapidly increase over the next 5 to 7 years. This will potentially accelerate shift towards generic-generics market vs the current branded generic market. Over the next decade, we expect payors to have a higher say in the drugs that are reimbursed under OPD insurance cover and this will potentially create pressure on pricing and a shift towards INNs.

- **With pressure on margins as a result of the shift towards generic-generics, it will be critical for pharma companies to ready themselves by optimizing their cost structure.** Economies of scale will become critical in keeping operating costs low. We anticipate that companies that are better able to control their costs will grow bigger and thrive in the new era. **Cutting down on the overheads, rationalizing operating costs and optimizing field force to create the right balance between physical and digital prescriber engagement are a few things that pharma companies need to focus on to protect margins.**

Higher focus on R&D will become a possibility

Lastly, **India today does close to 4 billion OPD visits per year[43].** With the open digital health ecosystem driving improved access and affordability, this is expected to only increase drastically over time. **Digitalization of the prescription and the aggregated and anonymized health data generated through it will be unlike any other dataset that is available in the world today.** We believe that analytics on this anonymized and aggregated data will federate biomarkers and can yield gargantuan benefits for the country by accelerating clinical trials and research. It can transform India into a research hub over the next couple of decades.

- **Clinical Trials and Research:** Clinical trials are costly and time consuming to run and pharmaceutical companies want to ensure that they have the right mix of patients for a given trial. Availability of patient health data can assist in identifying the appropriate patients to select for a trial (through analysis of demographic and historical data). It will also enable remote patient monitoring, reviewing previous clinical trial events, and even identification of potential side effects before they become a reality. With further advancements in health data analytics, pharma companies will be able to easily identify niche population segments to help speed up the time spent on clinical trials and thereby reduce the cost incurred on it.

- **Drug discovery and development:** Over a longer term, as the ecosystem increases the usage of digital platforms and availability of aggregated quality health data becomes available, new opportunities for Indian phenotype-based drug development will become viable.

[43] Source: India HMIS (Health Management Information System), Key indicators of social consumption in India: Health, NSS 2017-18, BCG analysis



Chapter 10

Implications for Government

Chapter 10: Implications for Government

Chapter summary

The Indian government has multiple roles in the healthcare sector today. It is a provider of health services through public health facilities, a payor for the health services through insurance schemes such as Pradhan Mantri Jan Arogya Yojna (PMJAY), and a regulatory body with policy decision making power. In the future, we see three big imperatives for the government:

- The role of the government will expand to building common playgrounds that can be leveraged by all entities, public and private, to build innovative patient centric solutions. This will enable the government to bring all healthcare stakeholders together and provide them a platform to collaboratively work towards improving India's health system.

- Government's processes as a provider and payor of health services will get streamlined, resulting in better utilization of funds. It may also innovate on public private partnership models, for instance piloting population health management models, where a consortium of public and private providers is rewarded based on health outcomes of a defined catchment area.

In this chapter, we start with laying out the challenges in the current healthcare delivery landscape and the issues faced by the Indian government in providing affordable and quality healthcare to its citizens. We then detail how an Open Digital Health Ecosystem (health ODE) will streamline government processes and help the government in improving healthcare delivery in India. We conclude by describing the steps that the government will have to take to ensure the successful implementation of health ODE.



A. Today: Inefficiencies and lack of co-ordination among players in the healthcare ecosystem

The Indian government is responsible for the overall health outcomes of the country and has a mission of achieving the Sustainable Development Goals (SDG) of good health and well-being for all Indians by 2030.[38] **However, it is currently struggling in its journey due to multiple inefficiencies and siloed functioning of stakeholders in the healthcare ecosystem.**

Issues faced by the government as a regulator and policy decision maker

- The current Indian healthcare market is highly fragmented. For example, more than 64 percent of all health services provision is done by small health service providers and more than 98 percent of all health service providers in the country have less than 10 employees.[39] I**n the absence of a credible repository of information on healthcare providers and various other stakeholders in the ecosystem, it becomes difficult for the government to ensure accountability and prevent fraud.** For example, a lack of reliable source on health workforce today leads to quackery.

- Additionally, multiple stakeholders such as the government, private health facilities, insurance companies, pharmaceuticals, and health tech start-ups are working in silos with limited coordination and collaboration among each other. Often, stakeholders are also subject to contradictory incentives. For example, private providers focus on volume-based care to maximize profits while the payors focus on rationalizing their payouts and managing their own float**. As a result, stakeholders are currently not working towards patient-centric care and improving patient health outcomes.**

- **Lack of appropriate and reliable data also makes it difficult for the government to assess the impact of various interventions and schemes, inhibiting effective policy decision making.**

Issues faced by the government as a health provider and a payor

- **In addition to limited collaboration among different stakeholders in the ecosystem, there is also a high level of verticalization within government departments** – with multiple disease programs working in silos leading to inefficiencies at the last mile. For example, many states have 50+ disparate health data systems being used across their public health departments. Many of these systems have similar objectives and capture information of the same beneficiaries. However, due to limited interlinkages, front-line workers often need to populate the patient data multiple times across different systems. Consequently, the process is highly inefficient and leaves the workers with little time to deliver health services. This, coupled with the difficulty of having a single patient view across the disease programs, compromises the quality of care delivery .

- **There are also limited interlinkages between the line-list beneficiary level portals (for example, the Reproductive and Child Health portal) and aggregate level portals (for example, Health management Information System),** even though these portals capture information on similar health indicators. This causes a high level of data discrepancy making it difficult to govern interventions and ensure accountability of healthcare workers. Additionally, disparate data systems also make it difficult to effectively implement government schemes. For example, there was limited enrollment in the first wave of PMJAY scheme, due to lack of streamlined beneficiary records.[40]

- **Additionally, there is limited co-ordination among the different levels of facilities within the**

[38] Source: National Health Policy 2017

[39] Niti Aayog: Health system for a new India: Building Blocks, November 2019

[40] Source: National Health Authority

government infrastructure. Many of the government health facilities do not capture beneficiary level data of care delivery. Further, data systems linking beneficiary data across the different health facilities are almost non-existent. As a result, it is difficult to keep track of patients and provide follow-up care, hampering continuum of care and wellness focused health care delivery. Also, due to broken referral linkages and processes, patients end up zigzagging across multiple facilities delaying the treatment and increasing health expenditure.

As a result of these challenges, there is increased inefficiency, duplication of effort, and potentially sub-optimal care being provided to patient.

B. Digital 3.0: Interoperable systems and single view of the patient

One of the most significant use cases of the health ODE is the ability to enable diverse health programs, stakeholders, and data systems to co-exist and exchange information. This creates an opportunity to provide a holistic and consolidated view of the patient and ensure best-in-class health care delivery. It will provide multi-fold benefits to the government, as a provider and payor of health services, notably.

- A common digital backbone will not only allow a single view of the patient across various government disease programs and government schemes, but also across interactions with public and private health facilities, pharmaceutical companies, and other stakeholders. **With all patient data available in a consolidated and conveniently accessible form through patient's consent, government health providers will be able to provide improved health services to the patients.** For example, a patient will not need to visit the primary health center multiple times for availing services across different disease programs. **Additionally, it will enable effective implementation of schemes.** For example, with a single patient view, it will become easier to reach beneficiaries, that many a times, are same across multiple schemes.

- Interoperability will enable seamless communication across various stakeholders, irrespective of the data system they are using. **As a result, referral linkages and processes will get strengthened not just among government facilities but also among the entire ecosystem of government and private health facilities.** Government healthcare providers will be able to track patients as they receive services across multiple levels of care, do timely follow-ups, and provide post-intervention care. This will result in wellness focused and comprehensive care delivery. It will also lead to the efficient implementation of schemes on the ground. For example, private hospital empanelment in PMJAY scheme will become faster.

  For further implications on the government as a provider and a payor of health services, refer to section 7 and 8 of the report.

Two other important components of the health ODE are the "health registries" and the "health data analytics platform". These will help address multiple challenges faced by the government as a regulator and policy decision maker, notably.

- Health registries for all stakeholders in the ecosystem such as health workforce, health facilities, insurance companies, and pharmaceutical companies will act as a single source of truth. This will enable the government to ensure transparency and accountability among the stakeholders.

- Policy makers and researchers will have better access to quality data and analytics. This will improve their understanding of the effectiveness of various government schemes and lead to better monitoring of indicators across demographics and geographies. In turn, this will help the government in improved decision-making. **Policy makers will be able to improve policy design, better target the government schemes, and improve the reach of the schemes, thereby enhancing health care**

delivery. However, in order to make this a reality, the government will have to facilitate a comprehensive feedback loop among researchers, policy makers, and health service providers.

C. Future: Changing role of the government

The Indian government has already taken several strong steps towards "comprehensive care" and wellness-focused care delivery through the Ayushman Bharat scheme. This is a solid foundation on which a world-class health system can be crafted by leveraging the health ODE platforms. This will create a plethora of opportunities for the government to leapfrog towards universal health coverage.

To ensure the success of a health ODE in India, the government will have to expand its role from a provider, a payor, and a regulator to also being a key intermediary in the healthcare ecosystem. It will need to facilitate collaboration and coordination across various stakeholders and nudge them towards the common goal of improving patient health outcomes.

We detail below the government can expand its role:

- **While the government usually assumes the sole responsibility for providing access to essential health services, in the 3.0 era, it can also partner with private players to enhance delivery by building user-facing applications on top of privately built open platforms.** It can leverage the expertise of private players and combine it with its own advantage of scale and reach to provide improved patient experience.

- **The government will be responsible for building health technology infrastructure that public and private bodies can leverage to build innovative solutions for patients.** This role arises from the need for collaboration between public and private sector actors to unlock innovations with each party undertaking those tasks that are best suited to their own capabilities.

- **The government's regulatory role will expand.** The government will have to establish and enforce a robust governance framework that includes rules related to openness, interoperability, data monetization and sharing, data privacy and security, etc. These rules will help avoid risks around exclusion, unfair value capture, and violation of individual privacy as well as provide mechanisms for grievance redressal and legal recourse.

- **Co-operation between the Central and the State governments will be integral for the success of the health ODE.** While the Central government will create the overall framework for the implementation of the open digital health ecosystem, the State governments will have to ensure effective on the ground implementation.

- **Adoption of digital practices by all stakeholders in the ecosystem is a precursor to the success of a health ODE.** Accordingly, the government will have to deploy schemes or policies to incentivize all stakeholders in the ecosystem to use digital platforms.

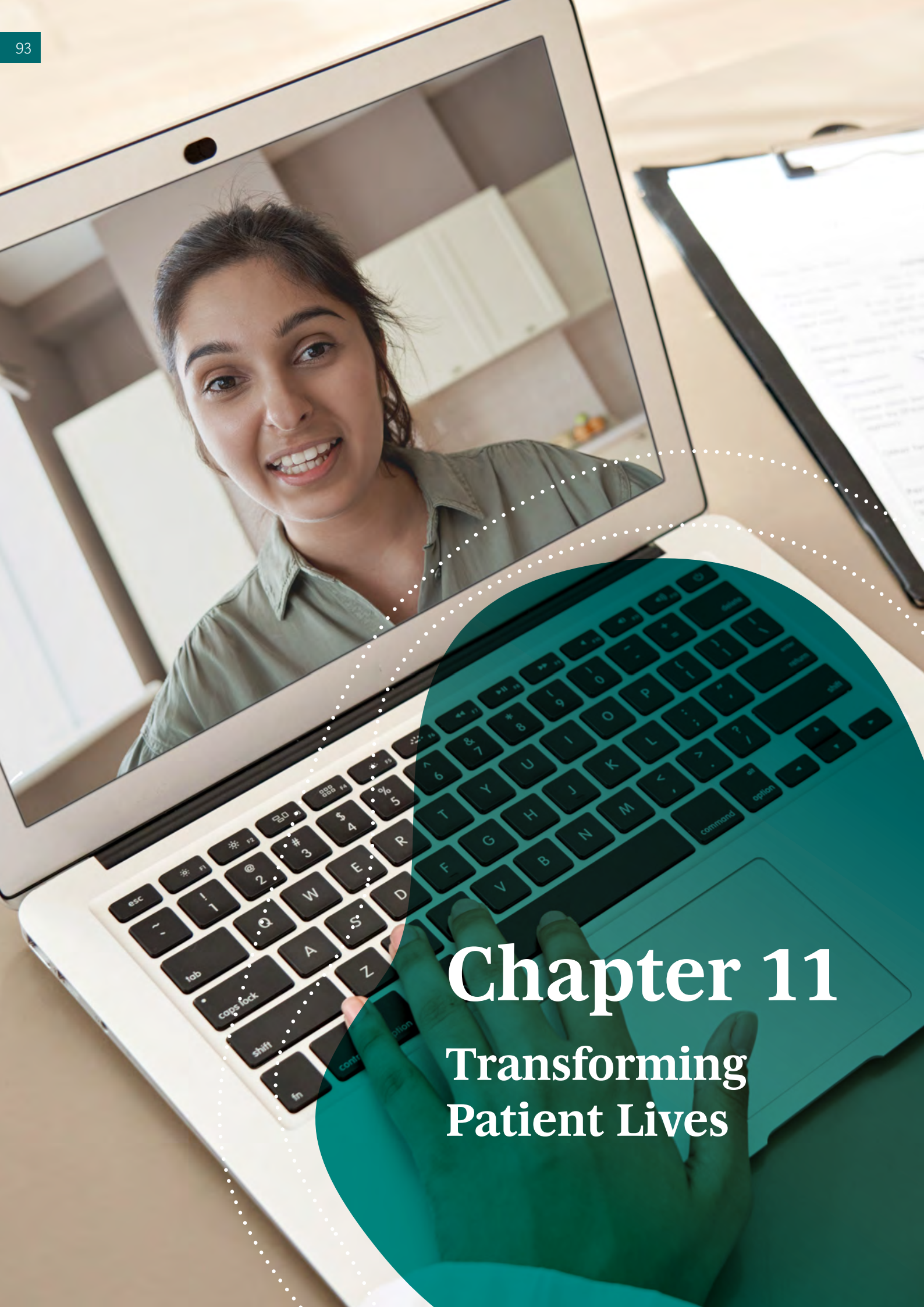
Ideas that the government can explore to incentivize the adoption of health ODE in the healthcare ecosystem.

- The National Highway Authority of India (NHAI) had introduced a cashback of 2.5 percent to users upon the use of FASTag for toll payments.[41] A similar approach can be explored by the government for the uptake of digital prescriptions. For example, the government can provide cashbacks to patients upon purchase of drugs made through digital prescriptions. Consequently, when patients demand providers for digital prescriptions, they will be incentivized to upgrade to digital practices.

- The government can decide to make digital prescriptions mandatory for processing PMJAY claims. However, for the government to expand the usage of digital prescriptions to Out-Patient Department (OPD) care, it will have to expand PMJAY coverage to OPD consultation. With the submission of digital prescriptions becoming mandatory for availing OPD consultation related claims, providers will be automatically incentivized to upgrade to digital practices.

Lastly, the government has the opportunity to leverage a health ODE for building innovative Public-Private-Partnership (PPP) models. For example, government can pilot a population health management approach. In this approach, a consortium of public and private health providers is created and made responsible for a set of population in a pre-defined catchment area. The consortium is financially rewarded basis the health outcomes of the population in the catchment, incentivizing the consortium to deliver end-to-end comprehensive care to patients.

[41] Source: National Payments Corporation of India



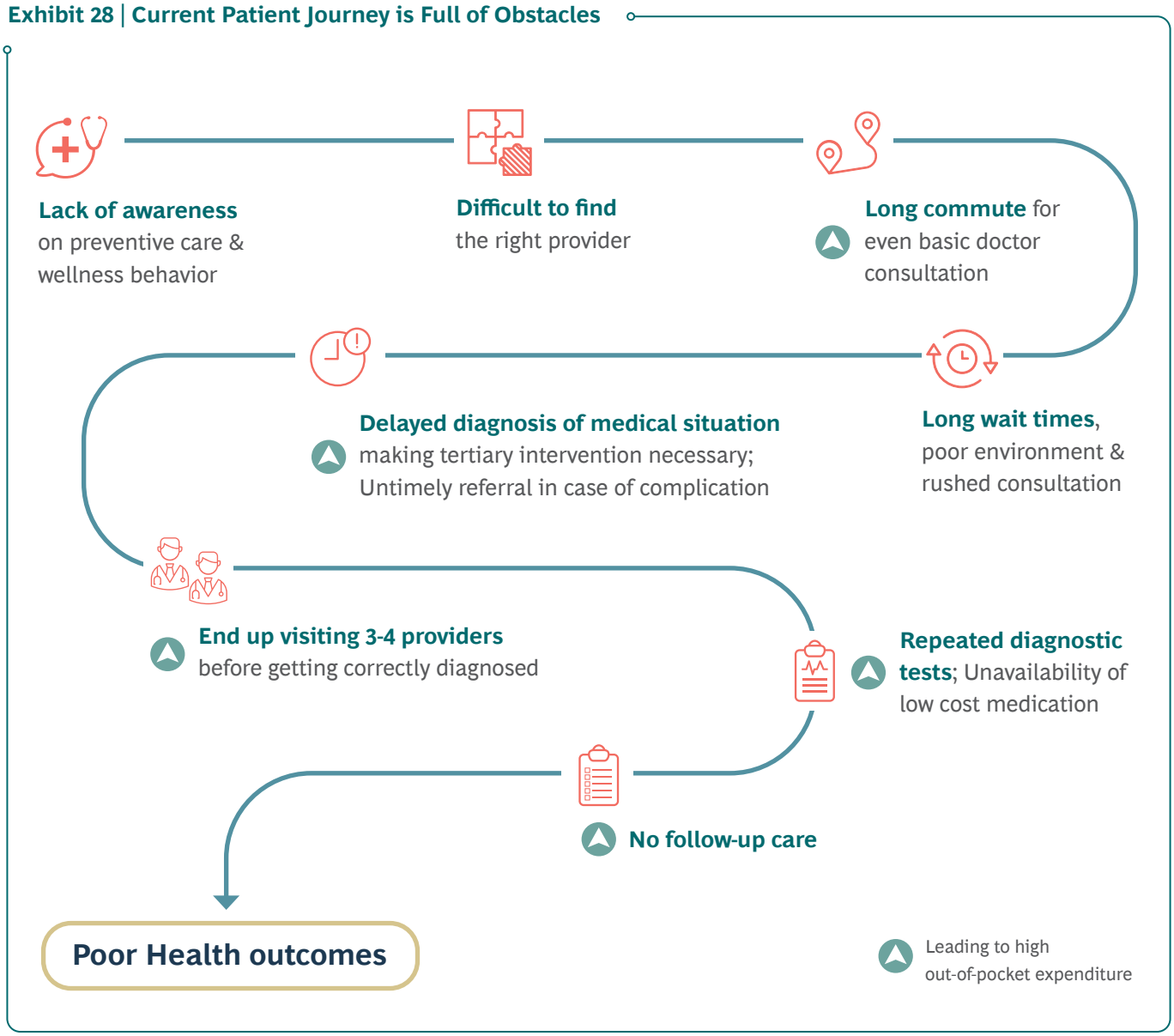
Chapter 11

Transforming Patient Lives

Chapter 11: Transforming Patient Lives

A. Today: Poor patient experience across all health touchpoints

Exhibit 28 | Current Patient Journey is Full of Obstacles



Patients today face multiple challenges in accessing the right healthcare, at the right time leading to overall poor health outcomes in India. As illustrated in Exhibit 28, starting from awareness about wellness behavior to accessing high quality healthcare at an affordable price, the patient's journey is riddled with obstacles leading to poor patient experience at almost all healthcare touchpoints.

Lack of awareness on preventive care and wellness behavior: Over the past three decades, India has experienced an epidemiological shift with the contribution of Non-Communicable Diseases (NCDs) to disease burden increasing. Most of the NCDs can be prevented with early detection and appropriate lifestyle changes. Patients need to be educated about the threats of these diseases. They also need to proactively adopt a care seeking behavior such as regular health-checkups. However, Indian patients today still continue to seek acute-based care upon the onset of symptoms, leading to late diagnosis. Additionally, lack of standardized and easily accessible sources of disease information makes it even more difficult for the patient to be well informed and make the right health decisions.

Difficult to find the right provider: Today, India lacks a comprehensive repository of information on various health ecosystem players such as health facilities, doctors, and pharmacies. Consequently, there is low visibility on the availability of services, quality of care, and the financial implications of choosing a particular facility or a doctor. This makes it difficult for the patients to select the appropriate health service provider basis diagnostic capabilities, availability of low-cost drugs, and proximity.

Long commute for even basic doctor consultation: Over 30 percent of the rural Indian population does not have access to an 'operational' first point of care located within a 5 km radius.[48] Additionally, only 20 percent doctors and 3 percent specialists serve 65 percent of the rural population.[49] As a result, patients have to commute long distances to get access to a medical facility. This in turn increases their Out-Of-Pocket (OOP) expenditure on health.

Long wait times, poor environment and rushed consultations: Due to limited availability of health resources in India, healthcare hubs are mostly over-crowded leading to long wait times for patients and rushed consultations by doctors. For example, the average time a primary care doctor spends on a consultation is just about 2 minutes in India vis-à-vis developed countries such as Singapore (10 minutes), US, Sweden, Norway (more than 20 minutes).[50] Often, in public health facilities, the doctor provides consultation to 2-3 patients at the same time, further compromising on the quality of service.

End up visiting 3-4 providers before receiving accurate diagnosis: Over and above the shortage of health resources in India, the quality of care provided by existing resources is poor. According to a WHO report from 2016, only 58 percent doctors in urban areas had a medical degree and only 19 percent doctors in rural areas had the requisite qualification.[51] As a result, patients end up visiting multiple providers to receive correct advice. This wastes time, increases expenditure, and results in a trust deficit.

Delayed diagnosis of medical situation and untimely referrals: Due to poor access to affordable healthcare services patients tend to delay their visit to the health facility despite the onset of health conditions. Often, patients are correctly diagnosed only after visiting multiple providers and following a complex referral pathway. For example, the average number of healthcare providers consulted by Tuberculosis (TB) patients in India before receiving correct diagnosis is 2.7.[52] This results in delayed diagnosis of the medical condition and makes tertiary intervention necessary, leading to increased health expenditure for the patient.

Repeated diagnostic tests; Unavailability of low-cost medication: Often, patients visit multiple providers before receiving correct diagnosis. This results in the creation of multiple health records for patients. However, due to difficulty in managing and storing these multiple on-paper records, patients are sometimes compelled to repeat diagnostic tests which increases their health expenditure. Additionally, patients visiting public health facilities are supposed to get the medicines prescribed by the public health doctor free of cost. However, inefficient supply chains often result in regular stock-outs, forcing the patients to purchase medicines from private pharmacies, further increasing their health expenditure.

No follow-up care: Healthcare in India is still focused on acute-based episodic care. With increased disease burden from NCDs that require chronic care over longer periods of time, follow-up care by the provider has now become a necessity. Even though doctors recommend follow-up visits, they are unable to keep track

48. Source: IMS - Understanding Healthcare Access in India 2013
49. Source: Press Releases, WHO, OECD Statistics, KPMG-OPPI report on healthcare access initiatives
50. Source: BMJ Open: International variations in primary care physician consultation time: a systematic review of 67 countries
51. WHO: The health workforce in India, 2016
52. Delays in diagnosis and treatment of pulmonary tuberculosis in India: a systematic review: Chandrashekhar T Sreeramareddy, Zhi Zhen Qin, Srinath Satyanarayana, Ramnath Subbaraman,and Madhukar Pai

of patients due to lack of consolidated and easy to access patient records. Patients also tend to drop-out themselves due to the inconvenience of accessing affordable healthcare. This leads to long recuperation periods and results in the resurgence of the condition leading to overall poor health outcomes in the country.

B. Digital 3.0: Addressing the fundamental challenges of the Indian healthcare system

"An open digital health ecosystem will empower the patients with accurate information and enable informed decision making. It will also open new avenues and opportunities that address the fundamental challenges of the Indian health system, leading to democratized access, improved quality of care, and affordability for all."

Democratized access

- As the ecosystem shapes up and all stakeholders such as health facilities, healthcare workers, and insurance providers increase their usage of digital platforms, multiple innovative platforms will emerge to address the challenge of access. Some of these innovations are already visible with digital care management models such as telemedicine solutions, eICUs, home-delivery of vitals and medicines, diagnostic test booking, online doctor appointments, and door-step sample collection. Additionally, interoperability will allow for an open market – providing fair access to any provider. This will help reduce the urban-rural divide and enable individuals across geographies to access healthcare.

- Centralized registries acting as a single source of truth on all health facilities and healthcare workforce in India will aid the patient's ability to access verified clinics and doctors. Patients will be able to determine the appropriate provider for themselves basis service availability, proximity, and approximate financial impact. This will also help reduce quackery.

- Furthermore, increased transparency will allow for creation of demand-supply matching algorithms that appropriately match providers and patients on the basis of the provider's capabilities and patient's needs. This will lead to better utilization of the available healthcare resources and easier access to healthcare for patients.

Improved quality of care

- Patients will have access to all their health records across family doctor, diagnostic labs, hospitalization events, and other health providers in a single view. While consulting a doctor, patients will be able to provide the consulting physician partial or full access to their health records through a time bound consent mechanism. This will ensure that the physician is able to take informed and appropriate treatment decisions without compromising on data privacy and security.

- Integration of data from wearables and other health tracking devices into patients' digital health records combined with anytime access to care through new digital channels opens new paradigms for ensuring continuum of care for patients. Hence, the provider's role will no longer be limited to the hospitalization event. Instead, it will extend beyond hospital discharge to provide follow-up care to patients through periodic access to their health records and digital interactions. It will allow the providers to truly become a part of patients' longitudinal wellness journey.

Case study: AccuHealth, Chile

In Chile, AccuHealth (a health management company) deployed AI solutions for the remote monitoring of diabetic patients. The monitoring data could be accessed by patients' healthcare provider to provide appropriate medical assistance. As a result of longitudinal care enabled through digital solutions, emergency hospitalizations decreased by 75 percent and the overall health expenditure for the patient decreased by 60 percent.[53]

- Clinical effectiveness today varies significantly across providers. The health data analytics engine, as part of the health ODE, will help drive standardized treatment pathways and protocols based on clinical efficacy leading to an improved common denominator for clinical quality across providers. Furthermore, the digital systems will ensure efficient Key Performance Indicators (KPIs) tracking for healthcare workforce leading to increased accountability for providers towards patient health outcomes.

Affordability for all

- Health registries will allow for fair and improved discoverability of providers and payors, helping patients make informed choices basis cost implications. Due to increased competition in an open market, providers may opt for differential pricing – resulting in improved value proposition for patients. As data archetypes get standardized, there will be improved transparency in provider billing, reducing unnecessary overhead expenses for patients.

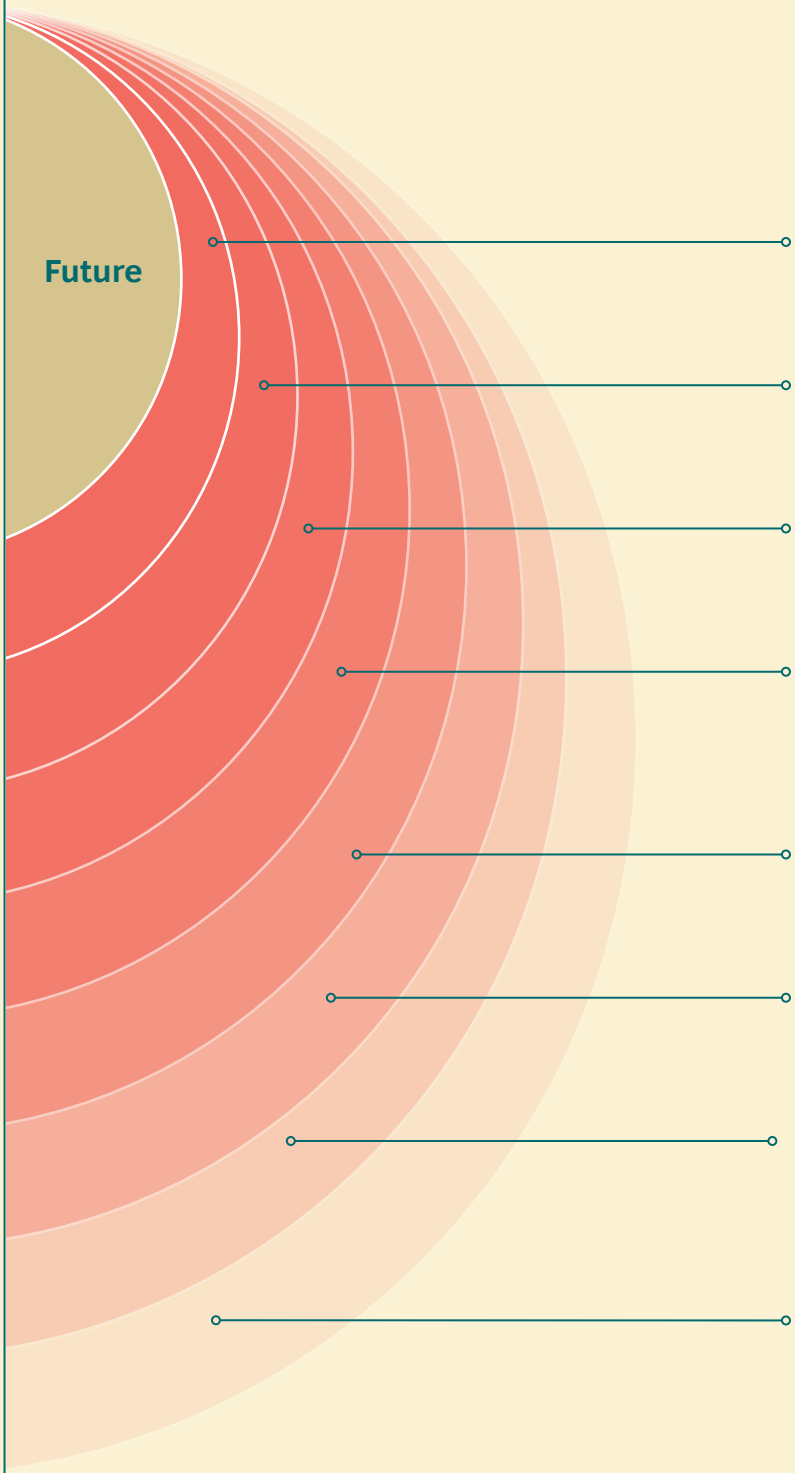
- The coverage and claims platform will reduce the claim processing costs for payors which will in turn lead to reduced premiums. Insurance coverage for OPD will also become feasible. Additionally, there will be little requirement for repeated diagnostics due to the easy availability of patient health records. The benefits of reduced administrative expenses at the provider's end can also be passed down to the patients.

- Digital also enables providers to offer differential pricing to customers. This will allow lower income groups to access providers' services at lower costs and at the same time result in cost-effective utilization of provider's resources. This will be a win-win situation for both providers and patients. Insurance companies will be able to leverage the patient health records to provide customized insurance or credit offerings to patients, further improving affordability.

- Lastly, with increased access to quality healthcare, patients will be able to get timely diagnosis and treatment. This will result in reduced need for tertiary care, leading to reduced costs for patients.

[53] Source: AccuHealth website

Exhibit 29 | Patient Journey of the Future



Appropriate health provider selection by accessing transparent information in health registries

Easier access to provider through new digital channels (e.g. tele-consultation) & demand-supply matching algorithms

High quality of health services by allowing provider to access longitudinal health records

Timely referrals due to interoperability among data systems of health facilities, preventing complications or allowing timely treatment of complications

Large choices for medicines/ diagnostics by accessing transparent information in health registries

Follow-up care provided as provider can access longitudinal health records and easily interact through new digital channels

Low out-of-pocket expenditure due to complete health insurance - which the payer was able to offer due to increased efficiencies from interoperability

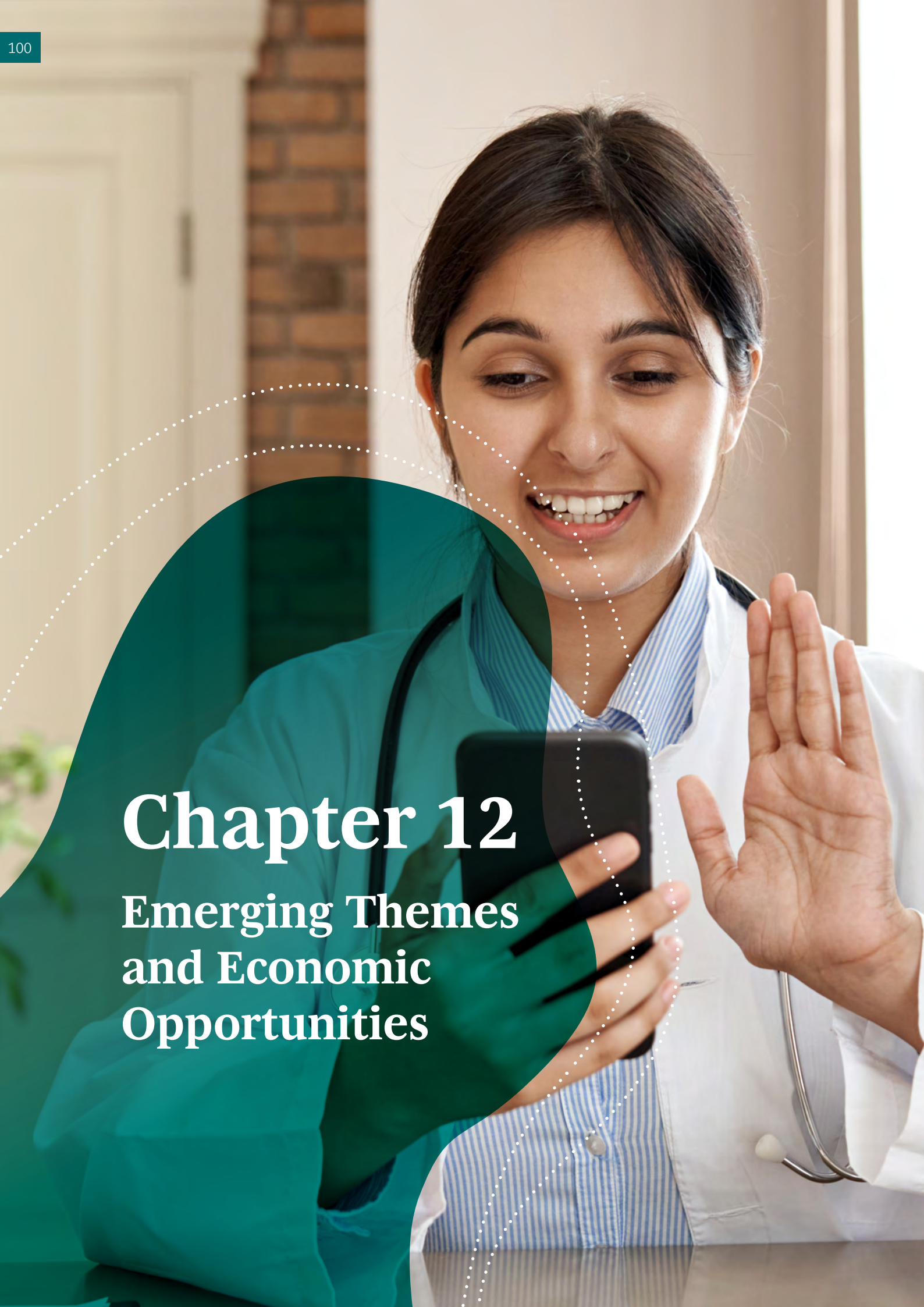
Overall, **improved care-seeking behavior** due to increased access to quality & affordable healthcare, resulting in improved health outcomes

Sources: BCG analysis.

C. Future: Fundamental transformation of patient journeys

The health ODE can help bring a true transformation across the patient's journey and make the dream of an efficient and "patient centric" Indian health system a reality.

- With increased access to reliable health information across health facilities and health workforce, the "patients of the future" will be able to make informed decisions on the choice of provider as per desired convenience and service quality.
- New avenues to access providers will emerge for patients, for example, access to e-consultation platforms will become more convenient. Increased transparency in health facilities data will help create demand-supply matching algorithms that will direct the patients towards appropriate providers. This will in turn reduce long queues and prevent rushed consultations.
- With the ability to share digital health records with providers, patients will be able to obtain optimal and higher quality care. The data and analytics engine will create opportunities for standardization of treatment pathways and protocols, ensuring better and consistent quality of care delivery to patients.
- Interoperability among various health data systems will streamline referral processes across multiple health providers. This will result in timely determination of medical condition and quick referral to higher-level facility, in case of any complication.
- Increased transparency in information on pharmacies and diagnostic labs will help the patient make smart choices based on convenience and financial implications. Patients will also get easier access to newer channels such as e-pharmacies and door-step diagnostic services.
- Access to patient health records and convenience in using remote-monitoring solutions will enable the providers to extend follow-up care to patients. This will lead to end-to-end comprehensive health care delivery to patients.
- Improved efficiencies resulting from digital adoption and interoperability will enable the providers and payors to pass on the advantages of reduced costs to patients. For example, OPD insurance might become a viable service offering in turn reducing patients' OOP expenditure on health.
- Overall, increased access to quality and affordable healthcare will help increase care-seeking behavior among patients. This will result in a paradigm shift from acute-based episodic care to wellness-focused care, improving the overall health outcomes of India.



Chapter 12

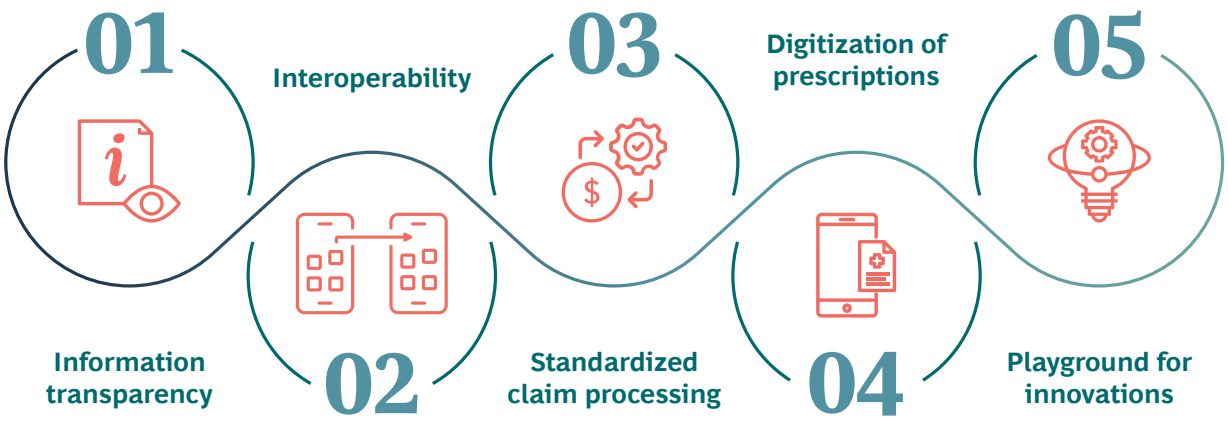
Emerging Themes and Economic Opportunities

Chapter 12: Emerging Themes and Economic Opportunities

The launch of the National Digital Health Mission (NDHM) is a significant step towards achieving a citizen-centric healthcare system. It will create an Open Digital Health Ecosystem (health ODE) that will serve as a backbone for an integrated digital health infrastructure and provide a platform for private innovations.

As depicted in Exhibit 30, we envision five big themes to emerge from the implementation of the National Digital Health Blueprint (NDHB) by NDHM. These will radically change India's health delivery landscape and impact all stakeholders in the healthcare ecosystem.

Exhibit 30 | 5 themes are emerging from implementation of NDHM



Sources: BCG analysis.

1. **Information transparency: :** The current master data on various stakeholders in the health ecosystem is weak. For example, there is no common and reliable repository to verify a health facility or a doctor. This paves way for quackery and inhibits the patient from receiving quality care. **One of the key components of NDHB is the creation of health registries which will act as a single source of truth for all health stakeholders such as doctors, hospitals, small clinics, diagnostic labs, pharmacies, and insurance providers**. It will also enable a common vocabulary across drugs, procedures, reagents, and other consumables. This will result in increased transparency and reliability of health information, thereby increasing trust and credibility among stakeholders in the ecosystem.

2. **Interoperability:** One of the key features of NDHB is interoperability across all systems and devices. **This will enable seamless flow of information among different stakeholders such as providers and insurance players, making it convenient and efficient to collaborate. It will also allow for a single and holistic view of the patient** across all patient interactions with the healthcare ecosystem, facilitated by a unique patient ID. Patients will be able to conveniently share their health records across multiple providers irrespective of the health data system being used by the providers. Additionally, interoperability will allow users to easily switch from one data system to another without loss of information. For example, patients will be able to conveniently switch across multiple user apps and the health providers will be able to conveniently switch across multiple hospital management systems.

3. **Standardized claim processing:** Currently, the claim settlement process is time-consuming and expensive. It takes anywhere between 30 to 60 days from the claim being raised to the claim being paid, stretching the short-term capital requirements for providers. It also entails high administrative burden for insurers who

have to manually go through paper-based records to verify the claims, resulting in a high claim processing cost of approximately INR 500 per claim. This further renders coverage for outpatient care economically unviable, limiting coverage to tertiary care.

One of the key features of NDHB is a coverage and claims platform which will make the entire claims process paperless and codified, enabling faster validation of claims and easy fraud prevention. Quicker turnaround time for payments and and-to-end visibility in the process will help reduce significant administrative burden for both providers and insurers, driving improved unit economics.

4 **Digitization of prescriptions: Implementation of NDHB will promote the digitization of a provider's treatment advice.** Payors and providers will be incentivized to use e-prescriptions to reduce the administrative costs and for easier claim processing. On the other hand, patients will be incentivized to ask for e-prescriptions in order to maintain digital health records and provide its consent-based access to providers for better quality care.

5 **Playground for innovations:** The role of the Indian government will expand from being a health provider, payor, and regulator to building common playgrounds for other stakeholders in the healthcare ecosystem to innovate upon. **The government will create and manage the core digital health data and establish a public infrastructure for the seamless exchange of this data, creating opportunities for all entities, public and private, to leverage this infrastructure for building patient-centric solutions.**



Analogy to understand the changing role of the government

A good analogy to understand the changing role of the government is the building of cities. Instead of just constructing fancy buildings in a slum cluster that rely on their own water or electricity, the government will now build "common infrastructure" such as drainage systems, electricity power grids, and mass transit systems. This will then become the platform upon which public and private entities innovate and create the vibrant ecosystem of activities that comprise our urban life.



We anticipate that over next 10 years, these themes can unlock economic value worth over **USD 200** billion and create an incremental benefit of **USD 200-250** billion to India's GDP.

Exhibit 31 | The Implementation of NDHM can create new market value of 200 Bn$ and bring an additional incremental benefit of ~200-250 Bn$ to India's GDP over a 10-year horizon

200 Billion $

New market value created over next 10 years

~200-250 Billion $

Incremental benefit to GDP over next 10 years

Market expansion

160-170 Bn$ of cumulative incremental revenue

- Improved healthcare access
- Improved healthcare affordability
- Increased adherence to medication

Cost efficiencies

30-40 Bn$ of cumulative cost savings

- Reduced admin burden for providers
- Reduced marketing expenditure
- Higher workforce productivity with access to digital tools
- Reduced claim filing & processing costs

Improved public health outcomes

~10-15% reduction in DALY loss

- Increased preventive & primary care
- Early disease detection & better disease management
- Higher population longevity
- Improved workforce productivity

As mentioned in exhibit 31, **we believe that three big shifts will be the key drivers of creating this economic value.**

1. From episodic care to wellness-oriented care
2. Streamlining of processes
3. From service-based to value-based healthcare

1 **From episodic care to wellness-oriented care:** The Indian healthcare market is currently estimated at USD 112 billion. Historically, it has been increasing at a Compound Annual Growth Rate (CAGR) of approximately 12 percent. **Currently, the Indian healthcare system faces multiple challenges across access, quality, and affordability inhibiting people from seeking timely care**. As a result, the entire system is primarily focused on episodic and tertiary care vis-à-vis preventive and primary care. The society as a whole is not wellness oriented and preventive check-ups are not promoted. This leads to India's Out-Patient Department (OPD) rates (4 per day per 1000 population) being much lower compared to countries such as Sweden (10), Norway (14), UK (16), Sri Lanka (16), Finland (18), China (18), and Switzerland (19).

We believe that the implementation of NDHB will transform our society towards being more wellness oriented, resulting in increased demand for healthcare.

Three factors will transform our society into a more wellness-oriented society:

- **Increased healthcare access**
- **Increased healthcare affordability**
- **Increased adherence to medication**

Increased access:

We believe that four factors will lead to improved healthcare access.

Firstly, reliable information on health providers and health workforce through the health registries will enable the use of sophisticated demand-supply matching algorithms, making it **convenient for patients to access appropriate healthcare**. Health registries will also **increase patient's trust in providers**, resulting in an increase in care-seeking behavior. This will lead to an increase in demand for both OPD and In-Patient Department (IPD) care.

Secondly, **new demand pools will get created.** A common digital infrastructure and interoperability will allow for creation of digital delivery platforms that are more user friendly and convenient to use, increasing the usage of such platforms especially for OPD care. Examples of such delivery platforms include e-consultation, e-pharmacy, e-diagnostic, e-ICU etc. As a result of these platforms, distance will no longer be a constraint to access healthcare.

Thirdly, standardized claim processing will reduce administrative overheads for health insurers, resulting in cost savings. This will make it viable for insurers to offer products like OPD insurance, that were earlier unviable. This will in turn lead to an increase in demand for OPD care.

Lastly, an increase in demand for OPD care will lead to **higher number of patients getting diagnosed for medical conditions.** This will increase the number of referrals made to the secondary and tertiary care facilities, increasing the demand for IPD care as well. However, at the same time, since patients will get diagnosed at an early stage, we expect the ratio of OPD to IPD to also increase. Currently, India's OPD to IPD ratio at 23 is much lower than other countries such as Norway (26), Sweden (29), Finland (30) and Switzerland (33).

Increased healthcare affordability:

We believe three factors will lead to increased healthcare affordability.

Firstly, health registries will increase the discoverability of providers, providing patients with greater provider choice. This will increase the competition and put **pricing pressure on providers**, increasing healthcare affordability and reducing the inflation rate in healthcare industry.

Secondly, consent-based access to patient health records will also allow the insurers to link premiums to patient's health outcomes. As a result, insurers will be able to **customize premiums for different patients**, reducing the premium amount for some customers. This will in turn result in increased healthcare affordability.

Increased efficiencies as a result of interoperability and access to health registries will reduce administrative costs for providers. The benefits of this reduced costs might get passed onto the patients. Additionally, digital platforms will allow providers to offer differential pricing depending on occupancy levels of hospitals. This will be similar to how hotels offer **differential pricing**. As a result, patients will have the opportunity to avail provider services at lower costs, increasing affordability.

Increased adherence to medication:

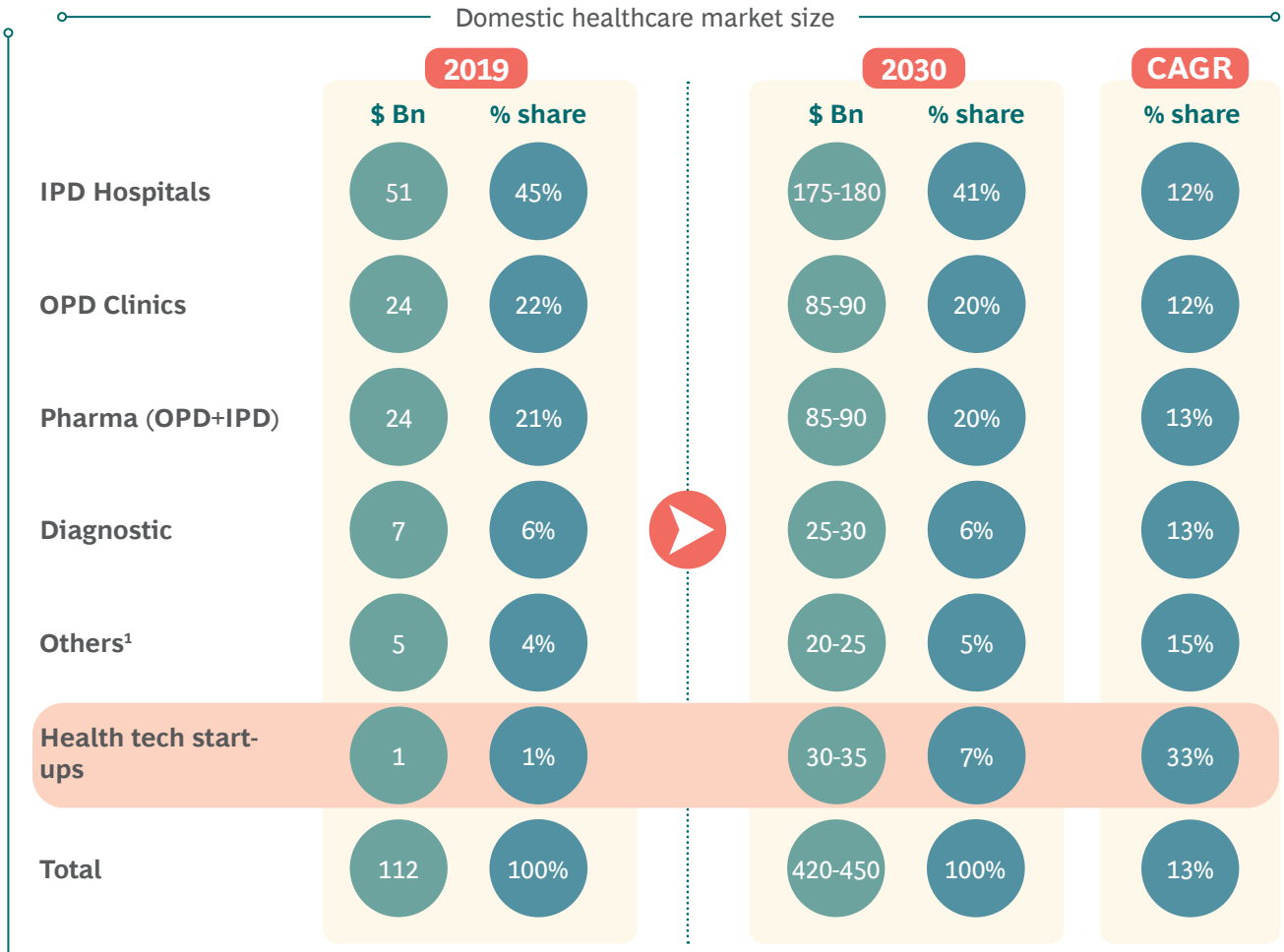
In addition to an increase in medication demand due to increase in demand for OPD and IPD care, we believe that there will be a further incremental increase in medication demand. **Digitization of prescriptions will open new opportunities for players to create products and services that increase patients' adherence to medications**. For example, players can create a mobile app that scans digital prescriptions and provide regular nudges to patients on timely intake of medicines.

"As a result of an increase in healthcare access and affordability, we estimate that there will be an incremental expansion in market size over the next 10 years. This will lead to **cumulative incremental revenue** of USD 160-170 billion by 2030."

Since patients will now be able to conveniently access affordable healthcare services, they will be more involved in their healthcare journey. This will mark a transition from episodic-focused care to wellness-focused care.

In addition to the value generated from an incremental increase in healthcare market size, **we will also witness shifts in the revenue pools among healthcare ecosystem players**, as depicted in Exhibit 32 and Exhibit 33.

Exhibit 32 | Shift in revenue pools among healthcare providers as a result of the implementation of a health ODE



1. Includes Med Tech, Transportation & Govt. admin expenses

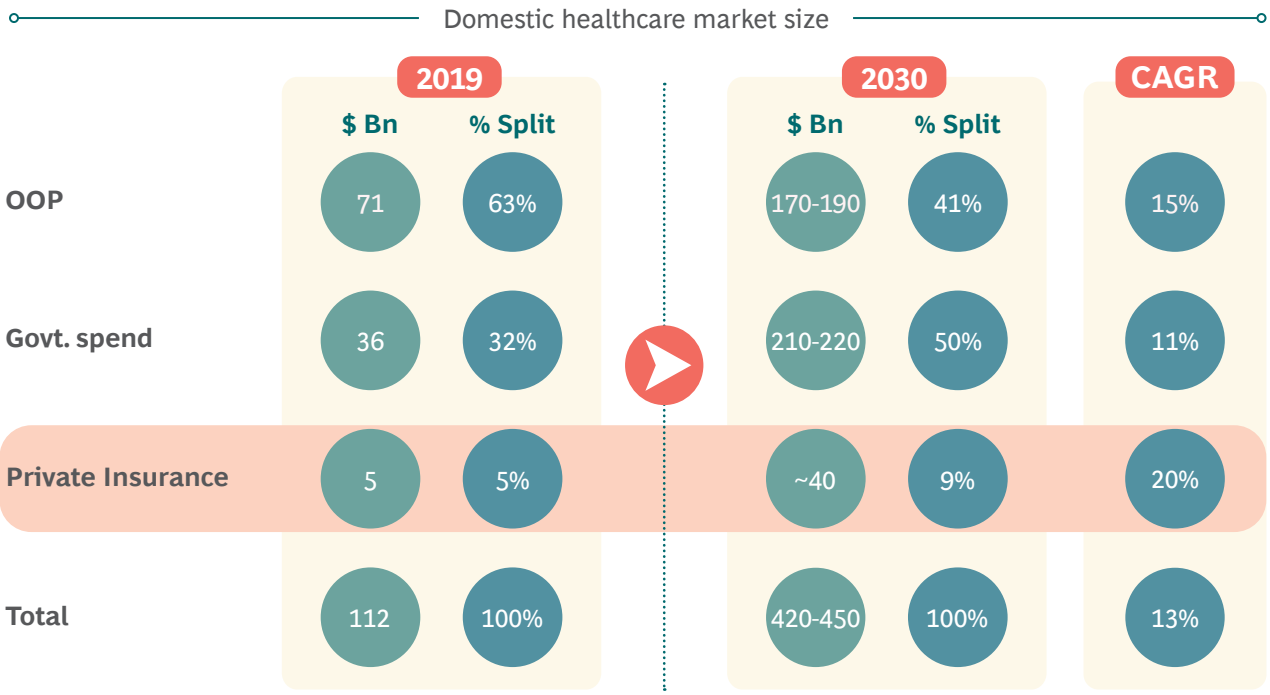
Source: National Health Accounts, BCG Analysis

Shift in revenue pools from the perspective of care delivery platforms

We expect health tech start-ups to benefit the most from the implementation of NDHB and experience high growth rate of 33 percent over the next 10 years. We expect this to result from two factors.

- As part of the implementation of a health ODE, **a new class of intermediaries will emerge** that will build technology solutions on top of the common digital infrastructure. Examples include health facility verifiers, consent managers, etc.
- Health tech start-ups will also be at the fore-front of driving consumerism in healthcare by creating cutting-edge patient - centric solutions that transform the way in which health services are currently delivered. **Expanded offerings will emerge across the patient journey** such as self-health management apps, gamified nudges to drive treatment adherence, health indicator tracking, etc. Such new offerings will contribute towards bridging the prevailing healthcare access gap.

Exhibit 33 | Shift in revenue pools among healthcare payers as a result of the implementation of a health ODE



Source: National Health Accounts, BCG Analysis

Shift in revenue pools from the perspective of a financer/payor

We expect insurance players to witness the fastest growth with their market size increasing at a CAGR of 20 percent. We expect this to emerge from two factors.

- The usage of a national claims platform will lead to cost-efficient claims processing for insurance players. This will subsequently enable them to provide expanded offerings such as **OPD coverage**. With coverage for OPD a possibility, patients will be incentivized to avail such services, increasing the demand for health insurance.

- The usage of data and analytics on the aggregated data and consent-based access to patient's health records will empower the insurance players to launch **innovative products such as dynamic premium pricing**, further driving the uptake of health insurance.

These factors will in turn improve healthcare affordability by reducing the Out-Of-Pocket (OOP) expenditure on healthcare. **We expect the OOP contribution to healthcare financing to reduce from 63 percent to 50 percent by 2030.** This will result from both an increase in government health expenditure as well as an increase in healthcare insurance penetration.

2 **Streamlining of processes:**

The implementation of NDHB will streamline processes and interactions across various systems, resulting in multiple opportunities for cost reduction.

- Increased transparency through health registries and interoperability across health data systems will **reduce administrative burdens for providers such as for doctor on-boarding, regulatory approvals and renewals**, and payor empanelment and claim processing for the providers.
- Health registries will also make all players easily discoverable to the patients, potentially **reducing the need for extensive marketing expenditure** which currently accounts for 5-10 percent of total expenditure.
- The healthcare workforce will be augmented with digital tools such as remote monitoring and digital access to consent-based health records of patients. This will increase their productivity and hence, capacity to serve more patients. As a result, providers will be able to **optimize health workforce costs** which currently constitute 40-45 percent of total expenditure.
- Efficient claim filing and processing through NDHM's envisioned claim and coverage platform will reduce administrative costs for both insurance players and providers.



"As a result of the efficiency gains engendered through the above mechanisms, we expect cumulative cost savings of USD 30-40 billion by 2030."

Additionally, we believe that the cost-savings related advantages will vary across healthcare ecosystem players. For example,

- **We expect an increase in margins for IPD hospitals and private insurers**. This will be primarily driven by an increase in efficiencies arising from the usage of NDHM's envisioned coverage and claims engine. Interoperability among different health data systems will reduce the administrative costs incurred by providers and payors in claim filing and claim processing, respectively. The process will become paperless and codified, enabling faster validation of claims and easy fraud prevention.
- **We expect health tech start-ups to also benefit significantly with businesses turning profitable for those players that adopt new models.** For example, players that expand vertically and build patient centric concierge solutions for specific therapeutic areas will have an advantage. Similarly, e-pharmacies that are able to effectively consume e-prescription to up-sell or cross-sell products will have an advantage.
- **We anticipate rationalization of prices in the industry with the implementation of the health ODE.** We expect the marketing expenditure for acquiring or retaining customers to reduce. For example, health service providers will now be easily discoverable through the ODE network, and hence will not require to extensively spend on marketing activities. Similarly, pharma players will have leaner field-force structures with increase in usage of digital platforms to engage with patients and prescribers. In addition, we expect prices to rationalize due to three reasons.

- Increase in discoverability will enable patients with greater provider choice. This will increase the competition and potentially rationalize prices
- The power of payors will increase. As insurance penetration increases and OPD insurance becoming viable, insurance players will favor products and procedures that have higher treatment efficacy and offer value-for-money. This may lead to higher growth in generic generics and make care more accessible.
- The creation of a standard drug and procedure registries and analytics on aggregated data will lead to creation of standardized industry-wide treatment and prescription protocols. This may lead to a higher growth in generic generics as well as put pricing pressures on providers.

3 From service-based to value-based healthcare

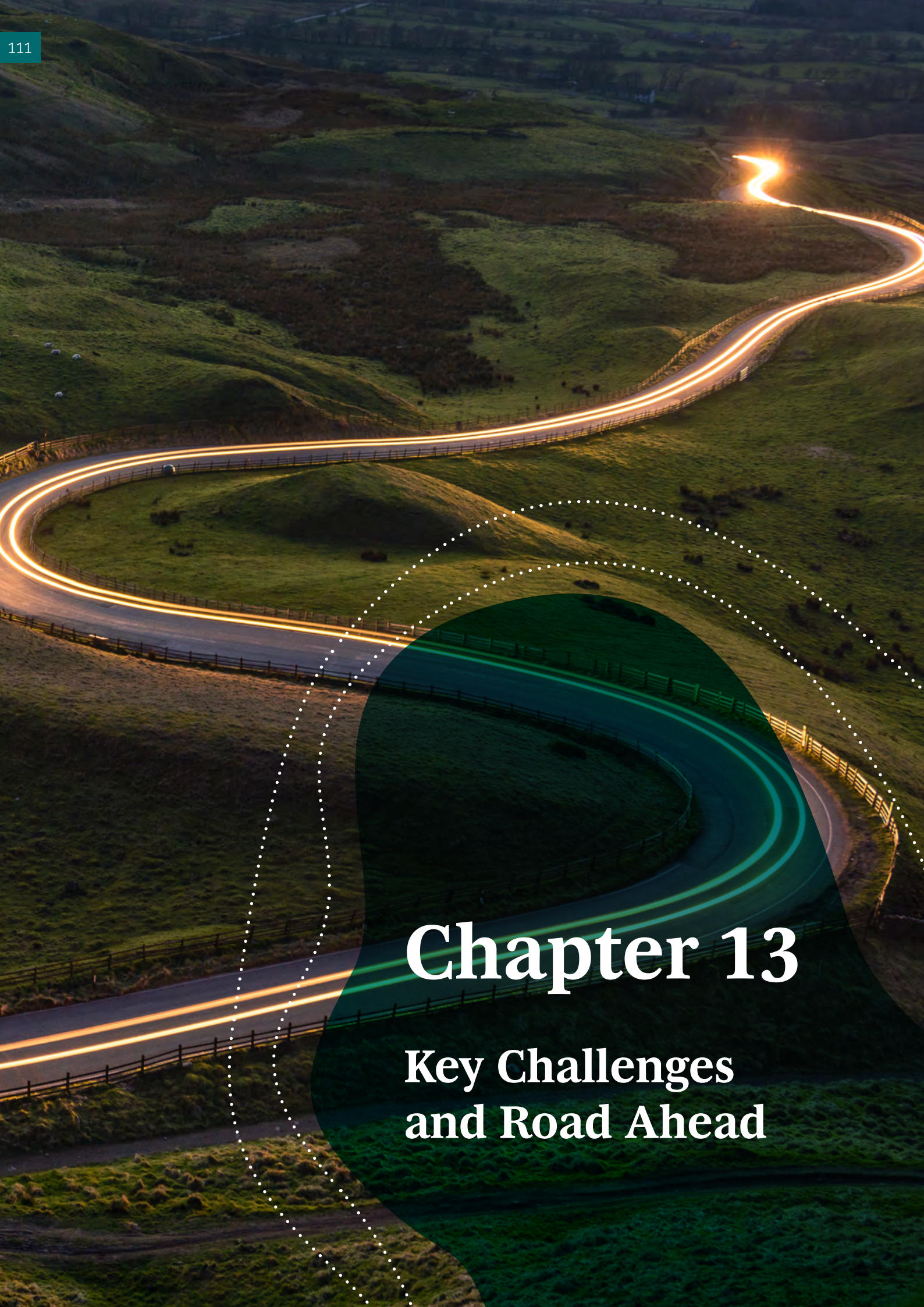
The implementation of a national health ODE will enable a transition to value-based care which will in turn improve patient health outcomes.

Below, we explain how a health ODE will enable a transition from service-based to value-based healthcare.

- **Currently, incentives across the various stakeholders in the health ecosystem are not aligned.** Payors try to rationalize payouts and manage their own float while providers try to increase patient footfall to achieve improved unit economics (given most of them have negative margins). As a result, **there is limited incentive for providing patient centric care and improving health outcomes.**
- One of the key components of NDHB is "health data analytics". The increased usage of digital platforms by the health ecosystem will lead to the generation of a significant amount of data. This aggregated and anonymized data can be further leveraged and analyzed to determine the impact of stakeholder activities on patient health outcomes. Since outcomes data will be publicly accessible, **patients will be able to make informed decisions and gravitate towards providers that provide value-based care**. Additionally, increased transparency through health registries will improve discoverability of all providers, thereby intensifying competition. This will further compel the providers to differentiate their offerings and provide care that is more value focused. Altogether, this could lead to a transition from **volume-based care towards value-based care**, resulting in improved health outcomes of Indian citizens.
- Additionally, the implementation of NDHB will improve the quality of care provided to patients. **Consent-based access to patient health records** will help providers dispense **appropriate care** and provide comprehensive services that extend beyond hospitalization. Ability for patients to share health records across multiple providers will also enable continuum of care.
- Lastly, the aggregated data will help in s**tandardizing treatment protocols.** New products that act as Clinical Decision Support Systems (CDSS) may emerge. This will further improve the quality of healthcare services.

Altogether, we believe that the implementation of NDHB will improve overall health outcomes for all citizens

We estimate that it can result in 10-15 percent reduction in DALY loss over a 10-year horizon. As a result of enhanced productive life and higher longevity of population, we estimate that there will be an incremental benefit of approximately USD 200-250 billion to India's GDP over the next 10 years.



Chapter 13

Key Challenges and Road Ahead

Chapter 13: Key Risks and the Road Ahead

The adoption of an Open Digital Health Ecosystem (health ODE) will represent a fundamental shift in the way the healthcare market currently operates, and the healthcare ecosystem stakeholders interact.

> "While a health ODE can create significant market opportunities for the players in the ecosystem and lead to improved health outcomes for the patients it can also give rise to a new set of risks. These risks need to be proactively mitigated to ensure effective implementation of the health ODE and to realize the incremental benefits."

We foresee three risks that can hinder the effective implementation and use of health ODE.

1. Risks associated with data security and poor data quality

Two key components of a health ODE are the longitudinal health records of patients and the health registries that will comprise information of health ecosystem players like pharmacists, health workforce, and the health facilities. The aggregation of such sensitive data poses multiple threats, notably,

- Consolidation of data into a centralized repository in the form of health registries can increase its vulnerability to cyber-attacks through even a single point of failure in the system.
- Access to longitudinal health records spanning health services availed and individuals' insurance related details poses a threat of potential misuse. For example, companies can use these details to promote higher cost products or health providers can discriminate amongst patients based on medical history. Such misuse of data puts the individual's privacy and well-being at risk. It also decreases the patient's trust in the health system.
- The health registries will act as a single source of truth for information on various health ecosystem players. Inevitably, there will be a huge reliance on this data source for multiple operations such as hospital empanelment for insurance schemes, health workforce onboarding by hospitals, roll-out of government schemes, etc. If the data in the registries is incorrect, incomplete or biased, it can lead to sub-optimal decision making. For example, it may lead to the exclusion of certain individuals from accessing government's health schemes or inappropriate empanelment of a hospital for an insurance scheme.

The National Digital Health Mission (NDHM) has laid out principles, such as security by design, for mitigating the risks around data security and poor data quality.

- Patient health data will be recorded and stored in a federated manner. While the data might be generated at different touchpoints, it will be owned only by the patient with no central repository of individual patient records. Additionally, anyone who wants to access the health records will require electronic consent from the patient. Only non-personal health data which is aggregated and anonymized that cannot be traced back to any particular individual will be used for data and analytics. This will subsequently inform health related decisions and policies at the national level.
- A national policy on Security of Health Systems and Privacy of Personal Health Records will be developed in accordance with the Personal Data Protection (PDP) Bill 2019. The Bill seeks to provide for the protection of

- individuals' personal data and establishes a Data Protection Authority (DPA) for the same. All the building blocks of the digital health infrastructure that handle personal health records will have to mandatorily comply with this policy. We believe that the creation of such a policy will have to be accelerated to mitigate any risks related to data security.
- Additionally, security and privacy will be built into the design of APIs and will be audited before deployment.

However, over and above the design related aspects of the digital platform, strong governance mechanisms will have to be established by the government to mitigate this risk.

Governance mechanisms that the government will have to establish

- The Government will have to create and mandate minimum standards and protocols for Health Information Providers (HIPs) and Health Information Users (HIUs) to prevent unauthorized usage. Further, appropriate penalties will have to be defined in case of any misuse. The government will have to ensure that the intermediaries that build user-facing solutions do not store any sensitive data or build their own repositories. Measures will have to be established to prevent the use of data for advertising, population profiling or promoting certain products.
- A formal governance body will have to be established to develop frameworks for data collection, sharing, and usage and draft a "code of ethics". The government will also have to provide 24*7 surveillance to ensure the security of all the data being generated.
- Mechanisms will have to be established for users to correct, complete or update data in the health registries. The Government will also have to design incentives for users to maintain completed and updated data.

2. Risks associated with adoption

The success of a health ODE depends upon its adoption by all stakeholders. For example, it will be important for the new class of intermediaries to leverage the shared technology infrastructure for building user-centric solutions on top. It will also be important for the end-users to utilize these solutions in their day-to-day work. Compliance with standards and protocols by all stakeholders will also have to be ensured. We foresee three factors that might lead to lower adoption.

- **Lack of awareness:** The builders might not be aware of the opportunity to leverage the shared digital infrastructure for creating solutions for the end user. The end users might themselves not be appropriately engaged and incentivized for adopting these solutions.
- **Poor quality of platforms:** In case the platforms use compromised or difficult to use data sets, intermediaries might find it challenging to leverage the platforms for building solutions.
- **Lack of incentives:** The implementation of a health ODE will change the market dynamics tremendously. As a result, some market players might want to inhibit its uptake due to lack of appropriate market incentives.

It will be important to undertake proactive measures to ensure the adoption of the common digital platforms and encourage end-user engagement.

Example of measures that can be taken to ensure adoption

- **High quality platform design:** The NDHM has emphasized that all the building blocks will be interoperable and conform to open standards. In addition to this, the government can build reference user facing applications to demonstrate its use and underscore the high quality of the digital backbone infrastructure.
- **Community engagement:** In order to create awareness and gain the trust of the stakeholders, a participatory mechanism can be used for developing the building blocks of the digital health infrastructure. Co-creation meet-ups, consultation workshops, hackathons, and incentive-based challenges can be held to generate excitement and increase acceptability of health ODE among the stakeholders.
- **Incentivization and building trust:** The Government will have to introduce mechanisms that incentivize all the stakeholders to adopt the health ODE platform. For example, the government can make it mandatory to submit digital prescriptions for the processing of claims via the PMJAY scheme. The government will also have to ensure transparency through the publication of data sources, policies for data collection and usage, etc. This will help create trust in the new platform.

3. Exclusion risk

The exclusion of any particular type of stakeholders or a group of users can undermine the efficacy of the ecosystem. We foresee two factors that can cause this risk.

- Certain population groups might not be able to leverage the new digital platforms due to limited digital literacy or lack of access to internet connectivity or smartphones. This risk is heightened for rural and marginalized communities.
- The informal sector comprises a large component of the Indian healthcare market. These multiple small players might get overlooked in the migration to the health ODE..

Ways to mitigate exclusion risk

- The open digital platforms will have to be user-friendly (including disability-friendly, vernacular interfaces) for easier usage. For easier adoption by all communities with varying levels of technical know-how, omni-channel solutions will have to be designed such as through web, mobile, Interactive Voice Response System (IVRS), etc. Last-mile infrastructure such as Community Service Centers (CSCs), Public Sub-Centers (PSCs), and Primary Health Centers (PHCs) can also be leveraged for delivering solutions at the last-mile. A default public sector solution can also be created for essential services. For example, Bharat Interface for Money (BHIM) for mobile payments.
- Incentives will have to be provided to ensure that private entities build solutions for the non-profitable population segments of the society as well.

In terms of the road ahead, with the announcement of NDHM, the GoI has already embarked on its journey towards an era of health ODE. The effective implementation of the National Digital Health Blueprint (NDHB) by NDHM will result in a true transformation of the entire healthcare ecosystem. This will result in an improved healthcare delivery system for the Indian population. **For an effective roll-out of NDHM, we recommend a two phased approach.**

Phase 1

The government can start with piloting the health ODE at the bottom of the pyramid where the issues of access, quality, and affordability are more severe. This can include.

- Consolidating all the existing data on the health facilities and health workforce from different sources such as the Medical Council of India (MCI) and the Pharmacy Council of India (PCI).
- Assessing all legacy systems such as the Health Management Information System (HMIS) and the Reproductive and Child Health (RCH) portal for conformance to the health ODE standards.
- Onboarding of all regulatory and license authorities, and the States/ Union Territories (UTs).
- Completing the creation of the common digital backbone including publicly accessible and interoperable Application Program Interfaces (APIs), standards, and licenses.
- Initiating the utilization of the platform by all public entities such as the creation of health IDs, public health doctors using e-prescriptions, etc. This will also require capacity building of the workforce.
- Integrating all the public health schemes for combined dissemination on the ground.

Phase 2

This can involve the onboarding of all remaining players, public and private, to the health ODE. This will require.

- Strengthening of the base data including all health registries pertaining to health providers, health workforce, diagnostic chains, and pharmacies. The creation of common nomenclature for drugs, consumables, and procedures.
- Creating public awareness for motivating new class of intermediaries to build user-centric solutions on top of the digital backbone that will in turn increase the uptake of digital platforms.
- Mandating the use of the digital platforms in all public health entities.
- Driving up adoption through new incentive mechanisms.

Additionally, in order to reap the incremental benefits arising from the implementation of a health ODE, we recommend all healthcare ecosystem players– the government, private providers, payors, pharma companies, pharmacies, and patients – to come together and make three proactive and concerted shifts.

We detail the required shifts below.

- **Shift in mindset from "siloed care delivery" to "collaborating and providing continuum of care to patients":** Traditionally, all health ecosystem players have worked in silos to optimize for their own local benefits. However, the health ODE era will require a more collaborative and coordinated approach towards patient-centric care. Synergies and best-in-class capabilities of different players will have to be leveraged for creating combined economic value that is much greater than the contribution of any individual stakeholder. For example, the government will have to leverage private sector expertise and technical know-how to co-create the digital health backbone. At the same time, the private sector will have to leverage government's currently wide scale and reach to reach all sections of society with new models of care delivery. All-in-all, a collaborative approach will be required to move towards a common vision of universal health coverage.

- **Updating business models:** While a health ODE will provide great economic benefits, it will inevitably change the current healthcare market dynamics. It will threaten the existing business models, calling for stakeholders to update their strategies in order to thrive in the new environment. As explained in section 11, an incremental market value of USD 200 billion will get created. Stakeholders who take timely actions will be able to grab a higher share of the incremental value pie.

- **Participatory and inclusive approach:** It is imperative that all players, irrespective of size or reach, are allowed to actively engage in the development and implementation of the health ODE. A culture of openness will have to be promoted, for example, through public consultation and workshops and appropriate feedback loops. The system will have to move away from the prevalent transactional relationships and gravitate towards multi-way interactions which can give rise to break-through innovative solutions. All players in the ecosystem will have to work with a shared accountability approach towards the creation and usage of a health ODE.

> "In conclusion, the adoption of a health ODE can have a transformative impact on India's public health system and create immense economic and market value. It can empower patients in unprecedented ways. It also calls for healthcare players to update their strategies."

This report is written with a view to accelerate the discourse and exchange of ideas on the health ODE and ensure that all health ecosystem stakeholders are well positioned to reap its dividends over the long-term, while undertaking steps to mitigate risks and challenges. It intends to provide a holistic perspective on the health ODE approach and nudge public, private, and social sector entities towards a more collaborative and safe digital health future.



Note to the Reader

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Acknowledgement

This report has been co-authored by Federation of Indian Chambers of Commerce and Industry (FICCI) and Boston Consulting Group (BCG).

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