

Assessment of Perceptions and Expectations *of healthcare stakeholders* *about digital health care ecosystem*

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RESEARCH QUESTION

What are the perceptions and expectations of healthcare stakeholder (patients and healthcare professionals) about digital health care eco system?

RESEARCH OBJECTIVE

Specific Objective:

- *To assess the perceptions of the consumers and healthcare professionals from digital technology.*
- *To find how healthcare ecosystem is getting benefitted and impacted with this new wave of digital transformation.*

INTRODUCTION

What is digital Health?

Digital health means utilizing the tech innovations to improve one's health and wellbeing. It is a broad and developing sector which involves a wide range of wearable devices to ingestible sensors, from mHealth applications to artificial intelligence, from automated machines (robots) to electronic health records etc. So, it is a kind of digitalization in healthcare industry.

Importance of Digital Health :-

- To prevent disease
- To help patients monitor and manage chronic conditions
- To lower the cost of healthcare provision
- To make medicine more tailored to individual needs.
- It helps people improve their lifestyles to maintain their health.
- Digital health tools could also help identify new illnesses or the worsening of existing ones. It not only shortens the disease period but also helps in easing symptoms at an early stage before the involvement of the healthcare provider. It improves the quality of life and reduces the total cost of a person's healthcare over their lifetime.

Types of Digital Technology

Artificial Intelligence

m-Health

Telemedicine

Wearable Devices

Electronic Health Record

Self Service Kiosks

Big Data & IoT

Virtual Reality

3D Printing

Robotics



RESEARCH METHODOLOGY

- **Data Collection** - Secondary Research
- The literature review is done to assess the expectations and inclinations of consumer and healthcare providers towards digitization/ digital transformation.
- **Search Strategy:**
 - The systemic literature is taken from the database - PubMed, Google Scholar, Research Gate and Science Direct.
 - All the figures shown are collected from primary researchers from unpublished sources, all listed in references.
 - **Unpublished Sources** - Survey by Accenture, Deloitte and McKinsey
- The **keywords** used to locate the publications deemed to be relevant to the aim and the objective of this review were: **Digitalization, Healthcare, Ecosystem, Artificial Intelligence, Big Data, Telemedicine, mHealth.**
- The published research papers and articles from the year 2017 - 2020 were considered for the literature review.
- Compilation of 12 selected sources in all, was done in tabular summary to get the findings.
- The results and interpretations are based upon the literature review and the unpublished source materials from Accenture and McKinsey.

FINDINGS

TABLE OF SUMMARY – (LITERATURE REVIEW)

S.No.	Title	Author/ Year	Methodology	Outcome
1	How to govern the digital transformation of health services?	Walter Ricciardi, 2019	Systematic Evaluation of articles	Cybersecurity should be integral part of health organization to protect and secure the data. Training of healthcare professionals in digital technology as the customer centric health tech solutions are more vulnerable to cyber threats.
2	The Bridging of electronic data to benefit communities.	Roland Gamache, 2018	Systematic review of literature	Big data & IoT is being used to identify, monitor & improve various factors affecting the health of communities.
3	Effectiveness of mHealth interventions in various health diseases.	Milena Soriano Marcolino, 2018	Systematic review of systematic reviews	mHealth is still at an infancy stage in developing countries.
4	Advance environmental public health tracking using EHR.	Gonza Namulanda, 2018	Case studies	The results show the neccessity to define best alogrithm for public health surveillance using EHR data.
5	Public health digitalization in Europe	Anna Odone, 2019	Conceptual framework and literature review	Digitalization shows a transition from cure to prevention making healthcare system more competent, reliable and economical.
6	Digital Health interventions for non communicable disease in India.	Md. Mahbub Hossain, 2019	Systematic review of intervention studies	Advanced technologies should be explored for sustainable development of digital intervention.
7	Potential of health analytics through big data in India and UK.	Souvik Bandopadhyay, 2018	literature review	Collaboration between India and UK on big data research will bring advancement in healthcare ecosystem.
8	Attitude of families of pediatric patients towards telemedicine.	Luisa Russo, 2017	Cross - sectional study, Questionnaire	Mostly High tech families were keen to embark telemedicine programs.
9	Digital Health strategies to reduce human resource constraints.	Maeghan Orton, 2018	Systematic review of systematic reviews	Engagement of health workers across the health system will expand the effectiveness of health service delivery.
10	Methods to evaluate the effects of digital health services for citizens.	Paolo Zanaboni, 2018	Systematic review of systematic reviews	Digital intervention should be constantly monitored & focused on chronic diseases.
11	Impact of Digitalization on healthcare infrastructural financing.	Roberto Moro Visconti, 2020	literature review	Increase in patient centric vision, entry of non - conventional competitors in health care sector, big data provides value for money in PPP
12	Artificial Intelligence with multi - functional machine learning platform development for better healthcare and precision medicine.	Zeeshan Ahmed, 2020	literature review	It requires useful analytic tools and approaches for efficient networking and should deal with ethical and social issues of privacy and cybersecurity in healthcare system.

RESULTS

CONSUMER EXPECTATIONS
FROM
FUTURE OF HEALTHCARE



Healthcare consumers today are changing, and their expectations for convenience, affordability and quality are redefining how they engage at each stage of care. Younger consumers are not satisfied with healthcare's status quo and consumers of all generations are more willing to try non-traditional services. The providers and payers who heed the shifts and deliver what patients are looking for will be the ones to earn loyalty, navigate disruption and be strongly positioned as the future of healthcare consumerism unfolds.



Traditional healthcare refers to established types of service delivery—i.e., doctors and other professionals in hospitals, clinics, medical centers or doctors' offices.



Non-traditional healthcare refers to other, emerging types of service delivery—i.e., walk-in or retail clinics, outpatient surgery hospitals, virtual health (via the phone, on video or apps), on-demand services or digital therapeutics.

Healthcare Consumer & their Preferences

Gen Z and millennials are least likely to have a primary care physician (PCP), compared to Gen X, baby boomers and the silent generation. Some younger generations say they would like to have a PCP but have not found one that meets their preferences for affordability and convenience. Gen Z is the most likely generation to seek out wellness practices (e.g. yoga, acupuncture) beyond Western medicine. With millennials projected to become the largest generation in 2019, this generation holds the most power to influence future healthcare models.

I have a primary care physician (PCP)/GP/doctor
(i.e., a doctor I return to for regular check-ups or whenever I need basic medical care)

85%

Silent Generation (born 1928 to 1945)

84%

Baby Boomers (born 1946 to 1964)

76%

Gen Xers (born 1965 to 1980)

67%

Millennials (born 1981 to 1996)

55%

Gen Z (born 1997 onward)

I would like to have a primary care physician (PCP)/GP/doctor but have not found one that meets my needs (e.g., affordability, convenience)

4%

Silent Generation

4%

Baby Boomers

8%

Gen Xers

14%

Millennials

20%

Gen Z

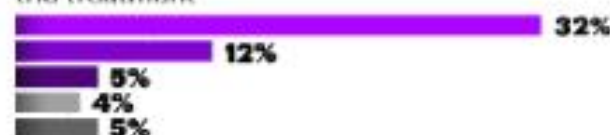
Younger consumers are dissatisfied with many aspects of traditional care

Younger consumers—Gen Z and millennials—are the most dissatisfied with the quality of traditional healthcare services. As these younger generations age and have greater healthcare needs, they will increasingly look for services to satisfy their expectations for effectiveness, convenience, efficiency and transparency.

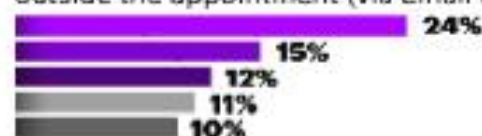
Figure 2. Younger generations are “dissatisfied” and “very dissatisfied” with aspects of traditional care

● Gen Z ● Millennials ● Gen Xers ● Baby Boomers ● Silent

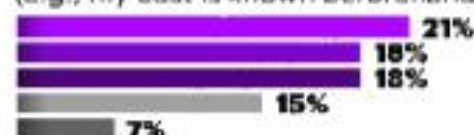
Effectiveness of the treatment



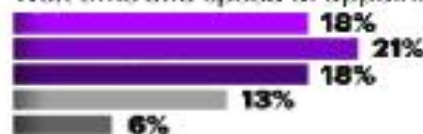
Responsiveness to follow-up questions outside the appointment (via email or phone)



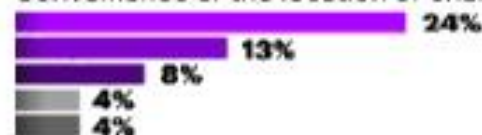
Transparency about cost to me (e.g., my cost is known beforehand)



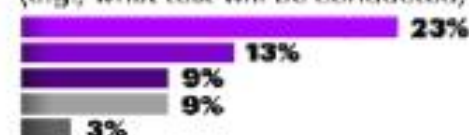
Wait time and speed of appointment



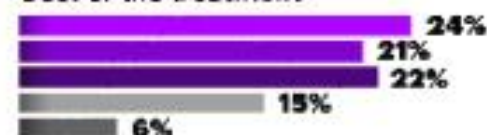
Convenience of the location or channel



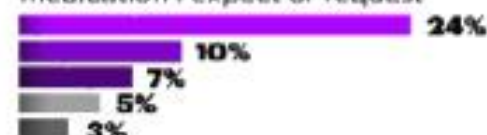
Transparency about care (e.g., what test will be conducted, and why)



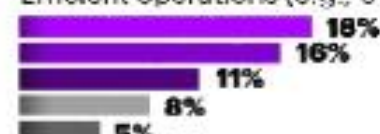
Cost of the treatment



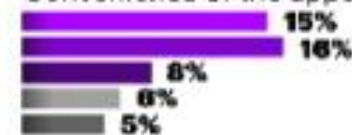
Whether or not the doctor prescribes medication I expect or request



Efficient operations (e.g., e-billing)



Convenience of the appointment times



Influencing Factors before seeking medical assistance

Convenience is also a top factor influencing care choices

Understandably, insurance coverage is the top-ranked factor influencing US consumer decisions about where and when to seek medical treatment. Consumers also will choose care that is conveniently located, reputable, comes recommended and has short wait times, among other factors.

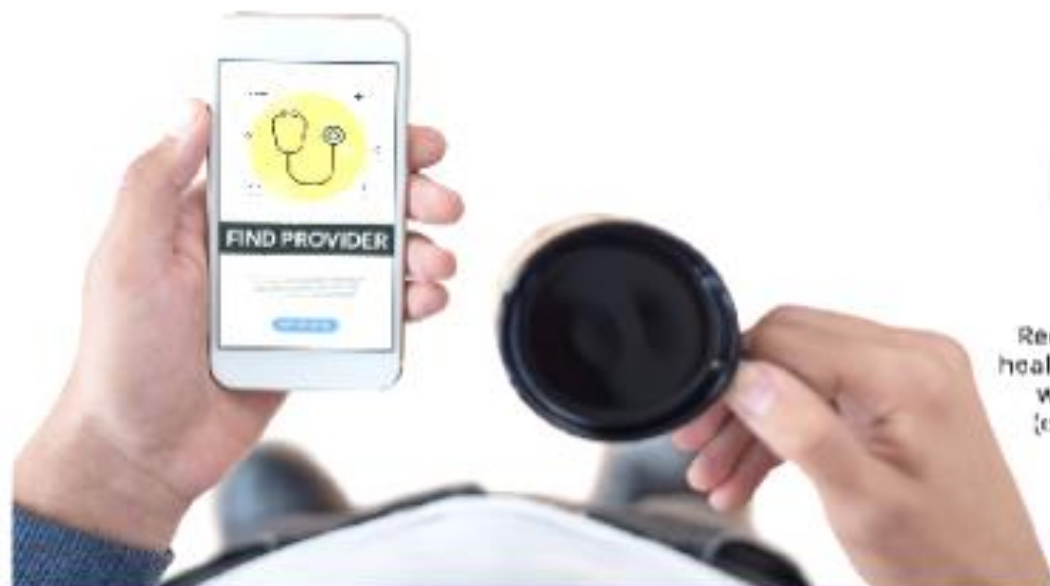
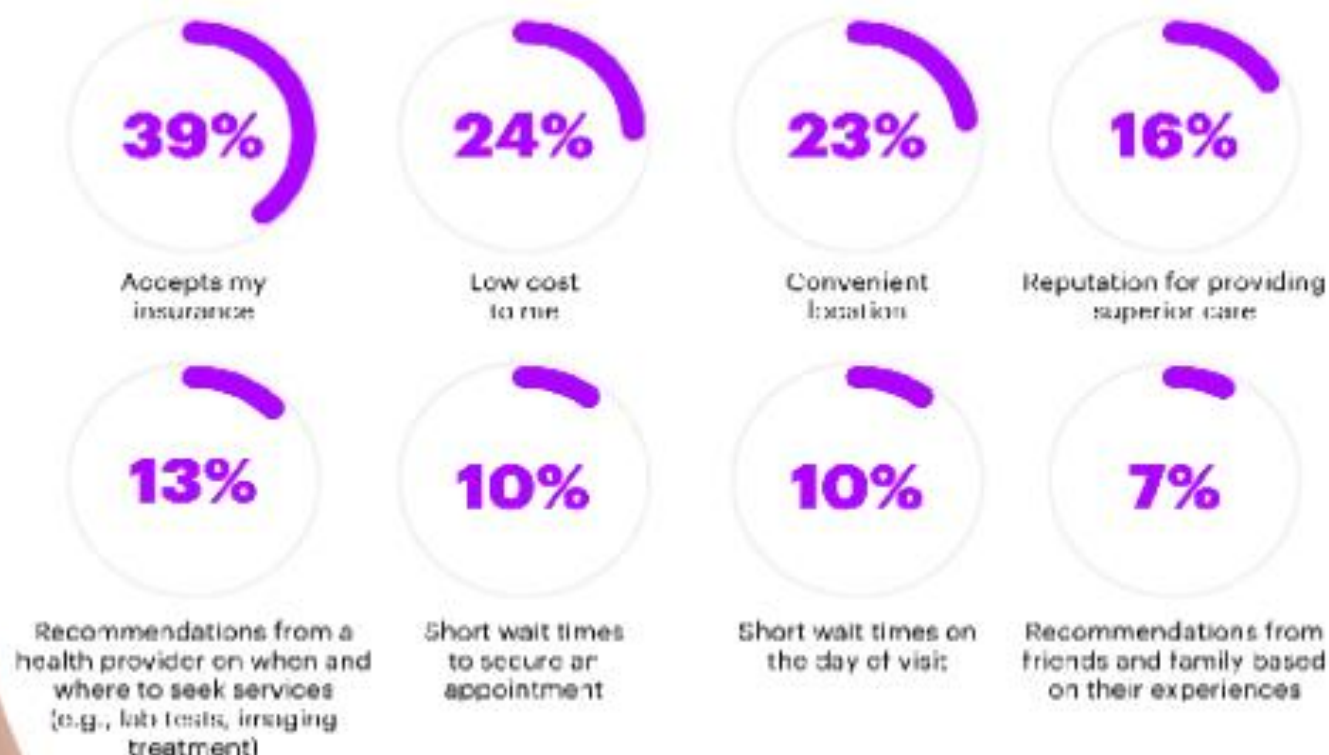


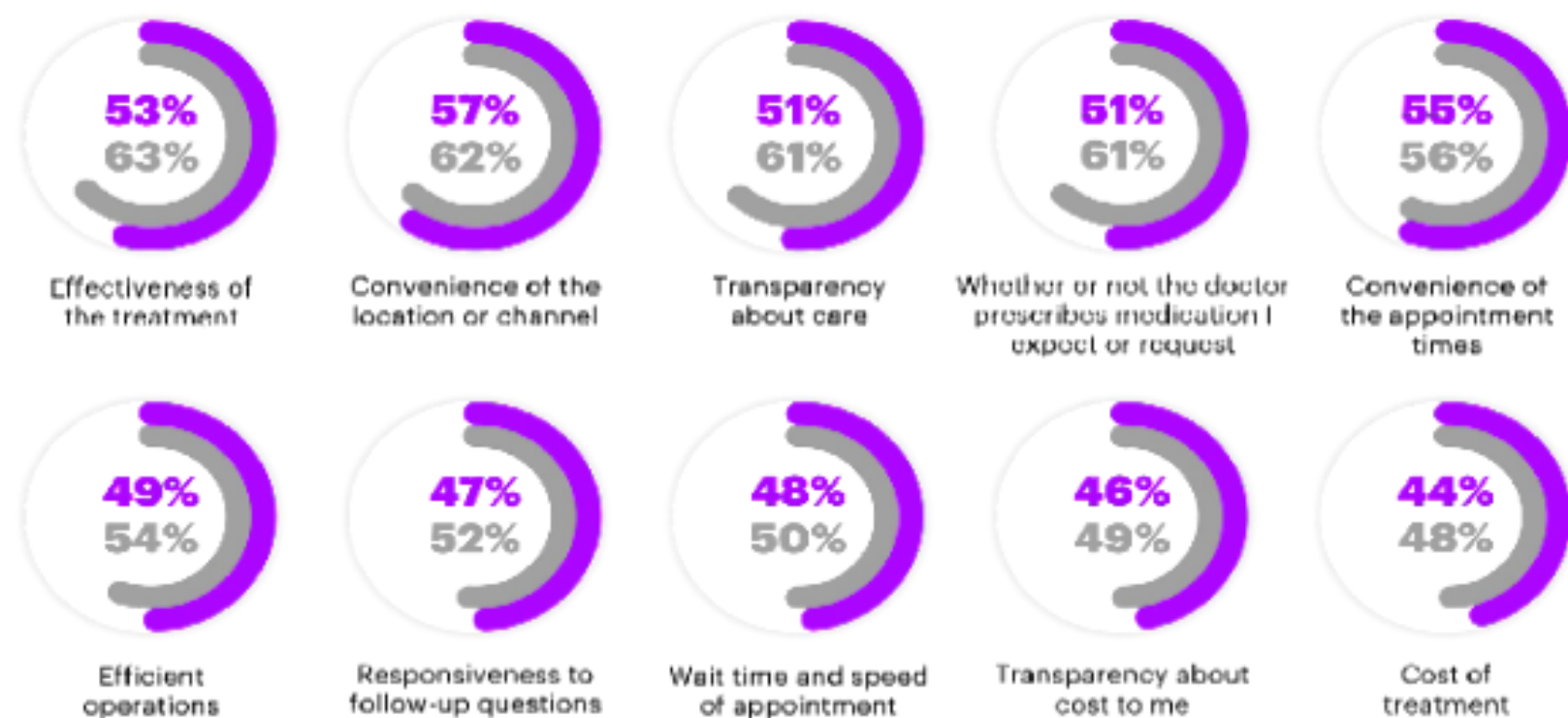
Figure 3. Consumers make decisions on when and where to seek medical treatment based on affordability, convenience and reputation



Customer Satisfaction Levels

Figure 5. Satisfaction levels of those “very satisfied” and “extremely satisfied” are comparable across traditional and non-traditional

● Non-traditional
● Traditional

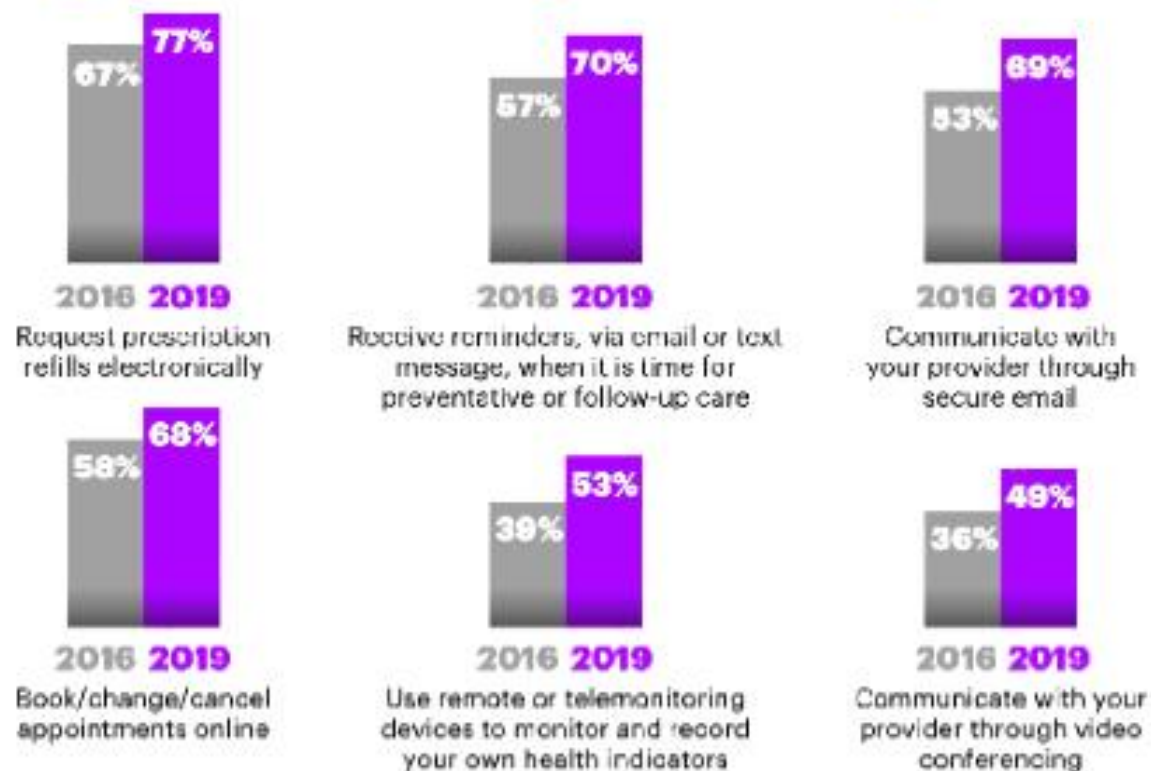


Consumer satisfaction levels are similar across non-traditional and traditional healthcare services

Patients believe the quality of non-traditional care is similar to that of traditional care. When thinking about non-traditional healthcare services, many patients are “very satisfied” and “extremely satisfied” with the level of transparency, convenience, effectiveness, efficiency and cost of those services.

Consumers Digital Inclination on the rise

Figure 6. Consumers increasingly will choose medical providers who offer digital capabilities



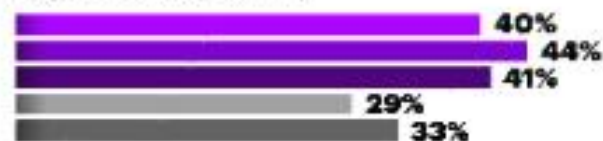
Younger consumers are **MUCH MORE LIKELY** to choose medical providers with digital capabilities

Compared with older generations, younger consumers are much more likely to choose medical providers who offer digital capabilities such as easy access to test results via mobile or online (40 percent of Gen Z and 44 percent of millennials) and requesting prescription refills electronically (38 percent of Gen Z and 42 percent of millennials).

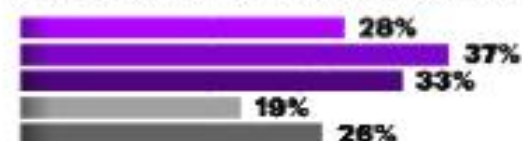
Figure 7. More than other generations, digital capabilities influence whether younger consumers choose medical providers

● Gen Z ● Millennials ● Gen Xers ● Baby Boomers ● Silent

Easy access to my test results
(e.g., mobile or online)



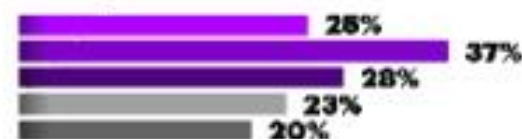
Receive reminders via email or text message,
when it is time for preventative or follow-up care



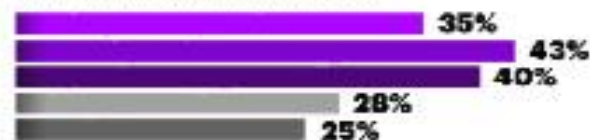
Request prescription
refills electronically



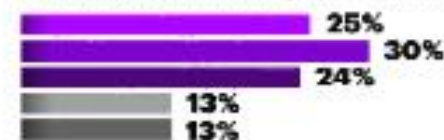
Communicate with your provider
through secure email



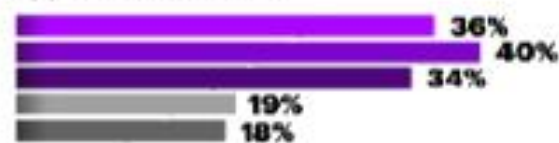
Online access to my
electronic medical records



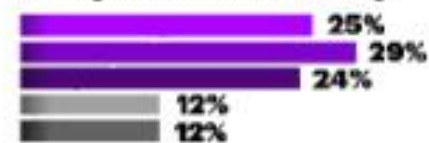
Use remote or tele-monitoring devices to
monitor and record your own health indicators



Book, change, or cancel
appointments online



Communicate with your provider
through video conferencing



HOW HEALTHCARE ECO SYSTEM IS GETTING BENEFITTED FROM “NEW WAVE OF DIGITAL TRANSFORMATION”

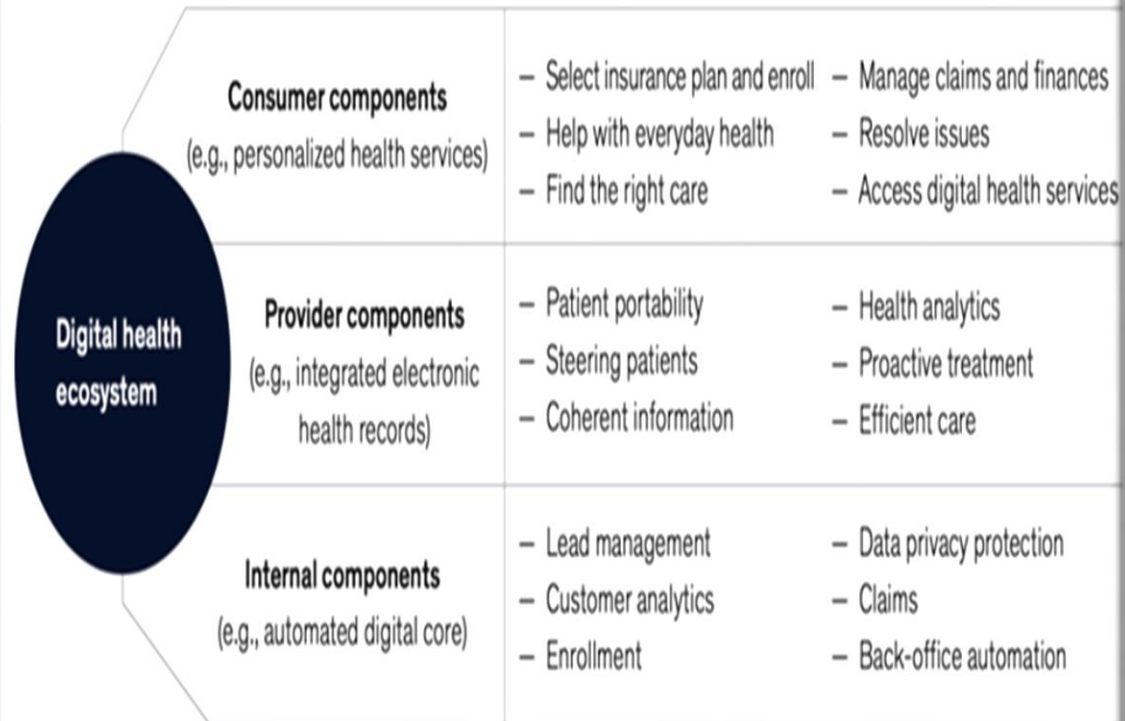
- Having a “Digital Health Ecosystem” will surely benefit customers from convenience, transparency & control on medical information point of view. It’s been long that much needed technology revolution was required in health sector & it has significantly fast-tracked in last few years. Consumer expectations are also growing rapidly, looking at the rapid growth of other industries due to tech interventions. All these new apps bring lot of data driven analysis that helps in shaping up new strategies in health sector.
- All these factors are causing disturbance in the sector, resulting in a healthcare market which demands new opportunities across the eco systems to improve internal / external customers experience. Hence setting up a “digital health ecosystem” will bring major value on the table.

Digital Healthcare ECO System

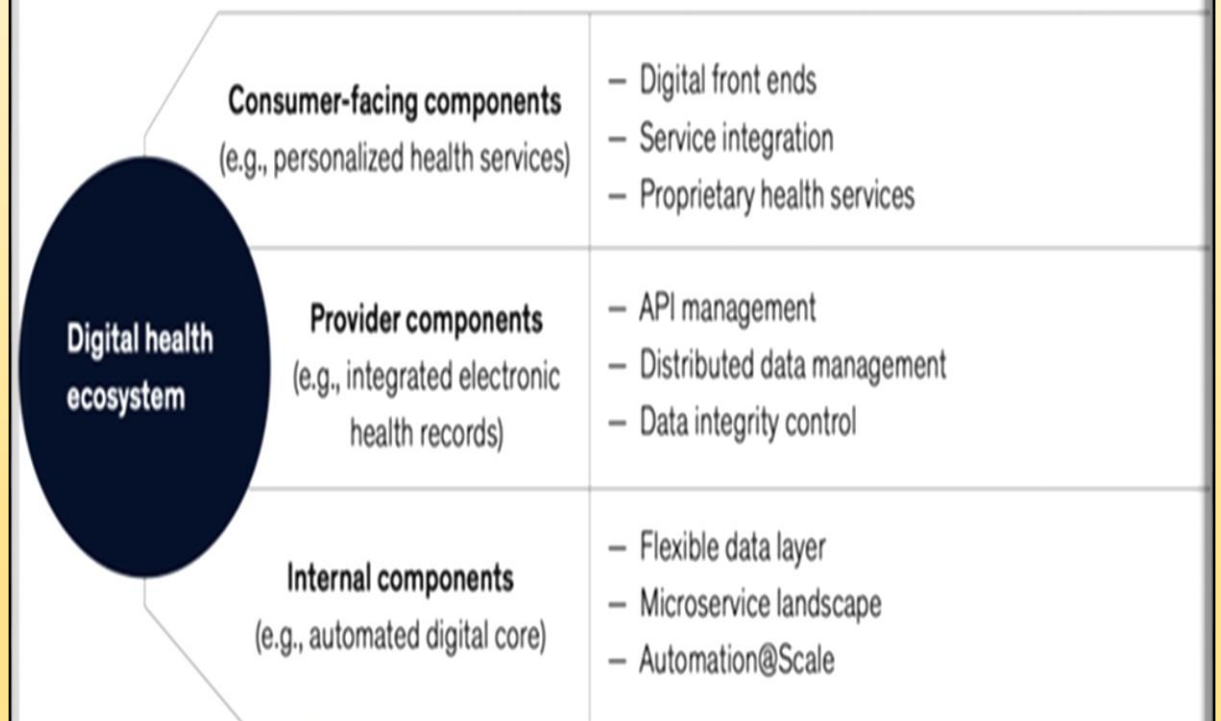
Functionalities	Key Services	Healthcare Services Details
Education and engagement	Health coach	Monitor health with fitness tracking data and receive personalized advice
	Challenges and rewards	Achieve goals each day to accumulate points, compete with friends, and redeem benefits
Screening and diagnosis	Premium check-ups	Receive information on premium health services and check-ups
	Treatment paths	Receive recommendations for treatment options and next steps based on symptoms
Access to care	Best doctor	Browse recommended doctors and make reservations with real-time availability
	Telemedicine	Have uncomplicated access to trained clinicians through video/voice calls
	Second opinion	Rapidly obtain a second opinion supported by seamless transfer of information
	Health concierge	Manage treatment pathways and have access to additional healthcare services
Care management and community	Food service	Receive dietary recommendations based on nutritional values and order meals online
	Social integration	Participate in medical social networks with content sharing and recommendations
	Community	View/read the treatment experiences of other patients and engage in discussions
Core insurance services	Financial coach	Get prediction for total treatment costs to help decide on an adequate treatment path

Digital health ecosystems enable administrative efficiency, lower operating costs and faster turnaround times.

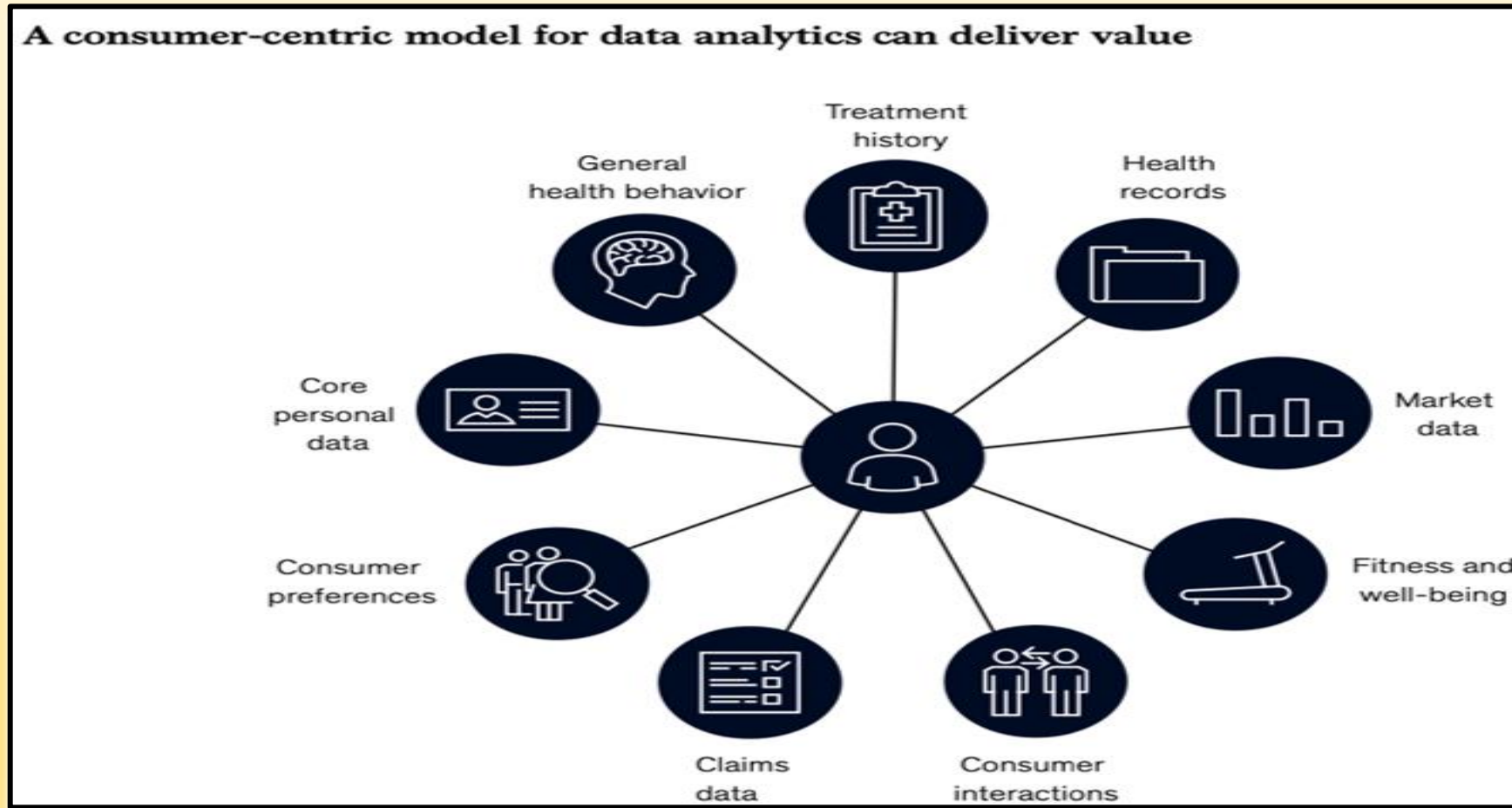
Business capabilities in digital health ecosystems (core components)



Technology foundations for core components in digital health ecosystems



Consumer centric data analytics will add value across the ecosystem



INTERPRETATION

1. Healthcare consumers of all generations are more open to non - traditional services.
2. Younger consumers are least satisfied with traditional care models.
3. People of all ages expect transparent, convenient and high-quality care. They also expect digital capabilities across the lifecycle of health services.
4. New model of non - traditional care delivered via virtual reality is becoming popular.
5. With ever increasing customer expectations towards non - traditional health services it is equally important for the ecosystem to quickly adapt to new digital transforming methods where customer's life becomes more convenient and they have self-service options.
6. To identify, monitor and improve the factors that affect the health of communities, Big data and IoT is being used.
7. Transition from cure to prevention makes the healthcare system more proficient, consistent and cost-effective due to digitalization.

CONCLUSION

- The digital transformation of healthcare will go miles with digital tools like AI and virtual reality to empower patient engagement and outcomes, institutional investments and technology adoption.
- Now a day's consumers are more inclined to gather information about their health to focus on prevention and maintenance. Data collected & analysed through these multiple health apps helps formulating different consumer strategies towards healthy lifestyle advice for their patients.
- Now a days with the help of machine learning new healthcare predictive model can be sliced & diced to visualise when next big health threat may occur so that relevant stakeholders can prepare themselves for any such disruptions in advance.
- These days, "Telemedicine channel" (home delivery of medicine) is becoming very popular. Remote consultation with healthcare doctors & home delivery of medicines provides great convenience & value for consumers & a step change in primary health care services.
- Information Security & Cybersecurity have to be an integral part of any health organisation to protect these tech solutions from being hacked & stealing of sensitive patient information. So healthcare sectors have to ensure that they have the right skill people in their organisations to ensure smooth functioning of these operations, protect their branding image due to such disruptions that impact consumer experience.

E-Health

more than just the electronic record

PART – 2 (ONLINE COURSE)

HOURS - 15 hours

UNIVERSITY - The University of Sydney

COURSE DESCRIPTION

- "eHealth: More than just an electronic record!" is a versatile course which targets to train the global audience of health physicians, students, managers, administrators, and researchers to reflect on the global impact of eHealth on the combination of care. It discovers the scope of technology application, emerging trends & creates a platform for both native and worldwide eHealth practice and research.
- The course was supposed to be completed in five weeks and contained five modules. Certificates were issued to the participants on the basis of their involvement in the course. This course gives insights on the realistic knowledge and implementation of eHealth in practice. It encourages you to pursue advance courses in this domain.

This course aims on following learning:

- "The fundamentals of eHealth and where it is heading"
- "What kind of health data we are currently collecting and how it will transform healthcare in the future?"
- "How new technologies are helping health consumers participate in their own healthcare?"
- "How eHealth can improve the coordination and efficiency of healthcare and what the barriers might be?"

OBJECTIVE OF THE COURSE

- To learn what eHealth is all about.
- Expert's opinion about benefits / challenges and future of eHealth?
- To learn about current trends of technology & usage in Health Sector.
- Learn about current trends of electronic data in healthcare.
- How mobile technology is being used clinically for personal health and healthcare?
- How doctors are using these technologies in their clinical practice?
- With surge in mobile devices / digital adoption across Urban / Rural areas, how consumer expectation is increasing in health sector.

COURSE CONTENTS

Module 1 - “What is eHealth?”

- “What are the fundamentals of eHealth and where is it heading?”

Module 2 - “Health in our Hands”

- "How are new technologies helping consumers 'participate' in healthcare?"

Module 3 - “Data and the Quantified Self”

- "What kind of health data do we collect now and how will it transform healthcare in the future?"

Module 4 - “Interacting with Health Professionals using New Technologies”

- “How can eHealth improve the coordination and efficiency of healthcare and what are the barriers?”

Module 5 - “eHealth in Professional Practice”

- "How can eHealth principles and technologies be applied in my own professional practice?"

LEARNING METHODOLOGY

- This course consisted a lot of videos, practice quizzes, discussion forums and case studies, reading materials and graded assignments to learn the basic structure of eHealth and how healthcare is transforming in future.

There were two graded assessments in this course:

- Firstly, I had to reflect on my own experience, critical understanding & explore a health related app and create a review by using the app and evaluating it on the basis of MaRS rating tool.
- Secondly, I had to suggest some case study based strategies on current eHealth practice. Evaluation was done by our fellow mates and I was supposed to assess their critical analytical skills.

ASSIGNMENT 1 – Reviewing a Health App

Name of the App : Recharge - Move well, Sleep well, Be Well

After using this app for a week now and evaluating it according to the MaRS rating tool I have come across some positives and negatives of this app. Let's put it into following 6 dimensions:

1

Engagement - It is well targeted with negligible issues, has basic interactive features and customisation. However, it lacks more visual content as it only shows graphs and no videos and is not enough to entertain user for a long time.

2

Functionality - we can use the app easily as it has very simple guidelines. Most of its features work very fast. It is perfectly logical, clear, consistent and intuitive.

3

Aesthetics - It has an appealing and well organised layout, average quality graphics and visual appeal.

4

Information - It is pretty accurate in terms of describing the app. It sets achievable goals on daily basis. The information given is self-explanatory and gives broad range of information which is clear, logical and easy to understand. This app comes from a legitimate source - ReachOut.com by inspire Foundation, The University of Sydney's Brain and Mind research institute and funded by the Young and Well Cooperative Research Centre and Macquarie Group Foundation. The daily set of goals are based on the scientific evidence.

5

App Subjective Quality - I would definitely recommend this app to my friends who have a disturbed sleeping pattern as it guides you to be physically active and reduces anxiety or stress. I would love to use this app for 3 -10 months and I may pay for it. My overall rating for this app is 4 stars.

6

App Specific - After using this app I can say that this app is likely to increase my awareness, knowledge, attitude about health and intention to change my behaviour, sleeping pattern and become physically more active. Earlier I used to sleep around 3 am and wake up next day at 1 pm. Due to this kind of sleeping pattern my health got disturbed as I used to have a lot of body fatigue, headache and acne on my face. After using this app for about one week now I have been a little more active as this app makes me do a lot of exercises in a day which makes you tired and go early to bed.

ASSIGNMENT 2 – A Practice Based eHealth Case

LEUKEMIA CASE STUDY

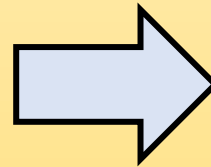
Background - Peter (38 years)

Lives with wife and two children, 2 & 4 years old. Peter was diagnosed with leukemia two years ago and is now struggling with his treatment and trying to maintain his daily life. Peter is used to working with computers and would like to be able to use both his computer and his smart phone to access his care information and communicate with his care providers. He has had high blood pressure for a long time and been medicated for it since he was 25. After changing physician, Peter tried to cut down on the medication, but has now been warned of the possibility of stroke.

Healthcare Needs – Peter would like:

- A reminder services for check-ups and treatment.
- To be able to track his own blood count and blood pressure and record how his lifestyle affects it.
- Rehabilitation support, exercises etc.
- Electronic communication with healthcare services – ask questions online without waiting on the phone.
- Participate in support from other young leukemia sufferers.
- Access to his own eMR and the ability to input and share his own health data.

Healthcare Issues - Peter finds that he is not as actively involved and in control of his healthcare as he would like to be. He is frustrated that he's not getting enough rehabilitation and is searching for alternatives.



Suggested eHealth Strategies -

- Peter should wear a wearable device consisting of various health applications:
- An alarm for reminder services for check-ups and treatment.
- Health monitor and instant heart rate app to track his lifestyle, blood count and blood pressure respectively.
- E smart application has an advanced symptom management system which could help Peter and his doctor to provide rehabilitation support as it generates alert alarms which provides real time patient symptoms to their clinicians.
- Remote consultations through tele-health and telemedicine systems could help Peter to electronically communicate with healthcare professionals.
- Online Patient communities called LeukaNET on social media platform could engage all the young leukemia sufferers from all over the globe to share their experiences and knowledge about their signs and symptoms which could help them support each other.
- Peter could get access to his own eMR through hospitals, medical insurance company where he has registered himself so that he could share that data with his physicians whenever needed.

KEY LEARNINGS

- Understanding of eHealth from consumers as well as health professional's perspective.
- Learning eHealth model & key eHealth domains & how they intersect with each other.
- Gain an insight into the fundamental principles of eHealth.
- Reviewed & rated an eHealth app.
- Got insights of currently trending eHealth industry practices.
- Getting familiar with current & future challenges of eHealth for consumers and health practitioners
- Understand the potential of mobile technology & how that elevates consumer experience.
- Consider strategies for including mobile health apps in your professional practice.
- How innovative tech, creates magical experience between consumers and professional.
- Advantages of technology-based eHealth services in bringing efficiencies, controls & productivity.
- Differences between online and face to face health service interactions.
- Insights on new models of healthcare supported by telehealth, social media and personalized apps.
- Read different case studies & how eHealth records assisted in overcoming serious illness.
- Got an experience to write an eHealth Strategy based on case studies provided in the course.

Thank You

