SCOPE OF HOMECARE SERVICES IN INDIAN HEALTHCARE SYSTEM POST PANDEMIC

Dissertation Submitted to

The IIHMR University, Jaipur

For the partial fulfillment for the award of the

degree of Master of Business Administration

(MBA)

In

Hospital and Health Management/Pharmaceutical

Management/Rural Management

By

Mr. Pulkit Raturi

Under the Supervision and Guidance of

Dr. (Shri) P.R. Sodani

July, 2022

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DECLARATION BY STUDENT

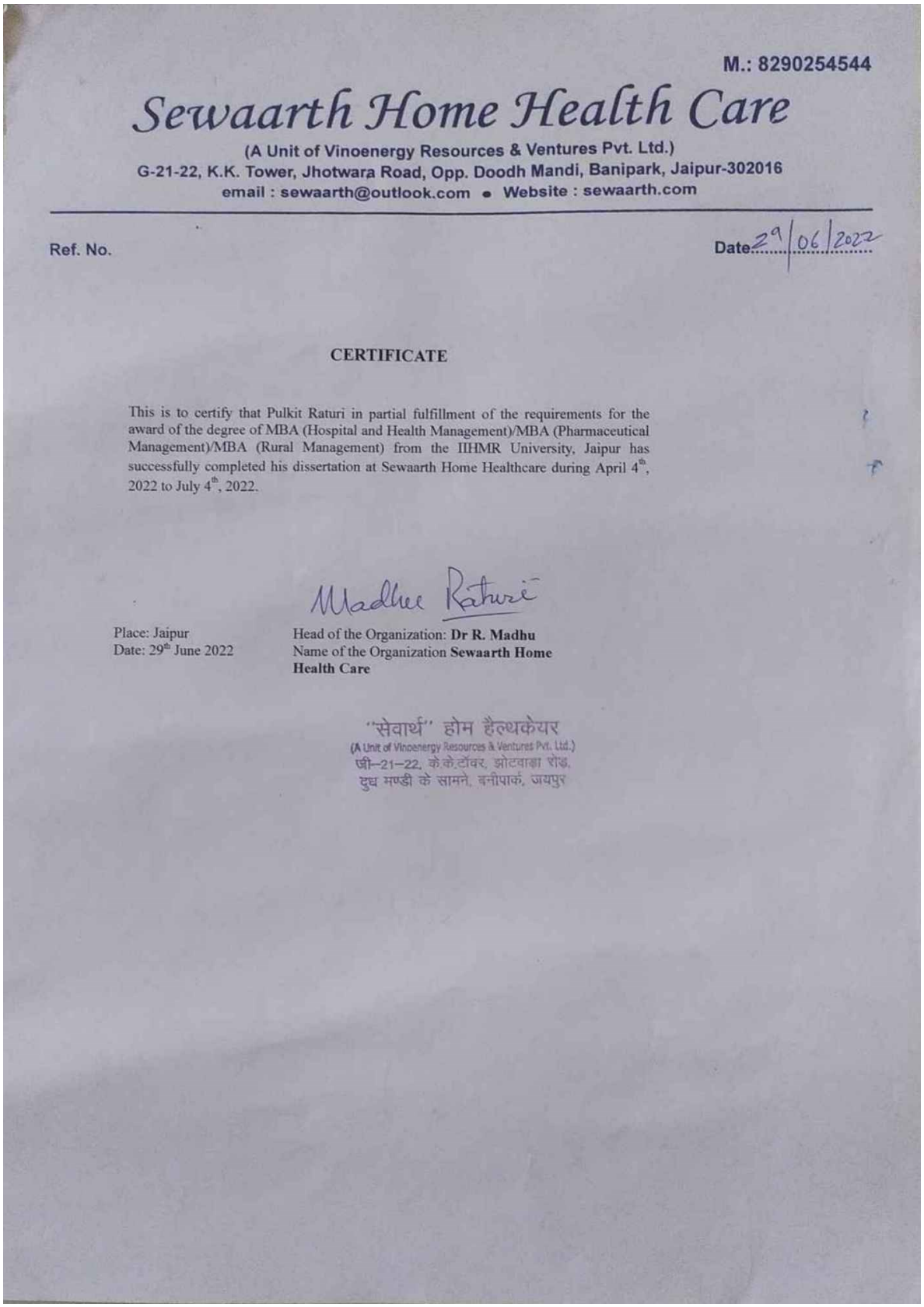
I hereby declare that this dissertation titled "SCOPE OF HOMECARE SERVICES IN INDIAN HEALTHCARE SYSTEM POST PANDEMIC", is the bonafide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

(Signature)

Name of Student: Pulkit Raturi

Date 30th June 2022

ORGANIZATION CERTIFICATE



M.: 8290254544

Sewaarth Home Health Care

(A Unit of Vinoenergy Resources & Ventures Pvt. Ltd.)
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Date 29/06/2022

CERTIFICATE

This is to certify that Pulkit Raturi in partial fulfillment of the requirements for the award of the degree of MBA (Hospital and Health Management)/MBA (Pharmaceutical Management)/MBA (Rural Management) from the IIHMR University, Jaipur has successfully completed his dissertation at Sewaarth Home Healthcare during April 4th, 2022 to July 4th, 2022.

Madhu Raturi

Place: Jaipur
Date: 29th June 2022

Head of the Organization: **Dr R. Madhu**
Name of the Organization **Sewaarth Home Health Care**

"सेवार्थ" होम हैल्थकेयर
(A Unit of Vinoenergy Resources & Ventures Pvt. Ltd.)
जी–21–22, के.के.टॉवर, जोटवाड़ा रोड,
दुध मण्डी के सामने, बनीपार्क, जयपुर

AN ODE TO IIHMR:

KNOWLEDGE HAS A BEGINNING BUT NO END

Pulkit Raturi (HHM25 Jublee Batch)
Class of 2020-22
CIIE Outreach Leader
IQAC Student Representative

ACADEMIC CERTIFICATE

This is to certify that dissertation titled ""SCOPE OF HOMECARE SERVICES IN INDIAN HEALTHCARE SYSTEM POST PANDEMIC" is a record of the research work undertaken by Mr. Pulkit Raturi in partial fulfillment of the requirements for the award of the degree of MBA (Hospital and Health Management)/MBA (Pharmaceutical Management)/MBA (Rural Management) from the IIHMR University, Jaipur under my guidance and supervision and his/her approach to the research study has been sincere, scientific, and analytical.

Dr. (Shri) P.R. Sodani
Faculty Guide
IIHMR University, Jaipur
Date: 4th July 2022

Dr. (Col.) Mahender Kumar
School Dean
IIHMR University, Jaipur
Date: 4th July 2022

ABSTRACT OF THE DISSERTATION

Background: Since the pandemic there has been an upswing in the innovation related to healthcare. When the second wave hit and the gaps in healthcare system was exposed with burden on hospital infrastructure, it drove the need into new dimension to sustain this pressure. Since 2012 HHC was expected to grow at 9% CAGR over next decade but since 2020 due to pandemic the demand has gone up in double digits to 19%. Various new innovation and method of delivery have changed the healthcare system delivery landscape. With Health IT, Data science, Hardware innovation new ways are emerging. My dissertation focuses on one of the fastest growing healthcare sector at this point of time which is Home HealthCare (HHC). The scope since pandemic has turned its attention on to how to provide care at home with specialised staff and technology. Sewaarth as an organization where I worked is bringing innovation to a traditionally non structured industry of nursing care at home in India. They are providing home healthcare services and now adding remote monitoring, assistive technology and improved scheduling algorithms. This study aims to study the scope of HHC in Indian healthcare system post pandemic.

Objective Brief: To understand the change in perception towards the HHC services since and post pandemic. This in a way leads us to the conclusion of what can be the recommended scope of HHC so that it can be better integrated into the healthcare system.

Methodology: We have deployed systematically integrative "scoping" literature review backed with a primary research survey data on perception of seeker and providers. Digital survey and interview starting end-April to mid-June (60 days) with seekers and providers respectively who were part of services with Sewaarth Care since 2019 in the city of Jaipur.

Finding: The study showed that respondents had improved awareness of services that are available for home services such nursing care, teleconsultation, therapy, medicine delivery and sample collections. With Aging population growing and various NCDs and comorbidities on rise, post pandemic respondents showed inclination in their attitude towards using HHC services. This shift accounting for close to 70% of the participating population. The papers showed that there were gaps in the home care services that could be identified by looking into its scope and integrating it within our healthcare system. It can benefit not only in urban area but also benefit in rural area where need for maternal and child care is critical.

Conclusion: With growing need for HHC there is also a need to improve the scope of care so that the delivery system can absorb the demand that has been created. **This work will extend its scope into proposing framework linking HHC sectors in my upcoming paper.**

ACKNOWLEDGEMENTS

I want to thank my faculty mentor Dr. P. R. Sodani sir for being a strong support of entrepreneurial zeal that has been infused in IIHMR University. As a guide he has been vital in allowing me to expand my horizon and learning. It would be a dream come true to create a Healthtech Unicorn that transforms the landscape of public health in India and World Over.

I also want to thank my institution's Dean, Registrar, Trustee secretary, Faculties, Support Staff (IT, Academic, Library, Accounts) for making this journey filled with valuable learnings that will remain with me forever. I thank them for their delivery, patience and care with students. Each day spent with ALL my faculties was enriching and drove my hunger to learn and apply innovation, strategy, research and science into healthcare innovation.

Special Acknowledgment to IIHMR University Jaipur's CIIE Incubation and IIHMR Startup foundation. I pledge to give back to the growth of future entrepreneurs and startup foundation.

I want to thank Sewaarth Home HealthCare Management for believing in me. Last one year of journey with them has been a validation to my knowledge and expertise in building and scaling start-ups. They allowed me to expand my horizon and express as a leader. I hope my contribution helps them scale up to new heights.

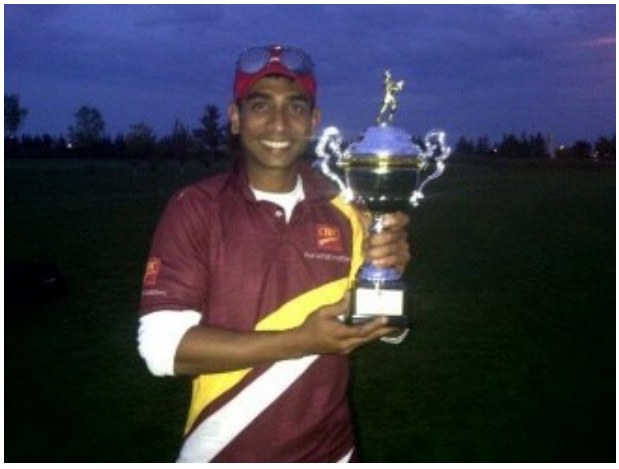
Last but not the least, I want to thank the Trinity – Mother, Father and God. They have withstood all trials and tribulations with me since my journey as an entrepreneur. Especially, last two years of pandemic thank you for being there as my boat, my sail and my anchor.

Sincerely,

Pulkit Raturi

Jaipur

11th July 2022



Contents

TITLE:

Scope of Home HealthCare Services in Indian Healthcare System Post Pandemic

ABBREVIATIONS:

Short form	Full form
3As	Availability, Affordability and Assurance
ADL	Activity of Daily Living
AI	Artificial Intelligence
ANM	Auxiliary Nurse Midwifery
ASHA	Accredited social health activist
AWW	Anganwadi Worker
CAGR	Compounded Annual Growth Rate
CKD	Chronic Kidney Disease
COPD	Chronic Inflammatory Lung Disease
CVDs	Cardio Vascular Disease
ECG	Electrocardiography
eDBs	Electronic Databases
EMR	Electronic Medical Record
eMRD	Electronic Medical Record Database
FFS	Fee for Service
HH	Household
HHA	Home Homecare Assistance
HHC	Home HealthCare
ICMR	Indian Council of Medical Research
ICT	Information and communication technology
IIPS	International Institute for Population Sciences
ILP	Integrated Linear Programming
IMR	Infant Mortality rate
ImOT	Internet of Medical Things
IOT	Internet of Things
IT	Information technology
LASI	Longitudinal Ageing Study of India
LTV	Life Time Value
MeSH	Medical Subject Heading
m-Health	Mobile Health
ML	Machine Learning
MMR	Maternal Mortality Rate
NCDs	Non-Communicable Disease
NDHM	National Digital Health Mission
NGOs	Non-Governmental Organization
NRHM	National Rural Health Mission

OECD	Organisation for Economic Co-operation and Development
OOP/OPE	Out of Pocket Expenditure
PHEIC	Public Health Emergency of International Concern
PMJAY	Pradhan Mantri Jan Arogya Yojana
PPP	Public Private Partnership
QOL	Quality of Living
RDW	Recently Delivered Woman
RHeMoS	Remote Health Monitoring System
RMNCH+A	Reproductive, Maternal, Newborn, Child and Adolescent Health
RPM	Remote Patient Monitoring
SDG	Sustainable Development Goals
TKR	Total Knee Replacement
UHC	Universal Health Coverage
UHC	Universal Health Coverage
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund
UNICEF	United Nations International Children's Emergency Fund
VBHS	Value Based Health System
VR	Virtual Reality
WHO	World Health Organization

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Introduction

CHAPTER 1 - INTRODUCTION:

In today's world when healthcare has become a pivotal point in everyone's life and people around them; we tend to search for options for better quality, ease of accessing, control over management, and way to monitor smartly the health of ourselves and our loved ones. PHEIC was declared with pandemic of Covid-19 and it shook the world in early days of year 2020. Healthcare has taken a new definition for both service providers and service seekers. When the clear protocols were for people to stay at home then a lot of way people access healthcare was also bound to change.

During covid and especially after the aftermath of second wave (delta) in 2021 the crack in healthcare system was visibly obvious. Where there were problems likes shortage of beds/supplies/oxygen, over charging rates, non-coverage of insurance, co-morbidity and isolation challenges, unable to travel to loved ones especially elders healthcare system saw a surge in overcoming these challenges by being proactive with health, transferring health and life risks as well as finding alternatives of hospitals for healthcare needs. India spends Very less as per capita income on the health and health Insurance. However, with growing concern of unexpected events, National Health Policy launched in 2017 recognizes the goal that spending in India is expected to rise from current 1.15% to 2.5 % of GDP by 2025 [1]. These challenges and avenues presented innovators, service providers and demanding seekers to look at services such as tele medicine, home healthcare services, remote monitoring, home delivery of pharmacy/medical supplies/equipment, home lab sample collections and test. However, most part of these services remains surprisingly an unorganized sector and needs reform to ensure quality of care can be delivered of which the resultant is trust and growth in demand. With the elderly population average age growing to 73.4 as per the stats in 2019 [2] there is also growing NCDs, chronic diseases (figure 1).

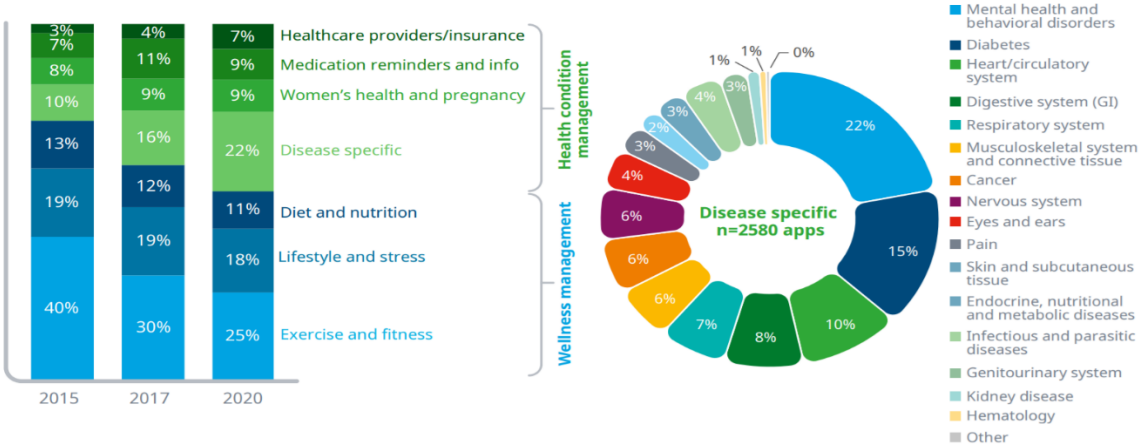

Figure 1: IQVIA digital Health Trends 2021 (source: IQVIA posted by Mantra Labs Global)

Thus specialized care and monitoring system have to be put in place which utilizes technology both software and hardware such as IOT and RPM systems. There are few studies that are pointing towards care given at home were made better because of the assistive technology around the patient [3]. In major stats provided by WHO in 2015, senior citizen world population (over 60) was 12.3% (377 million), with 50% of them living in the Asia-pacific region. It is estimated that by 2030, this percentage will rise to 16.5% of the world population. The percentage will rise to 55% in Asia Pacific during this time which is estimated to be 456 million. Another report states that over 50% of Asian population lives in rural area [4] which makes providing healthcare to each and every one under the 3A's becomes even more challenging. As per the LASI study commissioned by Health Ministry was conducted by IIPS [5], suggested that in the scope of Indian sub-continent in 2011 national census 60 plus age group population comprises of 8.6% amounting to 103 million. With 3% annual growth of this segment and Mortality rate decreasing, by 2050 this number will rise to 319 million (from 9% to almost 19%).

	1981	1991	2001	2011
Population size (millions)	683	846	1028	1210
Decadal growth of population	24.7	23.7	21.54	17.7
Elderly population (age 60 and above) (millions)	44	57	77	103
Infant mortality rate per 1000	110	80	66	47*
Crude birth rate per 1000	33.9	29.5	25.4	22.1*
Crude death rate per 1000	12.5	9.8	8.4	7.2*

*refers to the year 2010
Source: Office of Registrar General of India, Census of India 2011, Office of the Registrar General of India, Sample Registration System (2009, 2011, 2012-16, 2017), Office of Registrar General of India, New Delhi

Figure 2:Trends in population indicators, India, 1981-2011 (source: Harvard Lasi report)

The study that was in joint venture with the USC (California), Harvard School of Public Health, the National Institute on Ageing and the UNFPA the study further pointed out that 75% of old age population has some chronic disease, about 40% some disability and 20% suffer from mental health issues. Again, as per WHO [6] in the last few years, a new category of senior citizen has emerged, namely super-agers. These individuals in their 70s and 80s have the mental or physical capability of their decades-younger counterparts. As per WHO, by 2030 thirty four nations will have their 20% population above 65.years. This can also been seen in trending change in age pyramid through demographic transition of countries as they move up in HDI index. Thus, for the foreseeable burden that is about to happen in less than a decade on the healthcare system in India and worldwide; we need systematic, standardized, professional and complete continuum of home care model that

meets the psychological, social and physical care needs of patients to ensure the growth, development reducing the burden on Indian healthcare delivery system via the home care model. These cares are considerably flexible and an extension to VBHS models thus extra care must be given to planned needs of both patients and caregivers in order to provide the patient with the best nursing services. The combination of growth in aging population, co-morbidity, NCDs are factor contributing to the growing importance and need for a comprehensive, organized and now smartly digitalized HHC solution. What is catalysing this need is increasing accessibility and improved perceptive awareness factors post pandemic. With professionals working outstations, nuclear family systems, high levels of stress and a lack of work-life balance are the catalyst for this growing need. What has added fuel on fire in last two years due to extraordinary events of Pandemic which has bought in other challenges like HAI fear, cost of admittance and overall lack of facility in case of such pressing emergency like delta wave 2021 of Corona virus.

SOME OF HHC:

Home Health Care (Homecare and Home Healthcare)	Skilled nursing, Patient care givers, Hospice and Palliative care services, Physiotherapy, Pregnancy care, Lifestyle/chronic disease management services, Cancer care services
Therapy at Home	Physio, Occupational, Repertory, Yoga, Naturopathic, Infusion, Diet and Nutritional (also part of teleconsultation)
Additional Auxiliary services as Created by Sewaarth Home Healthcare	
Therapeutic segment	C-PAP, Bi-PAP, ventilators, nebulizers, oxygen delivery systems, IV equipment, dialysis equipment, inhalers, insulin delivery, ostomy devices
Diagnostics and monitoring products	Blood glucose monitors, blood pressure monitors, pulse oximeters, heart rate monitors, Various testing and monitoring devices, Different test kits like pregnancy/sugar, Smart Wearable technology, Biomarkers
Mobility care products	Wheelchairs, walkers, canes, crutches and mobility scooters, motorized stairway seats, Tube Elevators,
ePharmacy, Sample collection	Various Platforms are available ow integrating with HHC services – supplying both Modern as well as alternative medications and prescription refill. They are also provide lab sample collection (pick up and drop off)
Teleconsultation and eMRD	Various different smart integrated platforms are coming up that are managing patient appoints and has been legalized by government after "stay at home" policy during lockdown. eMRD can be captured using smarten, typing, voice recognition, tablet driven tapping
EMR (Ambulatory services)	Part of integrated service Sewaarth has kept 2 ambulances to cater to their home healthcare clients and their regular pick up and dropoff
Mobile ICUs, Smart Homes	This market is still in infancy stages in India but soon to pick up. Ambulances equipped with critical care equipment

Table 1: Segments in HHC (Sources: Various – John Hopkins, Grandview, MarketsandMarkets)

As shown in figure 1 below an example of IEC material to educate people and customers. In India homecare is predominantly perceived as Home Healthcare. Perception is changing and people are realizing that in replacement to hospital one can get specialized care at home.

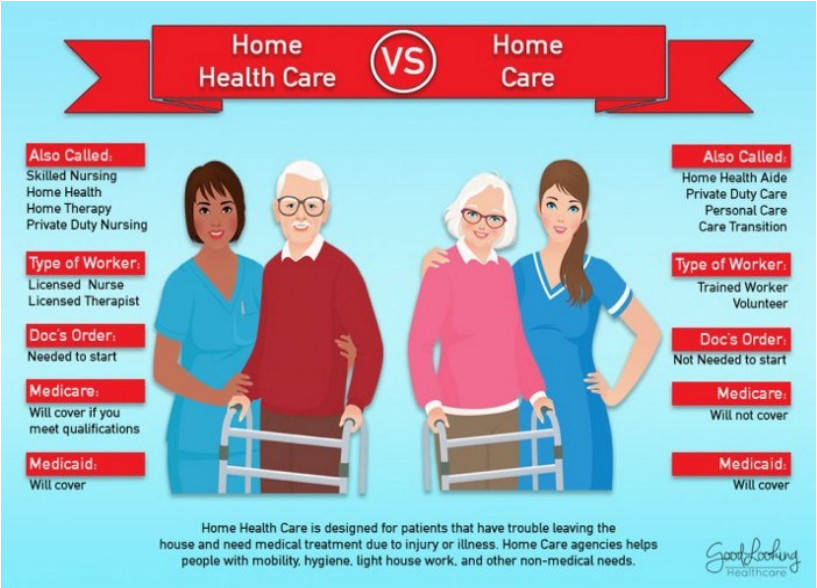

Figure 3: Difference in HHC service (Source: Clinic on wheels, Good looking healthcare)

Comparison Chart

eHealth	Digital Health
It is a healthcare practice supported by the use of information and communication technologies in the healthcare space.	It represents an evolutionary adaptation of the art and science of medicine to pervasive information and communication technologies (ICTs).
The goal is to improve the accessibility and quality of care in the health system using ICTs.	The goal is to implement and leverage ICTs to deliver and scale healthcare to the masses.
eHealth tools include products, systems and services that go beyond simply Internet-based applications.	Digital Health tools refer to the technologies that deliver services to consumer and patients and help them manage personal health and wellness.
Examples include electronic health records, health information networks, telemedicine services, health portals, etc.	Examples of such technology include apps, telemedicine, electronic medical records, 'connected medicine' and 'smart homes'.

DB Difference Between.net

Figure 4: IEC Training Provider: eHealth vs. Digital health (source: DifferenceBetween.net)

RESEARCH FOUCS AREA:

To understand the scope of home healthcare market we break down the areas in which HHC needs to be divided into following sectors:

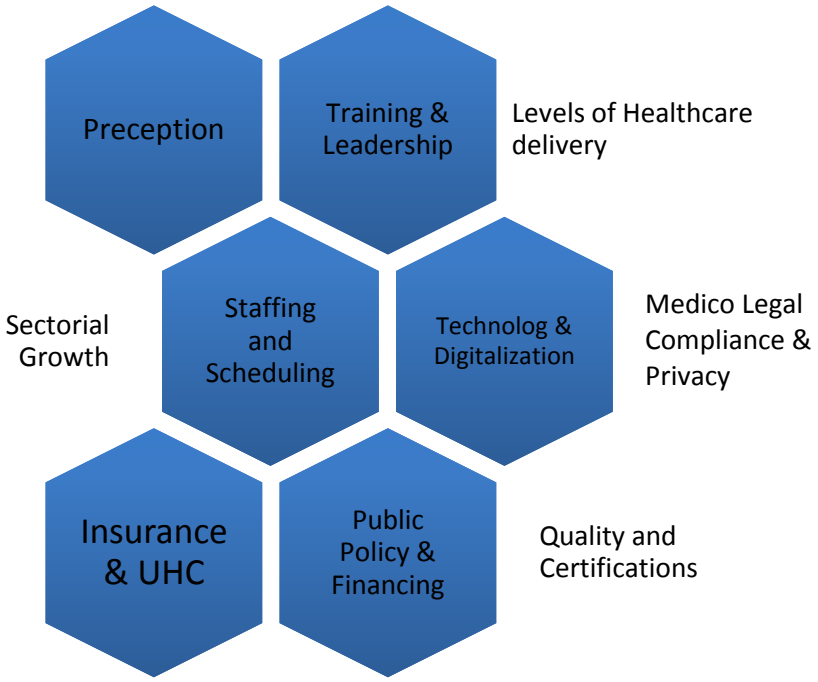

Figure 5: Important aspect of HHC

The above focus areas where carefully selected to try and make a comprehensive approach towards the scope of HHC system. Such studies were hard to find and saw a lot of focus on individual areas which lead us to believe that such compressive literature review will be helpful in visualizing bigger picture and goal for HHC.

A telephonic interview was conducted with various healthcare providers to seek their opinion and feedback in making this research work more comprehensive. Majority of them agreed on all the above mentioned points however giving the maximum important to Perception, Staffing, Training and Pocket spending as key issues of delivering healthcare. They also agreed in today's digital world technology places a vital role in solving the HHC service delivery related challenges and making it an affordable and reliable substitute.

Let us go over the brief of each of these dimensions of HHC that we undertook for the study:

1. Perception:

This aspect particularly relates to the mindset (attitude) with the client seeking HHC service is key to the way service has been operating in India till now. The prices, quality of staffing,

demands were all varied. It was important for us to come up with a perception study post pandemic to see how people think about home healthcare. The other dimension of perception that we covered over telephonic informal interviews with HHC providers, and staff told us what they thought about the HHC services overall and where client affects them the most in terms of delivering a good quality services (could be positive or undermining). The third dimension of perception study was what people thought about technology (both patients and care providers/practitioners). This perception resulted in the majority of the reasons why client wanted to always negotiate on price and services provided by the HHC service provider.

2. Training & Leadership:

One of the major challenges for service provider was organizing trained and qualified staff that not only can be made potential leaders but also match the varying demand of a patient care at home. Due to the pricing negotiation and perception it was seen that the staffing quality suffered. It always affected the quality of intake and their further development within the organization to improve and take on leadership role. This currently also can be attributed due to the demand and supply mismatch, where there is demand but with pricing and service desired mismatch either the client doesn't take services or the service provider is unable to match the terms. Primarily right now there is more demand (buyers' market) and due to that client tend to dictate prices. From 2020 till the end of 2021 due to the shortage of staff and extraordinary circumstance created a suppliers market which gave a glimpse and chance to service providers to adjust their prices to a sustainable margins. However. Still this can be related to the sector of nursing still being unorganized and not strictly regulated like western and European countries. Globally, in west and Europe families are already making home carers or elder care homes the first choice for their elder patients thus creating demand for Healthcare professionals. Even thought, the South East Asia is facing a major overcrowding problem and aging problem, after reaching a certain level of schooling accreditation, the population has turned to vocational training in nursing rather than formal education. It has become a breeding ground for trained caregivers. This symbiotic relationship with western, European, middle eastern countries has ability to satisfy both the internal and the external demands of HR at one end and economic gain at the other spectrum. In India to match these standards we have to thing in a new way to train and prepare staff for complex HHC services as well as leadership roles to take on managerial position or upskilling.

3. Insurance and UHC:

Third important area where both clients and service provider believe creates the most hurdle is understanding why the prices of HHC service delivery and out of pocket burden that HHC service seekers have to face. It overall affects the perception and demand with hesitations to spending money to get quality of care. Thus forcing providers to use untrained staff to meet the pricing demands or client themselves resorting to getting a domestic help rather than getting a specialized HHC. If the coverage of HHC services were regulated under the insurance package and regulated at public level as UHC (PMJAY) then various healthcare needs and gaps will be fulfilled reducing the burden on both public and private sector.

Another way to achieve this is to look at VBHS. Various different VBHS models are available which can be implemented with the public policy to improve UHC usage and governance. Some of the Low to medium risk models that can work well with the HHC services both in urban and public sectors are:

MODEL	FINANCIALRISK TO PROVIDER	DELIVERY	DESCRIPTION
"Pay for performance"	"Low-moderate risk"	Incentivizing the performance of care provider based on the health parameters of the patient	Best suited for ASHA, ANM workers who can be deployed for HHC services during pregnancy and Post pregnancy. Deployment in Public sector can work really well. Hilly Rural Tribal Areas where care is hard to reach volunteers can be trained to give these services
"Patient-centric medical home"	"Moderate risk"	A curated plan for the patient is created with professionals like Nursing, Doctors, monitoring devices and response unit is integrated.	Best suited in private sector or where the per capita purchasing power is reasonably high. Work well for NCD , terminal, chronic disease patients Can also be applied to public sector involving pay for performance mode given to provider
"Shared savings"	"Moderate risk"	A payer and provider bond is created for the service provided, medical costs including patient attribution. "Providers would submit bills and claims in the routine FFS model."	Works well in PPP model and can be applied with UHC. People having UHC card can go and avail services at private hospitals including taking HHC service in future. One disadvantage of this model is that if the provider works in a cost effective manner then they wouldn't opt this system

Table 2: Various low to medium risk VBHS models for HHC (Source: Centre for Healthcare Quality and Payment Reform)

4. Scheduling and Staff

Another challenge was idle time of the staff which created gaps for them to search and work for multiple organization to cover their basic living. The challenge remains on how to best utilize the staff to optimize their performance and attached motivation that meets their financial needs and requirements to run their HH. The challenge of scheduling is also vital to better implement constant staffing process. Even though still working as a general duty attendant, skilled nursing services has the lion portion of home care services market in the year 2019 according to a report from markets and markets. After pandemic, change in health belief system and fear of HIA - Skilled nursing care at home is starting to get recognition compared to residing at a hospital, nursing care homes or assisted living centres. [7] [8]

Reports and observational learning has suggested that skilled nursing staff is working multiple jobs, primarily in a hospital and doing HHC duties as a freelance. Thus these loosely bound work contracts in home healthcare industry is plagued with high attrition rates and lack of good retention. Despite of being a vital cog in the wheel to deliver care at home, various factors such as management backing, work culture, reward and recognition, perks (like pensions, saving coverage) and steady work flow from the agency are the common reasons for retention in nurses working in home healthcare. Workload (idle time), personal issues (financial needs) and communication gap are the driving factors for attrition in the HHC organization. As the demand and need for HHC is picking up these attritions are having impact on the business of home healthcare organizations who have just started and trying to steady their ship. The organization need to have comprehensive HR strategies in place to address this issue. In public sector as well, where NRHM has targets to meet NHP 2017 and SDG 2030 for programs likes RMNCH+A Health workforce play a significant building block in for strengthening of the health systems with nurses playing a key role both in providing adequate healthcare services. Though the healthcare sector is making significant improvement, there is a shortage of skilled health workforce.

5. Technology and Digitalization

Currently the technology and digitalization that has been infused in healthcare sector ranges from Software's, Data Science, Hardware integration. These can then be implemented in form of innovation such as Mobile Telemedicine Platforms, HIS/HMS, Diagnostic and Testing Software, Chabot, AI/ML, IOT , Remote Monitoring to name a few [9].

These advancements have now also entered the space of HHC where with use of technology

various challenges associated with VBHS delivery and quality can be addressed. It has allowed for integration with remote monitoring devices and such as been observed has accelerated in last two years.

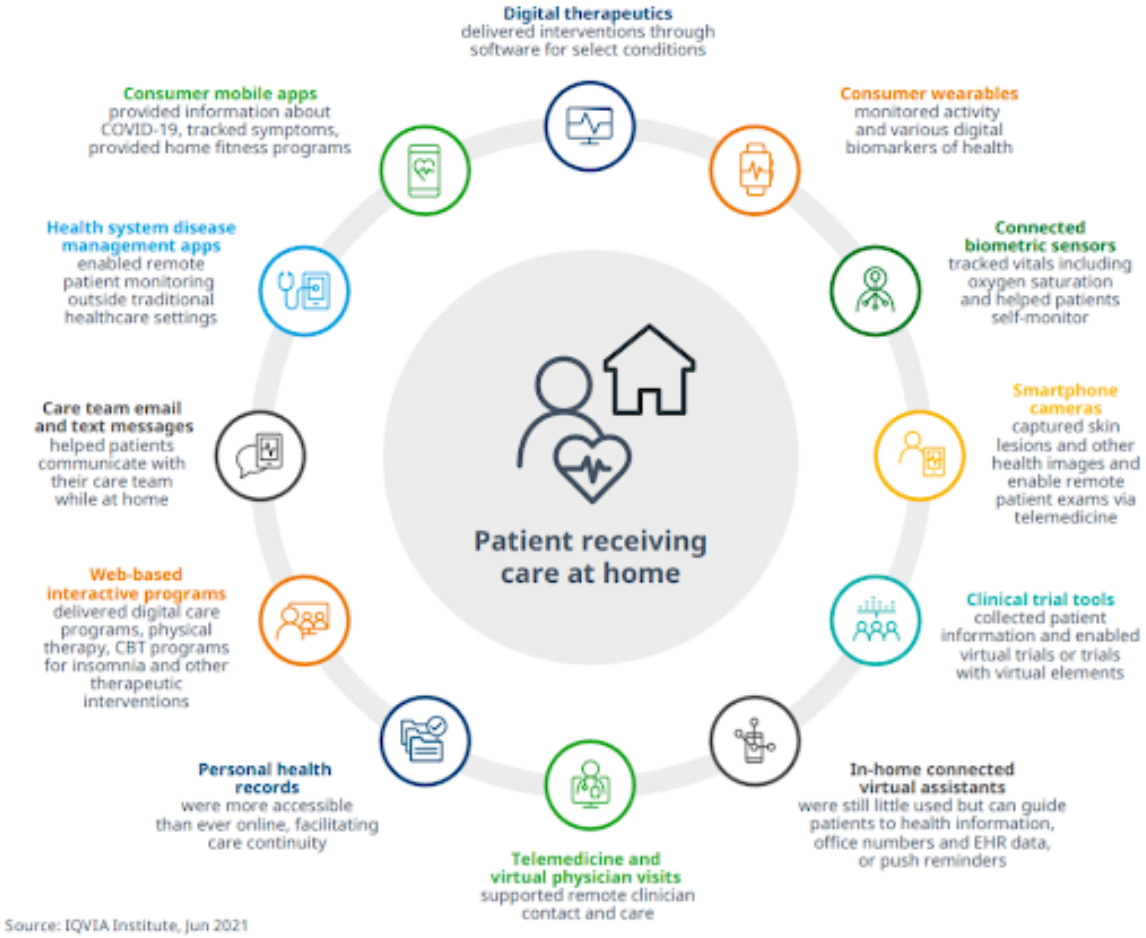

Figure 6: Digital Health Tools for patient receiving care at home (Source: IQVIA 2021)

Today, HHC is fast becoming synonym for Remote care management. Soon it will be the mainstay for hospitals and services providers to balance out the patient load at hospital. This can work really well in any future aftermath of pandemic outbreak where healthcare system might not be able to handle the admittance and resource.

As the health system is improving and we are seeing that age pyramid is inverting with elderly population growing the healthcare staff needs to have assistive technology to help them monitor and transmit/store data. These technology is not only being used in urban area b ut encouragingly is getting deployed to tackle health challenges with hilly, tribal, rural areas. These vulnerable population is able to get access to healthcare with various missions (Ayushman Bharat, NDHM), with ground staff helping with delivery and technology like telemedicine improving with every use in such areas were connectivity for hardware and

software is a major challenge (electricity, internet speed, maintenance & repairs) [10]

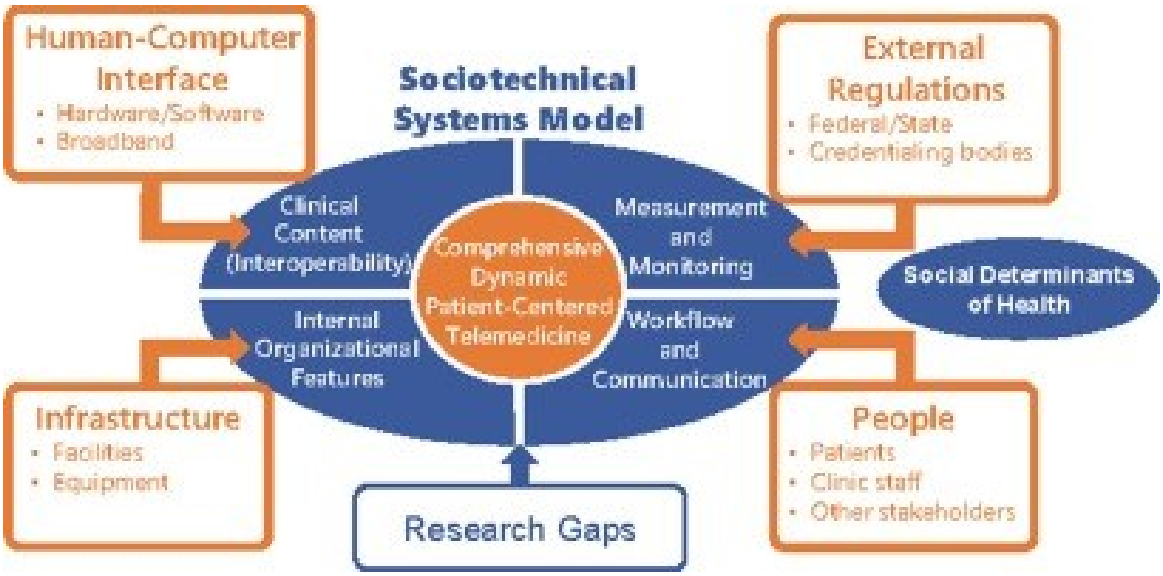

Figure 7: A framework for patient-centered telemedicine (Source: Science Direct)

With the latest 5G connectivity and improved computational power in newer hardware's when you integrate that with HHC service along with remote monitoring you can really ensure that HHC patient is not only given in person monitoring but also can be monitored remotely by a specialist and emergency medical response unit in case of emergency [11].

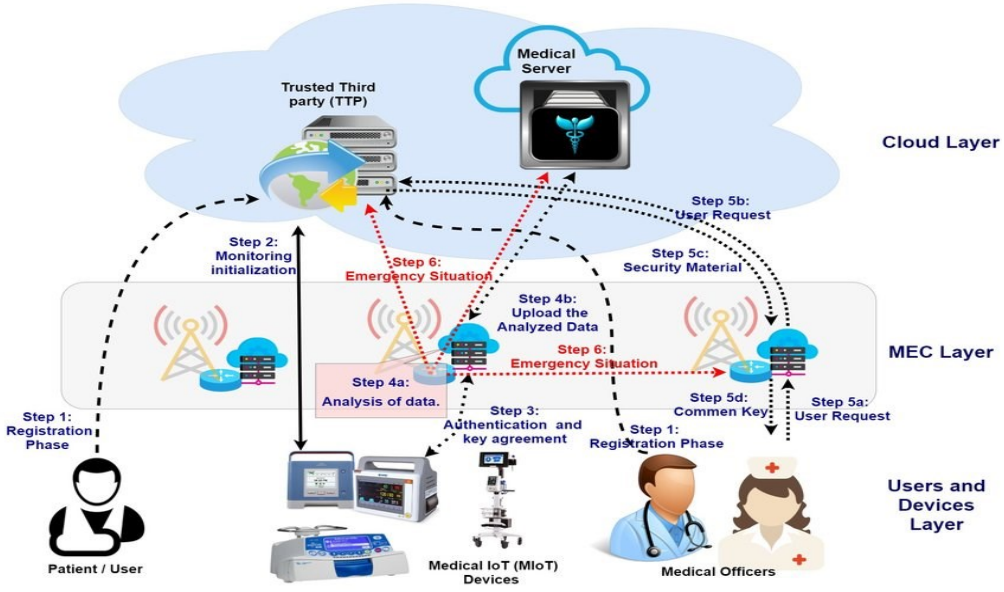

Figure 8: Six concrete steps for scheme in 5G (Source:JSC ResearchGate)

6. Quality and Certifications

Quality of care relates to refining and standardization, monitoring/ evaluation of these

deliveries and reappraising them for improvements. In HHC it becomes even more vital as care is being delivered under a single supervision of healthcare nursing attendant. At the current level of standard it can be observed that in India nursing sector remains unorganized for most part. However, special emphasis have now been given both in private and public sector to the quality of nursing training. There are few other aspects of quality that should be made inclusive of what it takes to provide HHC services. It could simply being how well the staff is equipped or prepared to tackle the needs of patient or what indicators monitoring devices are generating. These quality indicators can be related to technology, service delivery, staffing, and training. One thing Sewaarth realizes is the need of applying Lean Six Sigma processes to improve and standardize their services. This focus on quality will allow various aspects of HHC to be addressed which may relate to being approved for insurance, acceptance of services as part of normal healthcare delivery system. This HHC sector is also seeing better norms and reforms emerging to ensure governance is also part of quality both at public and private sector. Certain certifications will insist that not just services but also the hardware and newer innovation follow a standard that can ensure HHC can be at par replacement for care in hospital.

7. Sectorial growth

Currently the HHC market is growing at a phenomenal rate. Various start-ups and innovations are encouraged and driving the market forward. The CAGR is double of what was expected two years ago for HHC (i.e. 19.6% to 9%) [12] [13].

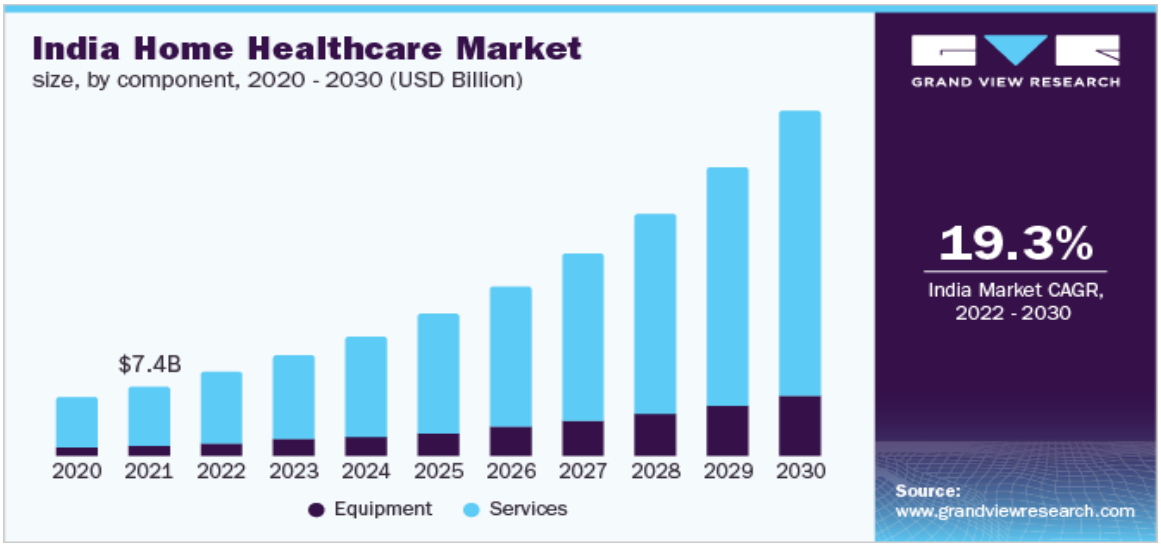

Figure 9: Indian HHC market (source: grand view research)

Another report from Mckinsey (figure 8 below) shows the sectorial growth of various

verticals within healthcare sector that can be applied and plugged into HHC sector. In fact with HHC sector such deliveries are much easier to patch up due to the flexible nature of service given in HHC. While the challenge may remain if the specialized care can have specialized staff or not all the time, but technology and innovation with AI and ML is bridging the learning gap with intuitive system with alerts to assist nursing staff at home. As the market is reaching saturation in Americas and Europe, market players are now shifting their focus towards emerging economies of Asia Pacific as the concept of home healthcare in counties like China and India is at the emerging phase. These countries especially Philippines remains the power house of producing healthcare workers in demand in western world [7] [8]

			Market size in Asia, estimated		
Category	Value pool	Example technologies	Market size 2020, $ billion	Market size 2025, $ billion	CAGR 2020–25, %
Wellness and disease prevention	Improve wellness and prevent disease	Wearables, activity trackers, fitness	2.3	6.6	23
Screening and diagnosis	Intercept diseases through screening	Genomics, other omics	3.5	11.7	28
	Identify the right patient	Digital diagnostics, AI imaging	1.6	3.6	18
Care delivery	Provide more effective therapies	CDM, digital therapies (CDS, cognitive games)[1]	6.1	7.6	4
	Provide remote patient support	Telemedicine, remote monitoring	16.8	37.1	17
	Supply therapies to patients	Digital pharmacies	7.1	33.8	37
Total			37.4	100.4	21 (average)

[1] CDM, chronic disease management; CDS, clinical decision support.
Source: Arizton Advisory and Intelligence; BCC Research; MarketsandMarkets; Mind Commerce; TechNavio

Figure 10: Inside Look: The Future of Digital Health in Asia (McKinsey Insights)

This growth has given people chance to cater to the healthcare needs and services in their own unique ways. Sewaarth Home Healthcare start up is just doing that. It has found a vacuum in the HHC market and they are adopting the technology to provide the care that can be equated at part with being admitted at hospital. This sectorial growth has given Sewaarth a chance to raise funds via grants and fellowships. With Support of IIHMR university's CIIE

Sewaarth has completed a few cycles of learning and development. As a VBHS model of acute care delivery grows, home health will also gain traction. VC and private equity investments in digital health in Asia have grown at 38% CAGR from 2015 to 2020. As a result, today Asia comprises 44% of global VC/private equity investments in digital health—$6 billion of $14 billion. [4] With future innovation investments in new, less intrusive technologies that aims to reduce the burden for health management in hospitals both public and private, smart and innovative home health models will emerge that will cater to the variety of illnesses that may be diagnosed and treated at home. With support from government and various private players' missions such as Startup India, Make in India, National Digital Health Mission has catapulted innovation that solves various challenges in private and public health. There are government projects like e-Ayushadhi and various other smart telemedicine solutions coming and to validate that it has been observed CAGR of astonishing 31% which has gone up in terms of capital markets to USD5.5 Billion by year 2025 [14]. Despite during pandemic home healthcare market seeing mixed results in demand with people avoiding outside workers entering the home, due to shortage of oxygen, the maximum mover was the therapeutic segment accounted for largest revenue share of over 40 percent from 2019 to 50% by end of 2020; attributed to home respiratory therapy equipment. In healthcare segment in general Diagnostics segment moved from 35% revenue in 2019 to over 45% by end of 2020. It is forecasted to have the fastest CAGR in the upcoming period. This will likely propel due to accurate and timely diagnosis using strapless heart monitor, TQR heart rate watches. Newer portable diagnostic testing machines and better sensory devices are flooding the market with health habits and trends of users tilting towards being conscious about their real time health status and monitoring. Mobility assistive market is nearing its much forecasted growth owing to increasing incidents of NCDs, increasing case of multiple co-morbidities, growing geriatric population and rise in disorders and disabilities. It is estimated Smart homes and Mobile ICUs will see their market share in terms of revenue jump up in another five years of time.

The founder of Sewaarth is an astonishing 67 yr. old doctor turned entrepreneur. She is benefitting from this sectorial surge and support start up ecosystem such as IIHMR itself and government is providing.

8. Public Policy and Financing

Currently the public policy and financing in India is gearing towards meeting various

healthcare needs that specially focuses on maternal and child health in public sector. HHC can be an important initiative in policy making where ANM, ASHA, ANGANWADI workers can be deployed to provide HHC services during formidable days of pregnancy, delivery and post-delivery. Challenge remains is the budget spending and the UHC implementation. Where budgets allocation is either underspent or ill-budgeted, UHC is yet to be properly implemented to limit frauds and inaccessibility. Once ironed out can be used to avail HHC services. With this research we hope to gain insight to propose policies towards the certification, medico-legal application should be incorporated to ensure the acceptance of these services within our healthcare delivery system is recognized. Just the way investment in private sector is being boosted by PE/VC firms the funding and development partners like UNDP , UNFPA, Melinda Gates foundations (to name a few) are working on figuring out how to best utilize the funds given to various NGOs and Public sources to improve healthcare. One way to look at it is by focusing on VBHS. In public sector it can work well as the main focus of VBHS remains with the improving patient's experience which is resultant of health outcome, standardizing services cost and treatment outcomes of disease, coordinating various departments in synchronicity (HW, Data Managers, Program Managers, Health care professionals and Institutions), and then finally being able to improve and sustain continuum of care. Implementing value based care would require and thus enforce building blocks of public health to work more efficiently trying to achieve 3A's. As per Niti Ayog and NHP 2017 and reports by WHO, UNFPA, UNICEF point out that India, as it is largely based on "Fee for service" and "Out of pocket expenditure" and healthcare spending is poor. Thus both Central and state governments play a major role in implementing a need based system as well as improve further spending in healthcare (only spending 2.1% of GDP). India has a task ahead to reduce MMR, IMR, Nutrition [15] and improve UHC through world's largest insurance scheme PMJAY-Ayushman Bharat with its public funding and focussing both on curative and preventive care, would put in place the under structure for value based care in India. Thus HHC services can work very well in public space as well by adding additional value and SOPs to the HW staff on field. With 65% of Indian Population being rural [16], it is important to address the growing need to give specialized care to mother and child to begin with. Indian public and private players (for PPP) can refer to the HHC market globally and established trend in the American and European Continents. This can be attributed to the favourable regulations and policies here. As India with Ayushman Bharat is moving towards some of these benchmark established by developed nations, maybe it is time to implement

HHC services to tackle Mother and Child challenges. It is proactively complementary as our nation has announced National Health Policy stating to meet targets by 2025 and SDG goals fast approaching by 2030, some radical thinking is required to improve the healthcare challenges in non-urban India through public policy and healthcare financing.

9. Level of Healthcare Delivery

Currently we define three different levels of healthcare delivery (Fig 9). There is a need for healthcare delivery system to better categorized and address the systematic need of HHC and its importance in today's world. With the pandemic it has become evident that three levels of care needs revamping and restricting and with the focus on being improving care delivery system and recognizing the impact of technology and new diseases being discovered with potent virility. Smart homes which are sensor enabled can help disabled or immobile patients at home to be not isolated and get assisted without disturbing or limiting daily life of other family members [17].

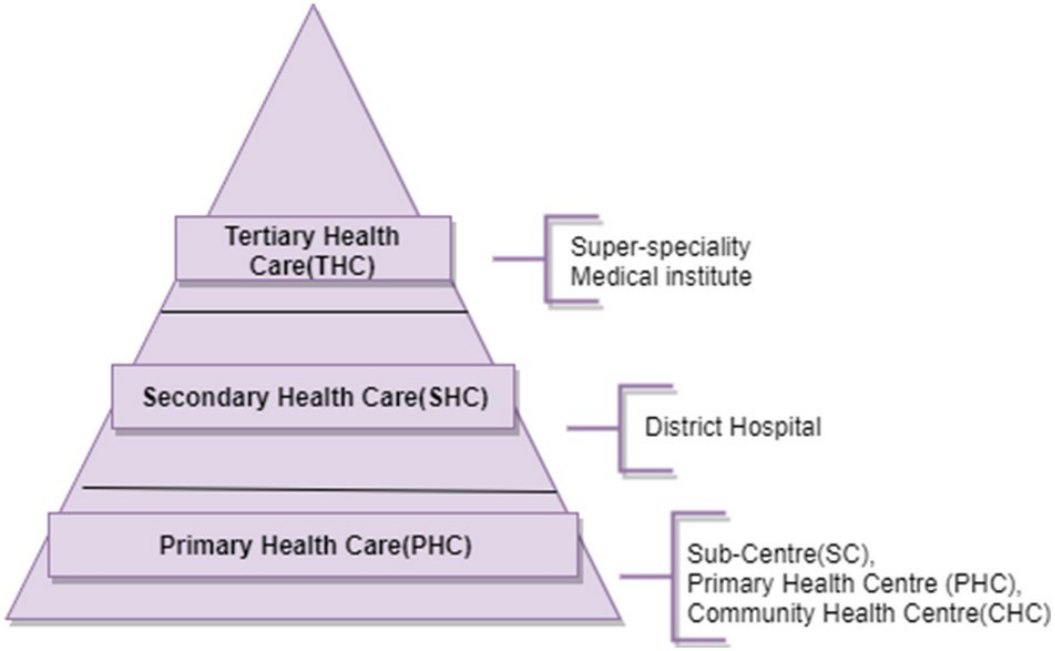

Figure 11: Levels of HealthCare delivery systems at public level (source: Springer Publications)

HHC can bring positive changes in the health care delivery model on principles of 3A's by the means of providing needs of the patient, including home medical care or even non-medical assistance such as Transactional Services (Sample collection, vaccination at home). Delta Variant in 2021 proved the point that neither public nor private systems were capable of dealing with the pressure and challenges in supply chain management of vital medical supplies such as oxygen and vaccination. As per WHO and NCDS body of India the non-

communicable disease is growing at a very fast pace accounting for 5.8 Million death in India in 2019 (Globally it will grow from 41 million to 55 million deaths by 2030) it is evident that more and more people are suffering from long term comorbidities and ailments. While system recuperated in time to come this reactive knee jerk reaction can be avoided in the future cases of outbreaks and international/national health emergencies. If HHC is integrated as a recognized part of level of care delivery system we will be able to address the need for care better and more efficiently.

10. Medico Legal Compliance & Privacy

With growing need of HHC services and data being shared via cloud there are lot of new challenges that are emerging which have been overlooked because of loose compliances. With more and more people demanding care, one wonders what will happen if one loses a family member and pins the blame on the nurse working there. Similarly there is all kind of health data that along with your personal information is digitally available by choice or unknowingly. What about the security and privacy of that. There are lot of things the HHC providers have to think about to create an environment that only provides quality of care but also is able to protect their own business from unforeseen challenges. Citing statistics from the research registry, he said the cases of medical negligence have gone up by 400|%. [18]. We can again refer to the standards followed and created by Western and European Nations where there is socialistic base of UHC and have well integrated HHC services part of their offerings. The regulations, policy governing should be studied to implement. Also the use of past medico legal cases involving nursing staff and healthcare worker can be reviewed to ensure the policy and regulations can be attached to HHC sector.

KEYWORDS:

Healthcare systems, Care coordination, Delivery of home health care, Scheduling of Home Health services, Financial Coverage of Home care services, Nursing Administration, Quality of home health care, Remote Health Care, Mobile Health Care, Mobile ICUs, Health Insurance, Health IT, UI/UX, Value Base Health System, National Rural Health Mission, Maternal health, Medicolegal compliance, ICT, RPM, wearable monitoring devices, SMART Homes, ImOT, IOT, Remote Patient Monitoring, Home Healthcare Markets, Nurse Staffing, Patient Perception, Policy & Regulation, Healthcare Service delivery

Chapter 2:

Literature Review

CHAPTER 2 - LITERATURE REVIEW:

Our Literature review was done with intention to understand and refine the Research Question. The path that was taken to start the initial literature review was done to make sense of the holistic view towards HHC and observational learning while working with Sewaarth HHC. We also used literature review to understand what best way possible will it be to move forward in terms of methodology.

AIM:

We wish to understand if post pandemic from 2020-2021 (two years) the perception has changed the HHC industry in the context of Indian healthcare system

OBJECTIVE:

1. Perception of health seekers
2. Needs and desire of types of services
3. Quality to be monitored for at par services
4. Where does home health care services fit in healthcare pyramid
5. Areas of challenges to be identified in HHC services

RESEARCH GAP/ OBSERVATIONAL HYPOTHESIS:

Since pandemic especially since the second wave in 2021 perception on HHC services have changed - post pandemic people are more than likely to consider the home healthcare services. However, we lack comprehensive understanding of what should be the scope of HHC services in content of Indian healthcare system for which we need to look at a holistic approach. However there is lack of such studies to understand the complete scope of HHC which we have identified and will be addressed in the research.

Research Paper 1:

Title: HealthCare System in India: An Overview (march 2020) [19]

Author: Seilan Anbu from Scott Christian College Nagercoil India

Source: International issues on Health Economics and Management researchgate.net/publication/340085233

Methodology: Systematic literature review of healthcare systems and secondary data available on the public health portals

Findings:

There were key challenges found and hence this article was important to find gaps that have been reviewed. The gaps that were found were:

1. Maternal and child health
2. Childhood nutrition
3. New Diseases on rise (such as Corona Covid-19)
4. Unfinished areas of communicable disease and growing vector borne disease
5. Financial burden – also including pocket spending and UHC
6. Shortage of Trained staff

This has led to systematic hurdles both at the state and central level in Indian healthcare system

1. Low effectiveness of public health spending
2. Unregulated private provision of healthcare
3. Lack of adequate health insurance
4. Little Emphasis on Communication to Improve Health and Create Demand for Health Services

This leads to following conclusion that

There is imbalance in India healthcare system. While we have facilities that are elite and medical tourism is on rise there are large section of Indian citizen deprived of proper healthcare as per the definition given in Article 21 of constitution. There is a huge scope in public health where NRHM has lot to achieve.

Our thoughts:

It leads us to the question for our research work that does the homecare services are need of the hour in only the major cities or does this have scope in rural parts of India too. Will it help with some of the gaps and ease up systematic hurdles. Annually India loose a certain amount of GDP due to such healthcare inefficiencies which affect the citizen of India financially and health wise for long term.

Research Paper 2:

Title: We Tie Up the Loose Ends": Homecare Nursing in a Changing Health Care Landscape (nov 2018) [20]

Author: Line Melby , Aud Obstfelder, and Ragnhild Hellesø

Source: Global Qualitative Nursing Research Volume 5: 1–11 (sage publications)

Methodology: This article is based on data collected for two of our previous research studies (first one via home visit observing studied the interaction between homecare nurses, GPs, and hospital staff, as well as how homecare nurses used an electronic messaging system as a collaborative tool and second one conducted interviews homecare nurses , case handlers, administrative staff

Findings:

1. Homecare nursing staff are usually negotiating their care level as it is hard to standardize especially involving patients family member demanding different settings
2. Homecare nurses' practice has become increasingly advanced, and homecare nurses now perform procedures that previously took place only in hospitals thanks to portable technology and monitoring tools that are patched in while patient gets care at home and is being remotely monitored.
3. With new diseases and co-morbidities on rise the care trajectory are very complex and requires more coordination and preparedness for emergency situation which can be a liability if care is not provided on time. This also requires communication with independent players in the process of care reaching the patient at home.

The article highlights three key areas of homecare that are most in demand and performed which can be improved to ensure more organized and better care is given. It also remains its biggest strength that the care at home can be made flexible and adaptive to the need of patient. It also highlights the role of education and training to help prepare nurses for such situations and newer technologies.

Our thoughts:

We have also observed that care remain unstructured for most part thus rendering it hard to give a systematic care at home needing modifications and changes. This is a case where we understand that maybe use of technology and interfacing IOT based devices can ensure that we can ease up some of these workload and build another case of streamlining the homecare nursing work as well as infusing quality.

Research Paper 3:

Title: Home Health Care in India: In Search of the Right Business Model [21]

Author: Wharton School of Hospital Management

Source: https://knowledge.wharton.upenn.edu/article/home-health-care-india-search-right-business-model/

Findings:

This article from prestigious Ivy League school's hospital management program tell us about if there is a right model that can work in India for the healthcare system. According to this insightful article global home health care market, which includes devices, products and services, was worth almost $215 billion in 2013 and is projected to grow at 8% per annum until 2020. Considering that pandemic disrupted everything in the middle since 2020 onwards

the growth of this homecare services seeing the gaps in the hospital system has just gone beyond double to 18% in India. Other major reason is that India has the second largest geriatric population in the world.

With latest advancements and extreme push for entrepreneurs to come up with solution, India has come together to solve their healthcare system gaps.

The challenge that remains is that there is a systematic alignment of care at home and ensure quality and continuum of care. Currently the trust of care seeker lacks due to loose ends in strong case management, medical oversight and lack of skilled manpower which also is an unorganized sector. Also enabling better last mile care for the patient will ensure effectiveness of homecare and reduce the financial burden.

Our Thoughts:

We have been observing through various papers and articles that the main problem remains is of organizing the services and yet demanding it to be customized per care. This problem is inherited in the healthcare system and more so in home healthcare which is predominantly understood as flexible. Yet reliability is considered to be epitome and most vital for people to be able to trust it. Yet the expectation to make it more cost effective adds another layer of complexity where expectations and delivery cost don't match. If we need to match it then it must be lowered in quality.

Research Paper 4:

Title: Patient-Centered Care: Case Studies on End of Life [22]

Author: Jean, Dr. Melissa

Source: Healing Hands vol 22 ed 1Winter 2018 – A publication of HCH clinical Hands

Methodology: Case study collection – Descriptive Observational Study

Findings:

There were five high quality geriatric and palliative care cases discussed of patients who have been living in old homes or were rendered homeless. These cases highlighted the complexity of care that was needed with these individuals along with the challenges faced and lessons learnt. Let us highlight a few

1. In case 1: The challenges faced were:

a. client rights of decision making which can be critical in emergency situations

b. The effects of mental health as they have been living alone this also creates a strong belief system

c. What goals are patients wanting to achieve and will the care provider be able to deliver those

promises and expectations.

2. In case 1: Lessons learnt

a. To work within patient framework to best address their needs and rights.

b. It is important to have direct and transparent conversation with the patient as they have no care taker and what it will take to manage that level of care.

3. In case 3: the challenges faced were:

a. Patient was uninsured and it was difficult to determine the autonomy of care

b. If person is uninsured how do the care providers determine best interest

4. In case 3: the lessons learnt were:

a. To train the staff in medico legal compliance to ensure safety and advance directives to address to the patient yet maintaining tact.

b. To seek proper public insurance that is accessible by the person so that the treatment can be covered in some shape or form.

c. The patients right to autonomy comes first and health care provider should not be leading the patient into decision making

5. In case 5; the challenge faced were:

a. Language barrier can lead to various challenges and hindrance to care and harmony that is between the patient and health professional

b. Cultural barrier can lead to negative perception and that also place a vital role in health belief system.

c. Lack of communication with guardian and legal status of the elderly. Especially dealing with a disease live HIV which carrier stigma and shame of rejection

6. In case 6: the lessons learnt were:

a. Be attentive to cultural and language the faster a nursing staff is attuned to the patient the better care can be provided

b. Approach the conversation upfront when dealing with a disease like HIV to comfort and ease up the patient. Difficult conversation needs icebreaker and sometimes patient is not capable of it which can lead to miscommunication

c. Establish family ties and communication as soon as possible to ensure the status and treatment care can be taken care of. Developing a support system is sometimes helping both parties heal and converge knowing there is a support system around to lean on.

Our thoughts:

It can be seen that some of the trivial and difficult cases of home care comes when there are

grey areas to deal with. This also entangles medico legal complexity which needs to be mitigated for a healthcare provider to continue delivering services and avoid legal financial risk. It also points towards having training sessions planned with staff to deal with such complex and high stake scenarios. In Indian system elder care is on rise and there are various loose ends over there when it comes to care providers. Also if usually patient is under family supervision in case of a situation that requires legal outlook the burden is on healthcare provider to prove otherwise of claims.

Research Paper 5:

Title: Factors associated with homecare coordination and quality of care: a research protocol for a national multi-center cross sectional study [23]

Author: Nathalie Möckli, Michael Simon, Carla Meyer-Massetti, Sandrine Pihet, Roland Fischer, Matthias Wächter, Christine Serdaly and Franziska Zúñiga

Source: BMC Health Services Research - https://doi.org/10.1186/s12913-021-06294-7

Methodology: This paper focuses on cross-sectional nationwide multi-center survey conducted in Swiss homecare settings. The recruitment process will focus on 100 home care agencies, their staff, and clients, with the data collection period scheduled to run from January to June 2021. Descriptive and multi-level analysis will be performed on all the data that was obtained.

Findings:

The study offers insightful information about this medical specialty that is becoming more and more crucial. It also highlights components related to coordination and quality in homecare on every level of the health care system, providing the first insights at this level into homecare quality in Switzerland.

Our Thoughts:

To provide a home healthcare services which can be demanding it is important to standardize the services and ensure quality and continuum can be delivered. This will also prevent conflicts and liabilities which will adversely affect the operation of services. However what is important is to understand it in context of Indian healthcare system and implement it.

Research Paper 6:

Title: Evaluating the Quality of Home Health Care for Individuals with Complex Medical Needs Receiving Private Duty Nursing Services in the Maryland [24]

Author: Dyllis Sefeh, Mbah Minang

Source: Faculty of the Graduate School of the University of Maryland, College Park

Methodology: This study used a combination of qualitative and quantitative data analysis techniques. Additionally, a descriptive research design with a retrospective analysis was used. In Google Sheets and Stata software, frequencies, percentage scores, and means with confidence intervals were calculated. In order to identify themes from important words or phrases in the DONS auditors' comments, qualitative content analysis was also performed.

Findings:

Study findings indicate that improvements to the quality of nursing services to REM program participants can be implemented at provider agencies as well as the executive and legislative levels of state government

Our Thoughts:

The paper cemented our observational learning and understanding to a stronger confidence level. The learning and training when given just at certification level at collage is not enough. These things should be implemented at service provider level as well as requires state and center to have legislation to make it inclusive of insurance coverage and better law governance. Some of the gaps including quality and standardization will start happening with this.

Research Paper 7:

Title: Clinical Outcomes and Quality of Life of Home Health Care Patients [25]

Author: Suk Jung Han, Hyun Kyung Kim, Judith Storfjell, Mi Ja Kim,

Source: Elsevier - Asian Nursing Research 7

Methodology: This is a prospective descriptive study. The convenience sample consisted of 100 home health care patients, who started receiving home health care services from a home health care agency in the United States.

Findings:

ADLs and instrumental ADLs of participants significantly improved between start of care an discharge or 60 days. Overall QOL, general health, and three of four QOL domains (physical, psychological, and environmental, but not social domain) were significantly improved at discharge or 60 days. Therefore, Home health care nurses should maintain and improve the functional ability of patients, as this could improve the QOL of these patients.

Our Thoughts:

We have also realized with our patients that when we do activities of daily living with patients there is significant improvement in physical and emotional wellbeing of the patients. As an observational learning we have involved nurses to do such activities which help the patients

and their relation with the nursing staff as well. The functional ability to ADL by patient gives them the confidence that care is working and thus improve their Quality of life.

Research Paper 8:

Title: IT in Home Health Care – A Case Study (Advantages and Disadvantages with Mobile Information Support) [26]

Author: Stina Nylander, Niklas Hardenborg

Source: Research Gate: https://www.researchgate.net/publication/279414112

Methodology: The preparation for the study included an interview with the commercial provider of the information system, together with a demonstration of the system. They conducted two group semi structured interviews with assistant nurses holding an experience from 2 to 25 years from the home care work. They had no prior technical education.

Findings:

The case study points out at how vital technology can be however needs to be given to right people with right choose areas to be implemented. It is also important to consider proper UI/UX.

Our Thoughts:

We have also been implementing technology and studying the effects of it on the user. We found that once trained and familiar with the functionality it helped both the staff and the patient (and family) to iron out operational hurdles. With digital health mission in play we hope to ensure that we continue the path and journey to implement more innovation to boost the operational quality of the home care process.

Research Paper 9:

Title: Home Healthcare in Europe – A systematic Literature review [27]

Author: Nadine Genet, Wienke GW Boerma1, Dionne S Kringos, Ans Bouman, Anneke L Francke, Cecilia Fagerström, Maria Gabriella Melchiorre, Cosetta Greco and Walter Devillé Source: BMC health research services http://www.biomedcentral.com/1472-6963/11/207

Methodology: A systematic literature review performed studying papers (Jan 1998 to Oct 2009) on home care published in English, using the following data bases: Cinahl, the Cochrane Library, Embase, Medline, PsycINFO, Sociological Abstracts, Social Services Abstracts, and Social Care Online spooling over thirty one countries. Topics such as clinical interventions, instrument developments, local projects and reviews were excluded.

Findings:

The mechanisms for providing home care appeared to vary between and within nations.

Additionally, it offered scant information and study on the subject. There were studies, but they were not thorough and only looked at one aspect of healthcare. Additionally, there is virtually little information available regarding healthcare financing. This only applies to Europe and demonstrates how much effort must be done before data on home healthcare services from other nations can be used in a comparative analysis.

Our Thoughts:

We observed and shared the same concern. Many of the data by Market Research Company also came with a very high cost with multiple of them providing report it is difficult to buy with startup just bootstrapping. They reply on public information which was spread across and sparingly available. However, one thing was sure there needs to be uniformity in services so that the home healthcare can operate with international uniformity and clarity of service.

Research Paper 10:

Title: Home Health Care Scheduling: A Case Study [28]

Author: Zhi Yuan, Armin F¨ugenschuh

Source: AMOS (Applied Mathematics and Optimization Series #22)

Methodology: In this case study, the optimisation goal is to provide coverage for all of the weekly client visits while maintaining low operational costs, particularly in terms of personnel numbers, and by reducing the overall workload of the nurses through efficient routing. The customer day and time slots should be adhered to as a strict constraint, and this should be done without sacrificing the quality of the service. As an example, a suitable treatment length should be guaranteed.

Findings:

This amazing piece formulated the weekly based home health care scheduling problem as an integer linear programming model, applying state-of-art ILP solver to it. The existing model can, only be addressed optimally up to a very small instance size. On the other hand, the heuristics work really effectively and can find solid solutions in just five minutes. Although it appears to speed up the solving process when the branch-and-bound procedure is started with a heuristic solution, the difference real-world scenario is still very large. The findings also point to a minimum 10% cost-saving potential for computerised optimization. The report offers several avenues for furthering the research and leaves it open-ended.

Our Thoughts:

In the search for optimization of HR and thus scheduling of care we had to come up with something more algorithmic and this we choose to spread our search into mathematics. This

work is not just for research but actual implementation in a very difficult, low cost, high intensity work environment – early stage startup. Such scientific work which are open ended leaves us much of work but a starting point. We will be implementing this in our Phase 2 scheduling model that is automated for appointments.

RESEARCH QUESTION:

After Literature review we have come to our research question:

The scope of home healthcare services in Indian Healthcare System post pandemic

OBJECTIVES:

a) To study the perception of the home healthcare seekers towards the HHC services provided

b) To understand the perception of the home healthcare service provider towards HHC industry

c) To examine the holistic factors contributing to the scope of HHC services (I.e. Technology, Staffing, Training, Financing, Coverage etc)

In Future, the relevance and applicability of the research will provide us with a way to:

1. Improve and evaluate our services given to seekers
2. Strategize pricing fluctuation
3. Create SOPs to standardize the operational and HR activities
4. Look for quality recognitions and certifications
5. Scaling up the services in various part of India

FUTURE WORK OBJECTIVE

This dissertation work has already culminated into paper writing process to expand this scoping literature review into recommending solutions. I will be working on expanding each individual sectors related to HHC services

Chapter 3:

Methodology

MATERIAL AND METHODS

STUDY TOOLS:

We will be applying a hybrid (integrative) study method to cover various aspects:

- **A systematic "scoping" literature search** was performed for papers published in field of home healthcare vertical spreading across topics such as Quality, HR, Perception, Need, Case Studies, Health IT, Health Systems, and Mathematical Modeling.

  Using keywords defined above various scholastic databases, reputed journals , institutions and article sites literature was gathered. MeSH
- **A Telephonic Interview** will be performed with the HHC service provider and professionals
- **A digital survey study** via google forms with circulated via chats and messages to HHC service seekers.

SETTING:

- Jaipur City - Digital and Telephonic Survey will be conducted online and through phone
- Remote Online Search for literature review (Desk Review)

STUDY POPULATION

For perception Sample Size: HHC Seeker

- 60 (SEE TARGETED (E) BELOW)
- Confidence interval of 75% (based on Hypothesis)
- Margin of Error – 5%
- Population size – 80%
- Population size – 200

For perception Sample Size: HHC provider and professionals

- 5 HHC Provider
- 15 HHC nursing staff
- Population size – 8 provider and 45 nursing staff

Inclusion criteria:

- Decision makers and working professionals from the age of 18-70.
- From city of Jaipur
- Taken Services since 2019
- HHC Service providers and Professionals from Jaipur associated with Sewaarth since 2019

Exclusion criteria:

- Minors and students, non-decision makers.
- Data outside Jaipur city - As this is a digital survey and may be circulated outside Jaipur therefore data from pan India will be filtered for internal planning of the organization.

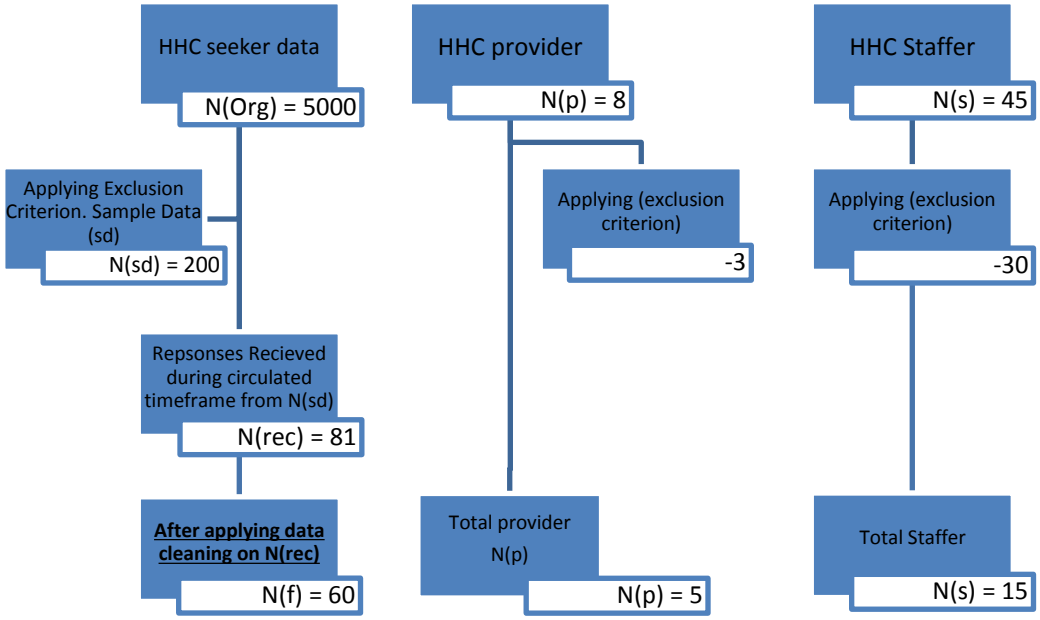

Figure 12: Sample selection for primary research

Biases

- Recall Bias – might have recollected something wrong or not correctly as clients date back from 2019 onwards.
- Confirmation or Leading Bias – Question quality was particularly taken care of but still there might be a few places where during phone interview there could have been these biases might have been experienced.
- Interviewer Bias – When taking telephonic interview even though script was given two personnel given task to interview might have asked questions in their own way.
- Cultural or Belief system bias – when talking about healthcare there is a big role that these psychometrics affect answers.

For Systematic Literature Review

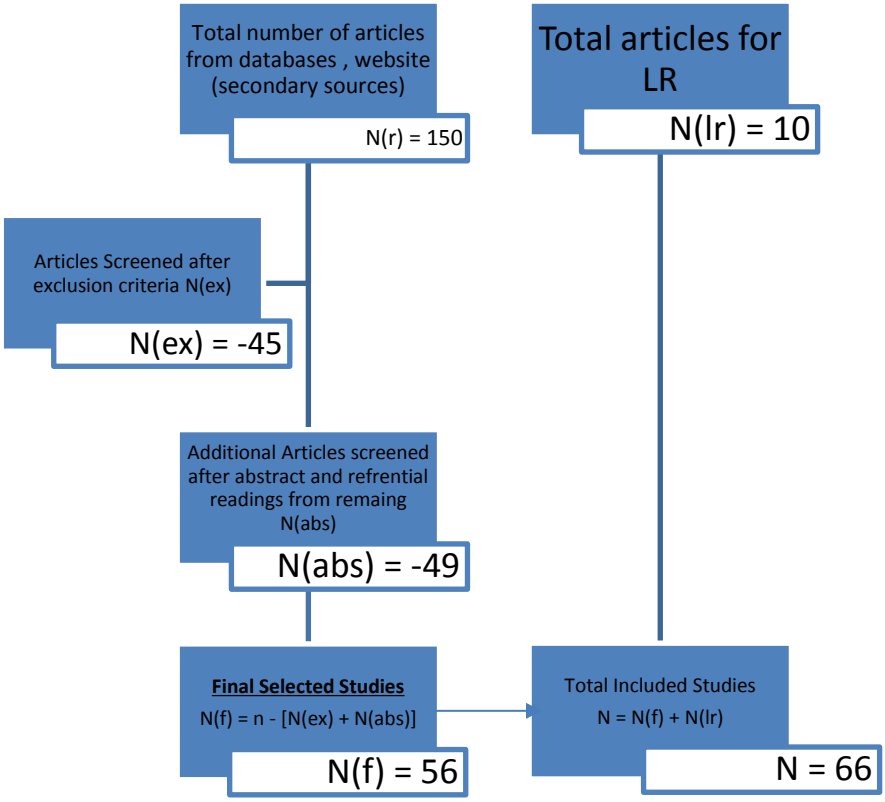

Figure 13: Sample selection for literature review

Exclusion criterion:

a) Articles before 2010, Books before 2000

b) Outcome was not reported (and or was an open paper, white paper for peer review)

c) Articles from third world country (under developed nations)

d) Exception Criterion: Topics with limited literature published available in region of India such as medicolegal we have considered articles dating back to 2000

Biases:

e) Information, Selection Bias – Researchers and data are coming from various different sources and reports to it is to insure that data has size that can help match the scope of review

f) Citation Bias – while writing a fact or statement something might get missed out that needs citation

g) Misclassification Bias – while using exclusion criterion missing out on some important information or misclassifying the information to be rejected or ignored

ANALYSIS TOOLS USED:

h) Excel

i) Mind Mapping

j) Keyword search tool / advance Search tools (i.e. PubMed)

DURATION OF PERCEPTION STUDY:

- 60 days. April 25th 2022 to June 25th 2022 (extended).

SAMPLING TECHNIQUE:

HHC seeker, Service provider

Non Probabilistic Purposive Convenience sampling method

Literature Review

Scoping review, search sampling with simple elimination technique

DATA COLLECTION PROCEDURE:

- HHC Seeker - Primary Data sources via online survey Semi Structured survey design with close- ended questions using Likert scale capturing both quantitative data and qualitative data.
- HHC Provider – Interviewer filling the close ended questionnaire while doing telephonic interview.
- Secondary data collection via various published papers, market research and competitive analysis (a systematic review –to name a few)

For Research Papers: eDBs

1. PubMed
2. Sage Publication
3. Google Scholar
4. BMC health
5. Elsevier
6. NCBI
7. Science Direct

For Reputed Opinions:

8. HBR (Ivey League Schools)
9. John Hopkins
10. HHC Networks

For Market Assessment:

11. Crunch Base
12. Company Sites
13. Market research databases
14. Startup Ecosystems

DATA ANALYSIS PLAN

a) Use of excel spreadsheets (if required Stata or SPSS software)

b) Data mapping based on systematic research and review of journals.

ETHICAL CONSIDERATIONS

Informed consent will be obtained from all the study participants. Appropriate measures will be stated and taken to ensure data security,privacy, and confidentiality.

IMPLICATIONS OF RESEARCH

Better quality of services with more efficient delivery system can be created. Scope of using tele medicine, IOT based technology and auxiliary services will be identified which can be added on to the home healthcare services. This understanding of home healthcare is rarely accomplished with comprehensive review of the system and then forwarding the thoughts to improve the quality and continuum of care at home.

We (with guidance of my mentor Dr P R Sodani), hope to publish a paper in reputed journal that can bring reform in the field of home healthcare as part of overall healthcare system.

DISCLAIMER

I HAVE DONE MY BEST TO MAKE THIS RESEARCH AS WHOLESOME AS POSSIBLE. TO DO SO, I HAVE RESEARCH AND TAKEN PAINSTAKING PROCESS TO CITE EACH AND EVERY RESEARCHERS EFFORTS. THOUGH MANY THOUGHTS ALIGN AND I HAVE DONE MY BEST TO ACCOUNT FOR THE WORK DONE BY OTHERS. UNINTETIONALLY IF I HAVE MISSED OUT CITING SOMEONE'S WORK, I SINCERELY APOLOGIES. TO SUGGEST CITATIONS OR CORRECTIONS - PULKITRATURI@GMAIL.COM, PULKIT.J20@IIHMR.IN

Chapter 4:

Data Processing & Discussion Analysis

DATA PROCESSING:

To understand the scope of HHC we had divided the sector into nine different categories. The primary data collected gave us some insight in each and every sector as survey and interview questions did ask perception of HHC seeker and provider.

Here is how study plan was created to address all the different areas of our HHC services identified.

Area of Study	Type
Perception (2 primary studies)	Mostly Primary data (survey & interview)
Staffing and Scheduling	Mostly secondary data
Insurance and UHC	Mostly secondary data
Training & Leadership	Mostly secondary data
Technology and Digitalization	Mostly secondary data
Quality and Certification	Mostly secondary Data
Medicolegal	Mostly secondary data
Sectorial Growth	Mostly secondary data
Public Policy and Financing	Mostly secondary data
Level of Healthcare Delivery	Mostly secondary data

Table 3: DATA COLLECTION PLAN

Based on our methodology and study plan we gather the data from the two primary source (survey with seekers and interview with providers) and systematic integrated literature review to certain our claims and hypothesis.

PERCEPTION PRIMARY DATA FINDING

There were two perception studies that were conducted:

Survey with health seekers

The survey was semi structured close ended questions and was shared with over 200 sewaarth customers from city of Jaipur from 2019 year onwards.

Demographic Data Collection:

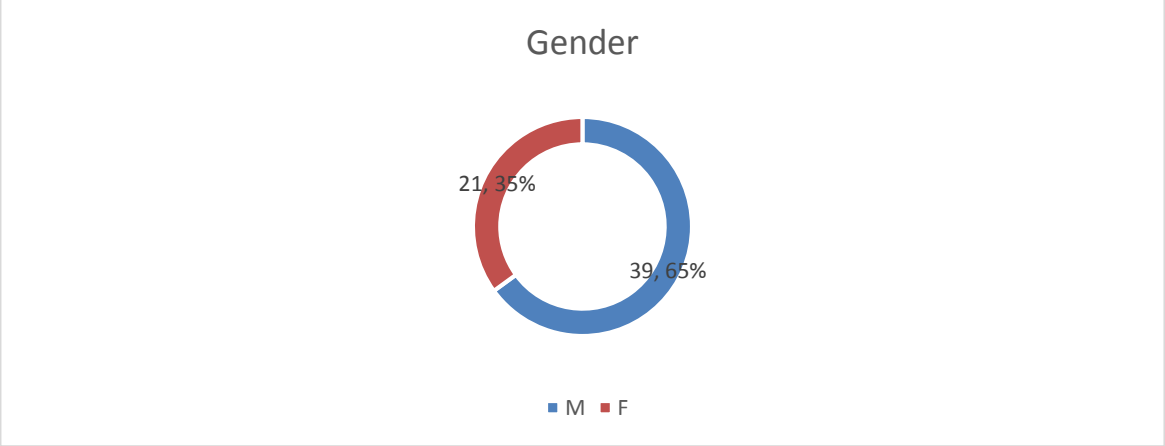

Figure 14: Demographic Data Gender (n=60 source: Primary)

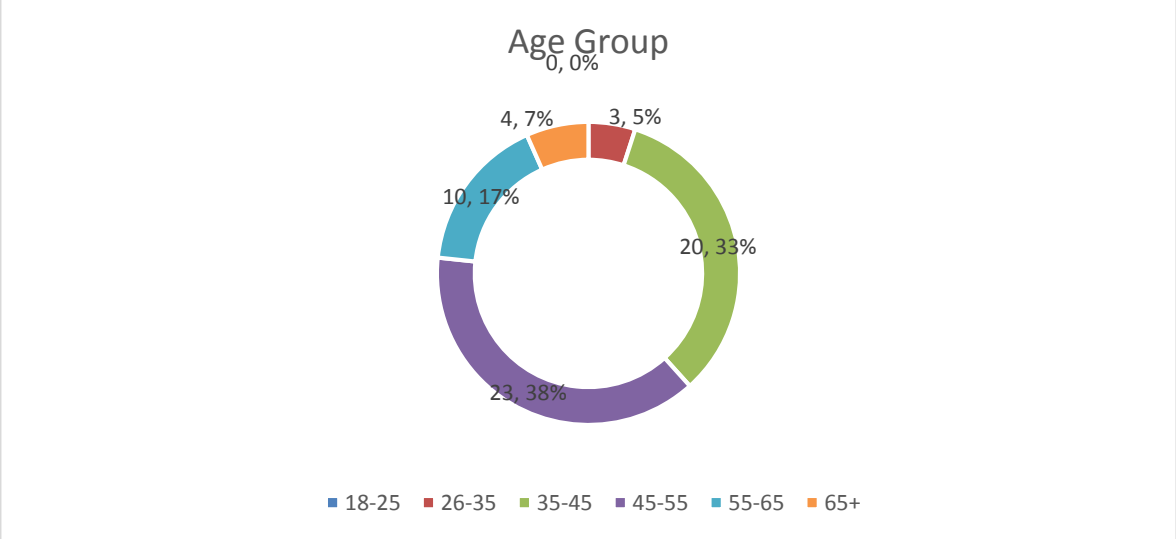

Figure 15: Demographic Age Group (n=60 source: Primary)

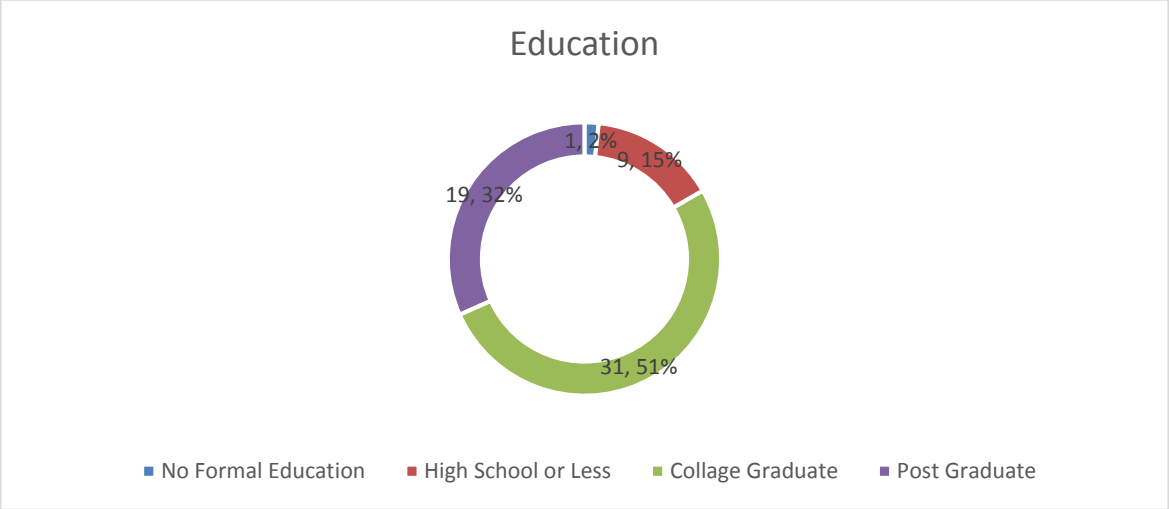

Figure 16: Demography Education (Source: Primary)

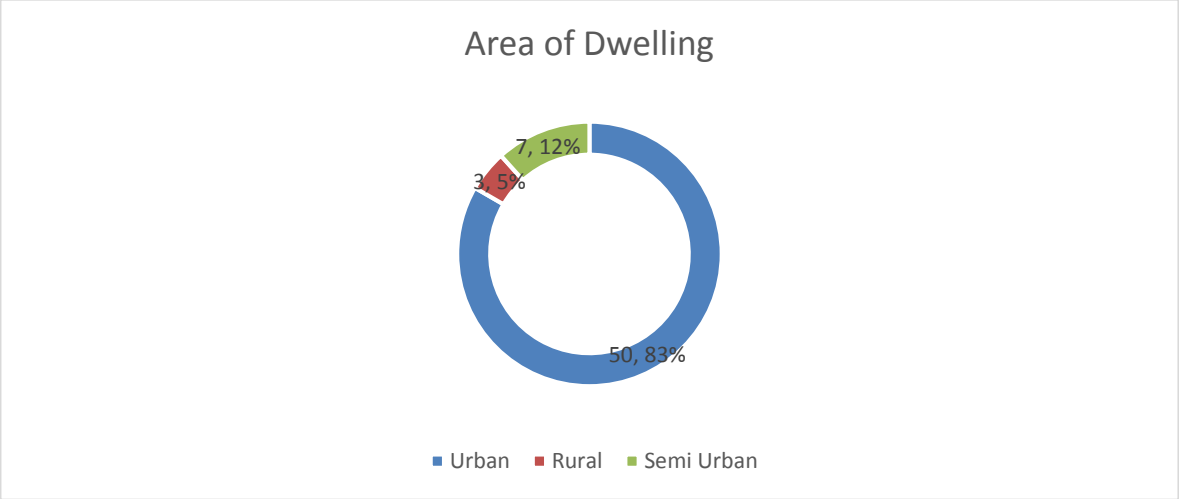

Figure 17: Demography Living Area

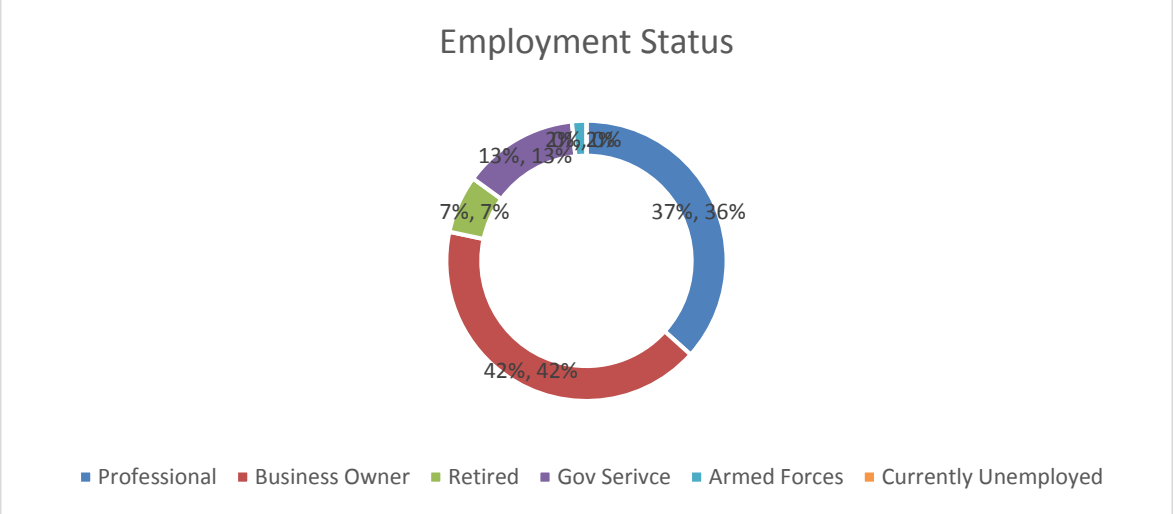

Figure 18: Demography Employment Status

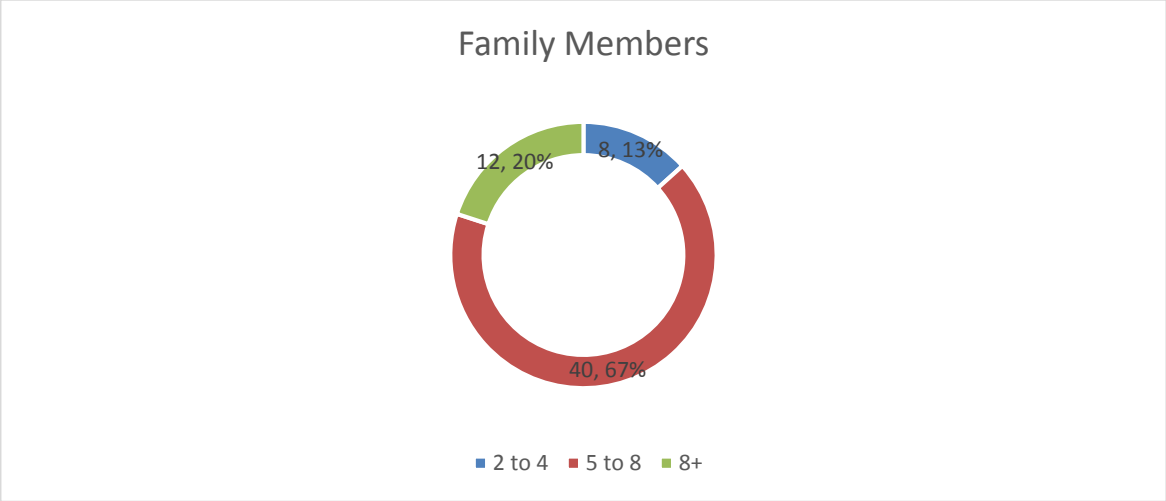

Figure 19: Demographic data Size of Family

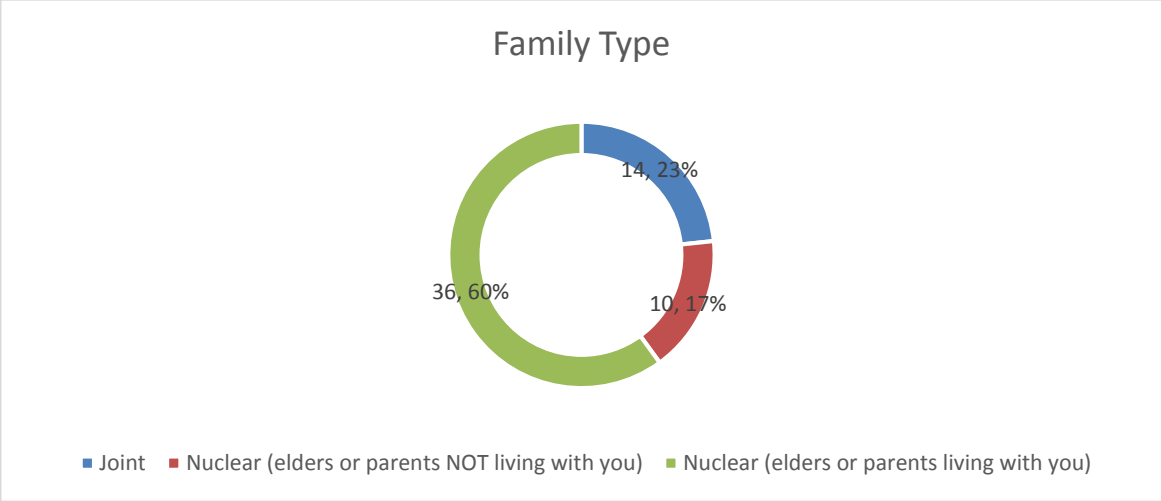

Figure 20: Demographic Data Type of Family Structure

NOTE: Family economic status question was inconclusive and was omitted survey all together.

Variable	CHARACTERISTICS	FREQUENCY	PERCENT
What is your Gender	M	39	65%
	F	21	35%
		60	
What age Group you belong to	18-25	0	0%
	26-35	3	5%
	35-45	20	33%
	45-55	23	38%
	55-65	10	17%
	65+	4	7%
		60	
Level of Education	No Formal Education	1	2%

	High School or Less	9	15%
	Collage Graduate	31	52%
	Post Graduate	19	32%
		60	
Where are you living	Urban	50	83%
	Rural	3	5%
	Semi Urban	7	12%
		60	
Employment Status	Professional	22	37%
	Business Owner	25	42%
	Retired	4	7%
	Gov. Service	8	13%
	Armed Forces	1	2%
	Currently Unemployed	0	0%
		60	
Number of family Members (including you)	2 to 4	8	13%
	5 to 8	40	67%
	8+	12	20%
		60	
Type of family	Joint	14	23%
	Nuclear (elders or parents NOT living with you)	10	17%
	Nuclear (elders or parents living with you)	36	60%
		60	

Table 4: Summary of Demographic Data Collected

Usage of Services:

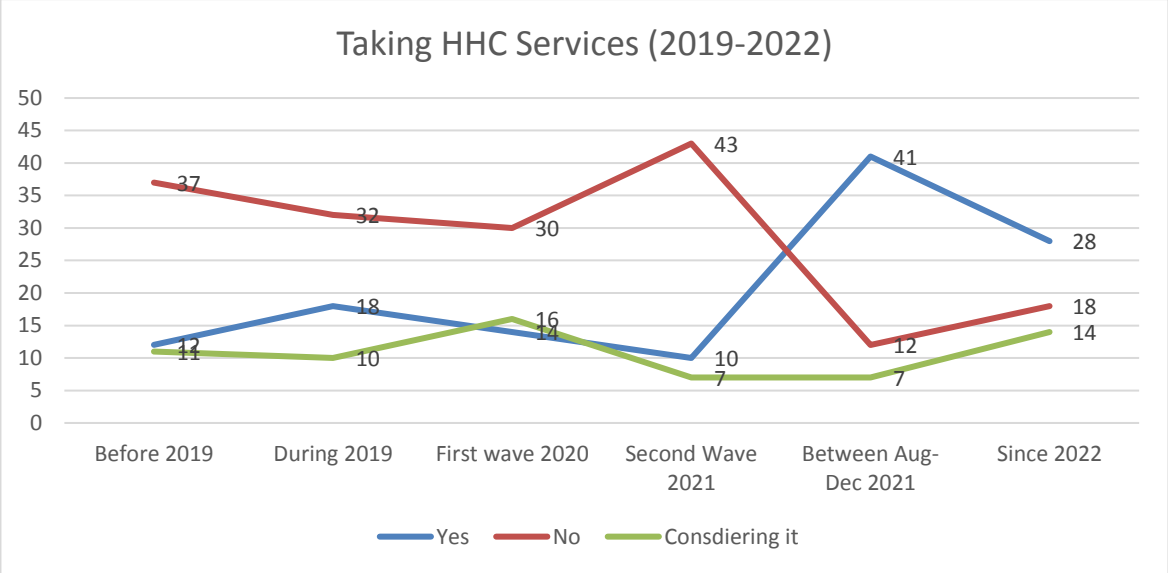

Figure 21: Availing HHC services since 2019 (n=60, source: primary)

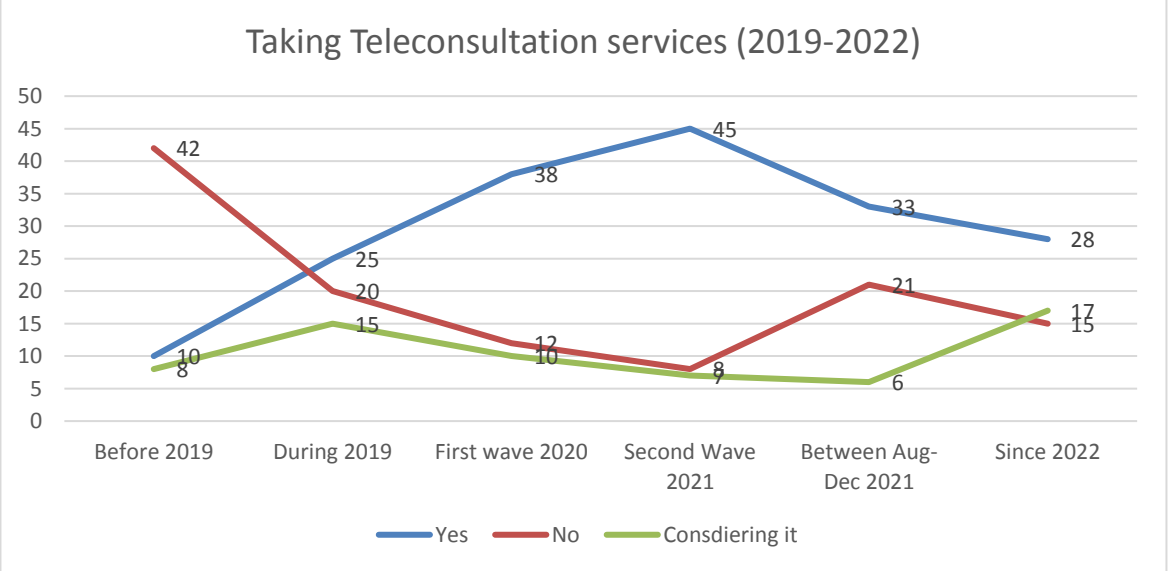

Figure 22: Availing Teleconsultation Services (source: primary , n = 60)

Variable	Characteristics	Frequency					
Taking HHC Services		Before 2019	During 2019	First wave 2020	Second Wave 2021	Between Aug- Dec 2021	Since 2022
	Yes	12	18	14	10	41	28
	No	37	32	30	43	12	18
	Considering it	11	10	16	7	7	14

Taking Teleconsultation services		Before 2019	During 2019	First wave 2020	Second Wave 2021	Between Aug- Dec 2021	Since 2022
	Yes	10	25	38	45	33	28
	No	42	20	12	8	21	15
	Considering it	8	15	10	7	6	17

Table 5: HHC and Tele consultation services from 2019 to 2022 (n=60, source: primary)

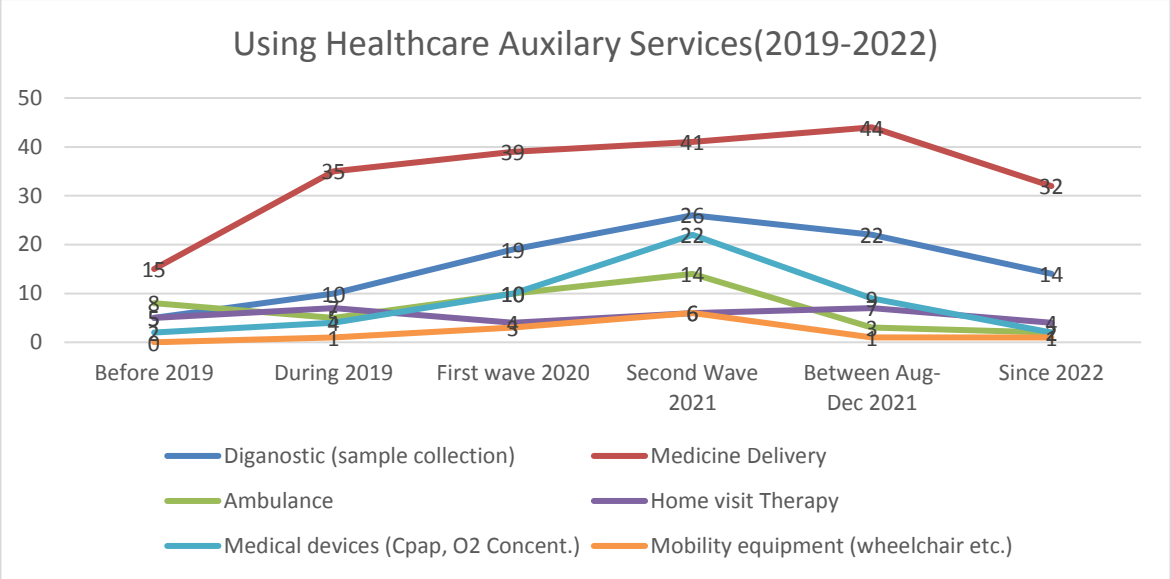

Figure 23: Use of Aux Healthcare services (n=60, source: primary)

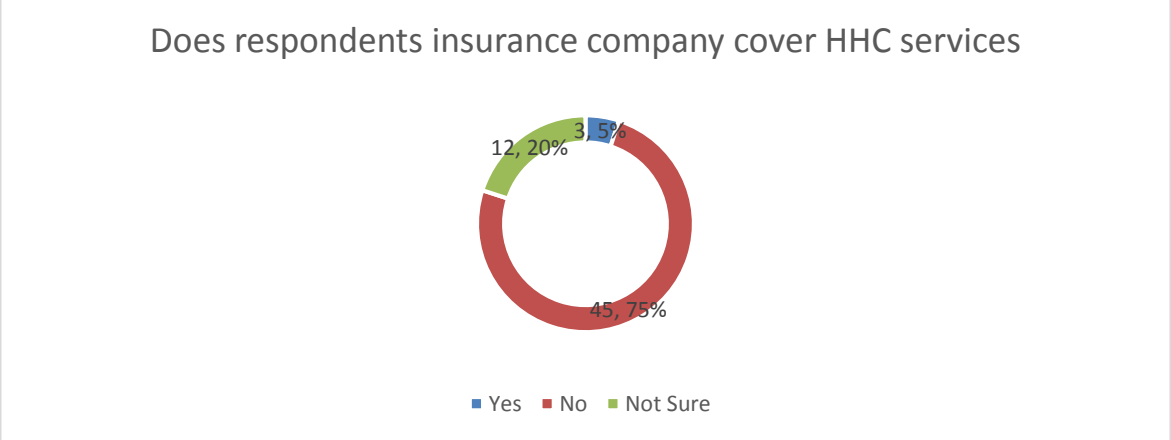

Figure 24: Awareness about respondent's insurance company covering HHC services

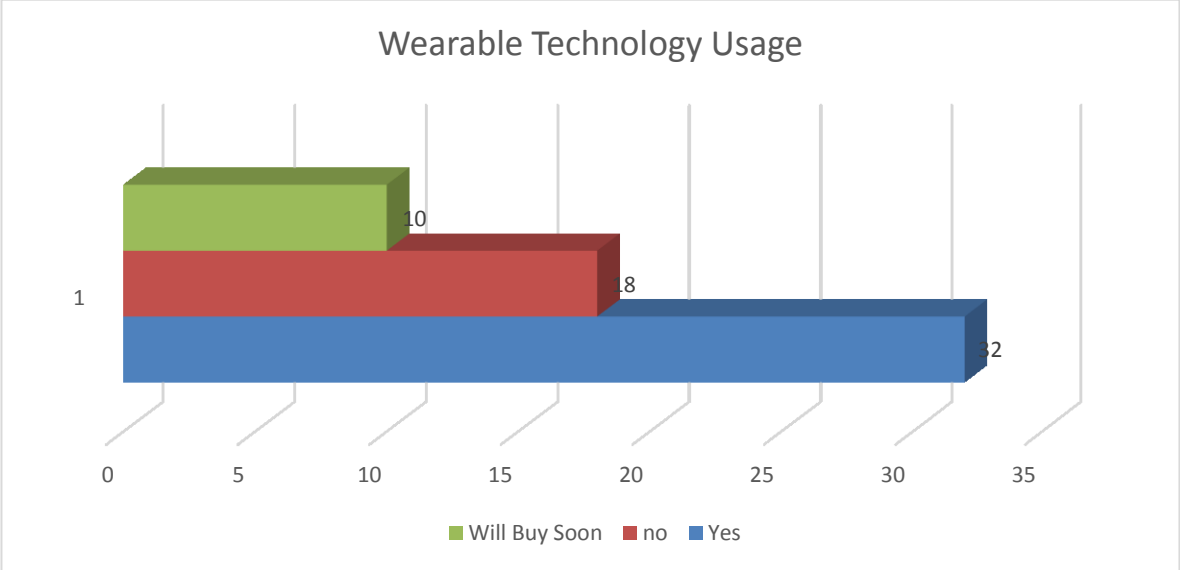

Figure 25: People using Wearable technology

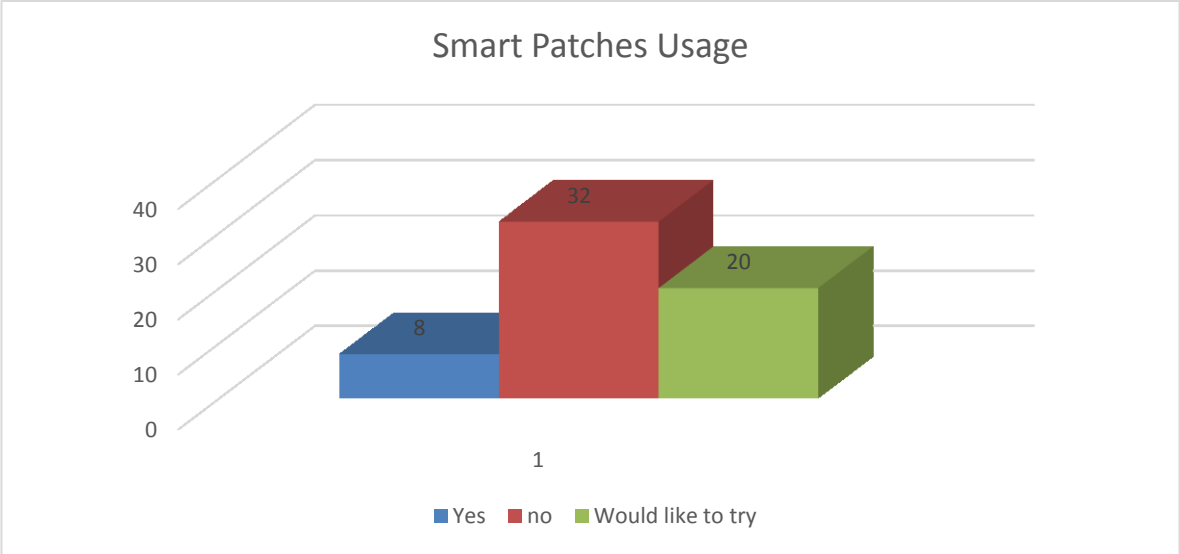

Figure 26: Respondent using Smart Patches (i.e. Diabetic Patch)

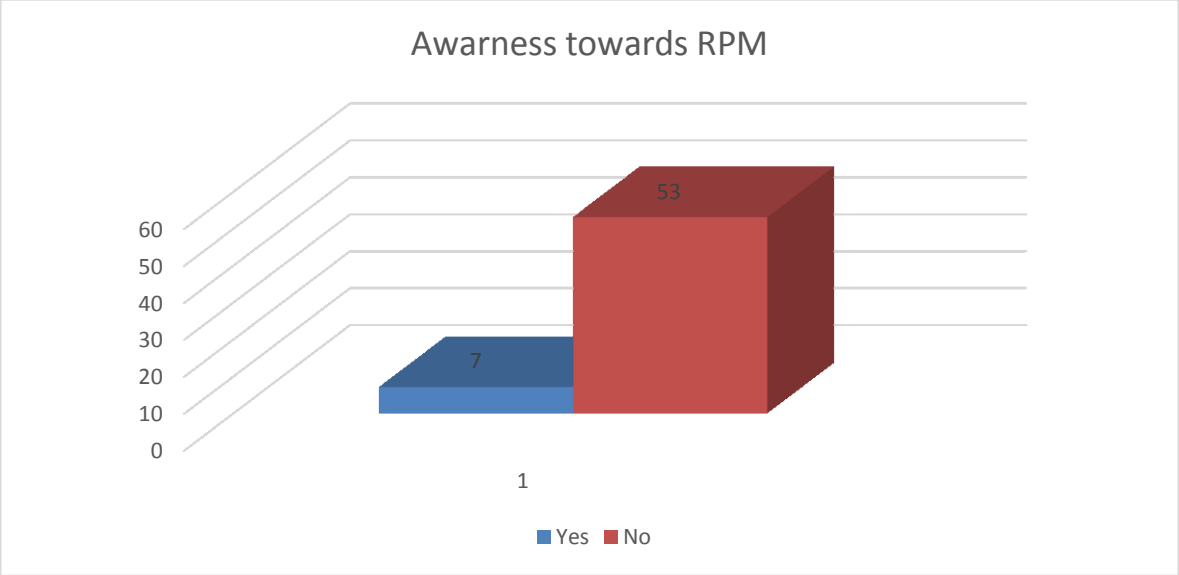

Figure 27: Awareness of existence of Remote Patient Monitoring technology

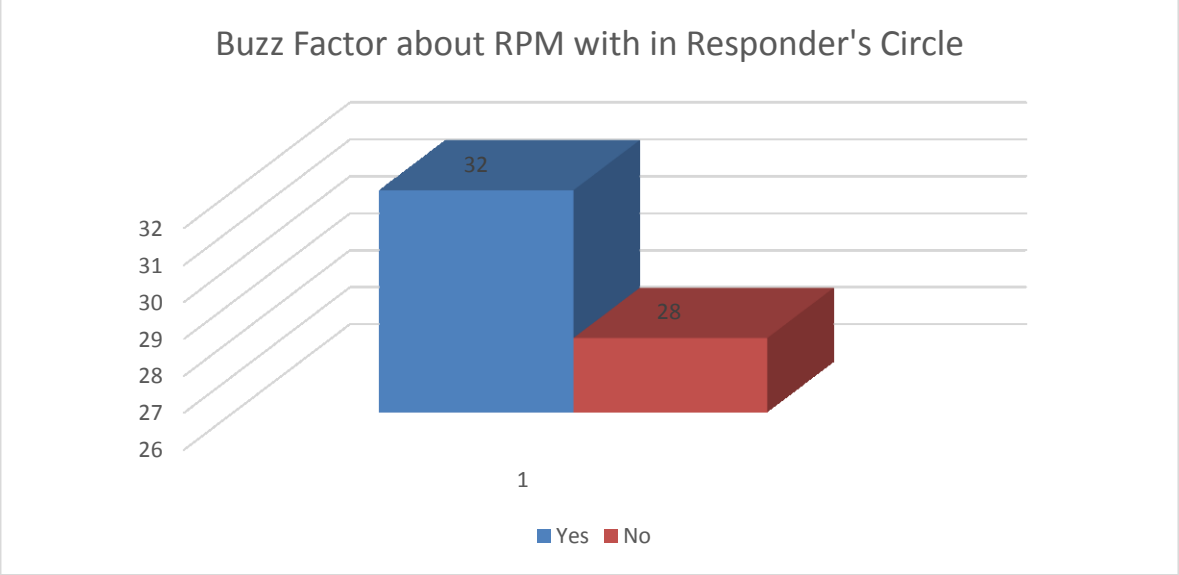

Figure 28: Awareness about use of RPM with in respondent's network (friend, family, familiars)

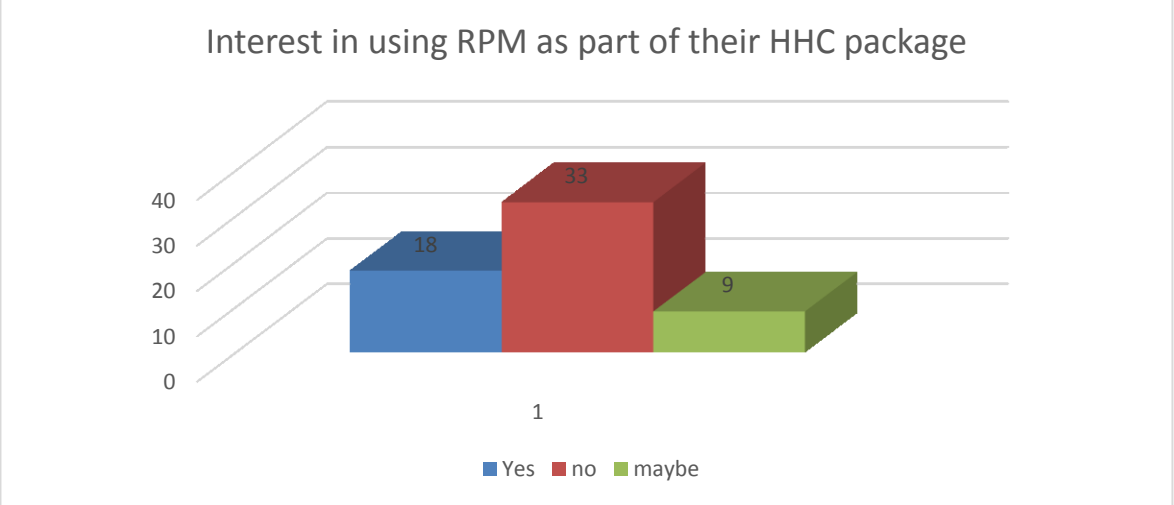

Figure 29: Scope and interest level of using RPA technology with HHC service

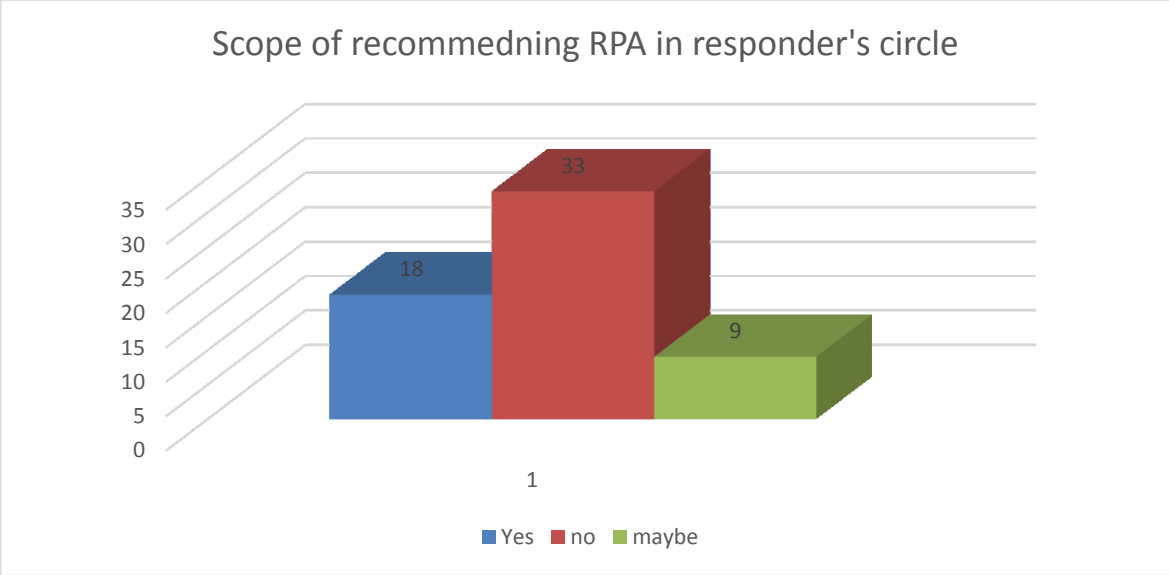

Figure 30: Scope of recommending RPA technology with in respondents circle

Perception study

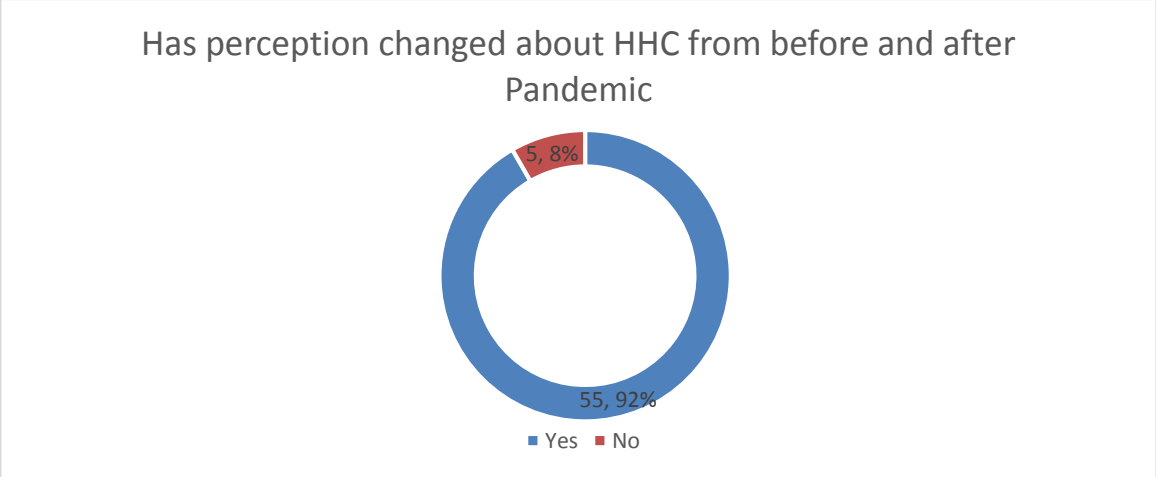

Figure 31: perception before and after covid about HHC:

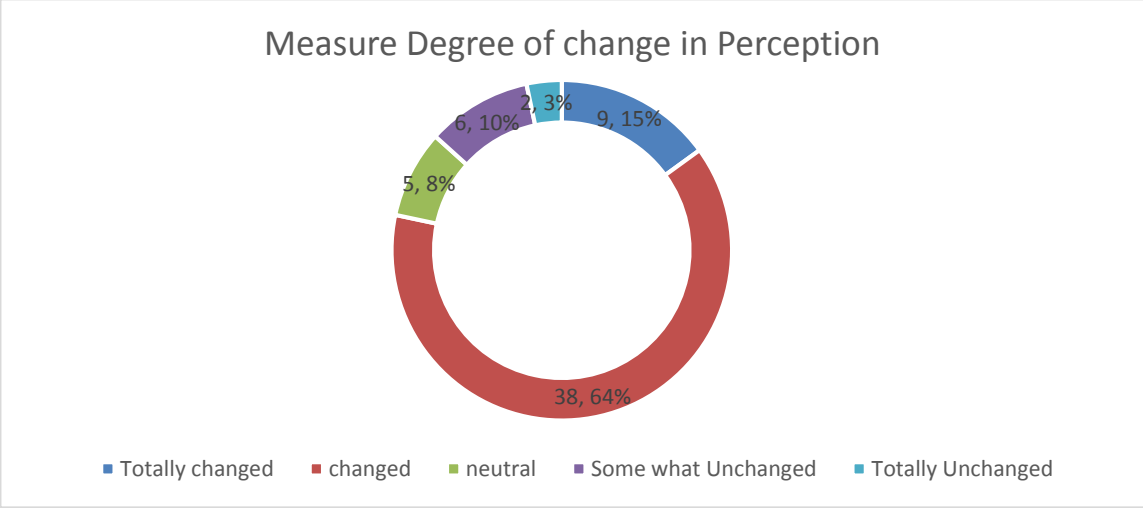

Figure 32: Measuring Degree of change in perception

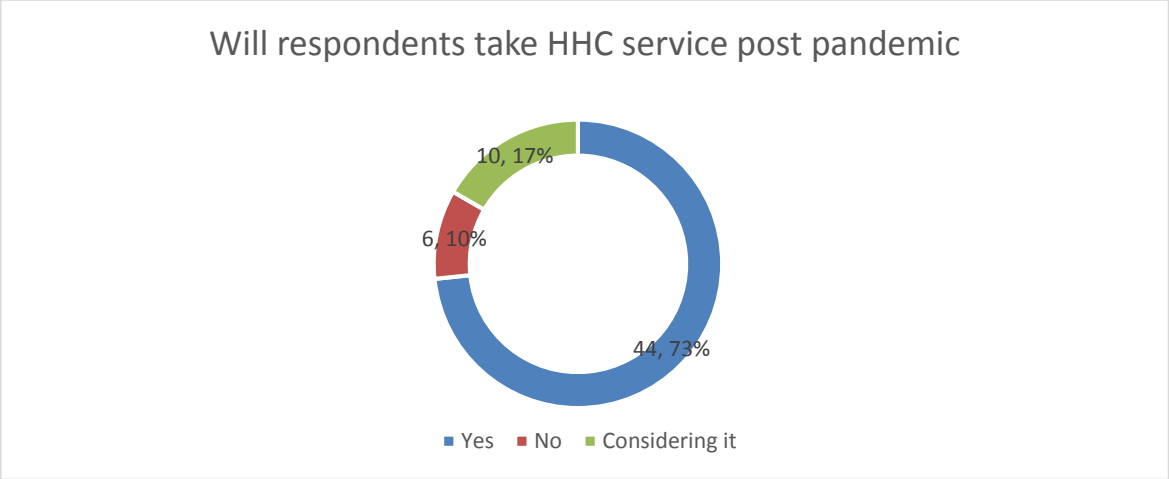

Figure 33: Likelihood of taking HHC services since 2022

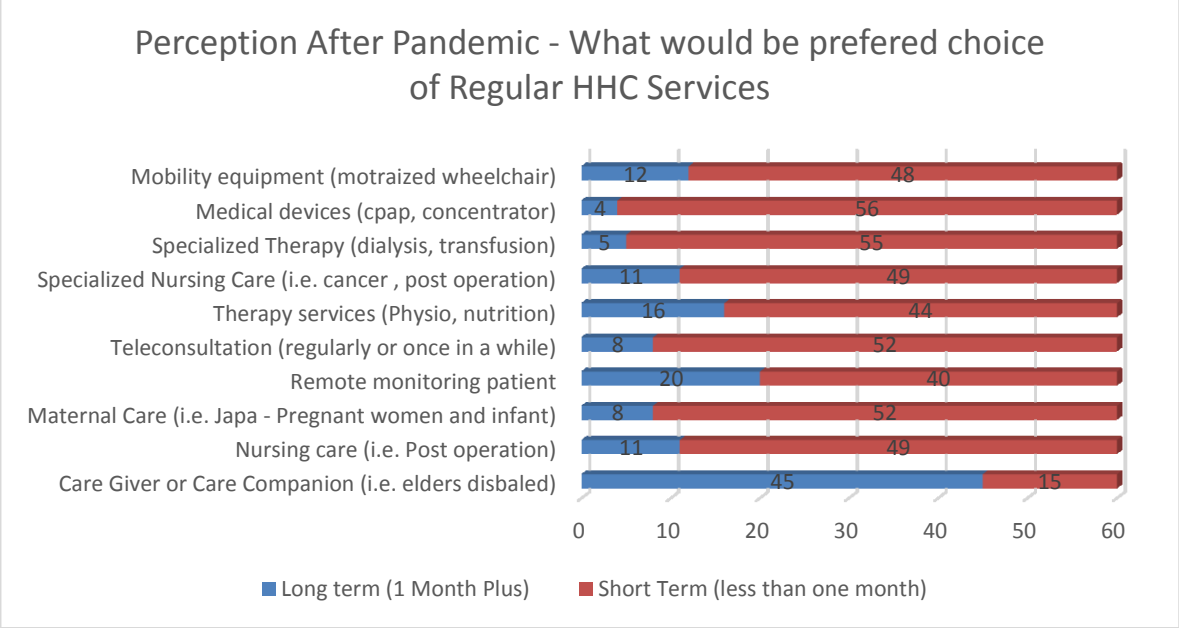

Figure 34: Likelihood of services people will take in short term and long term

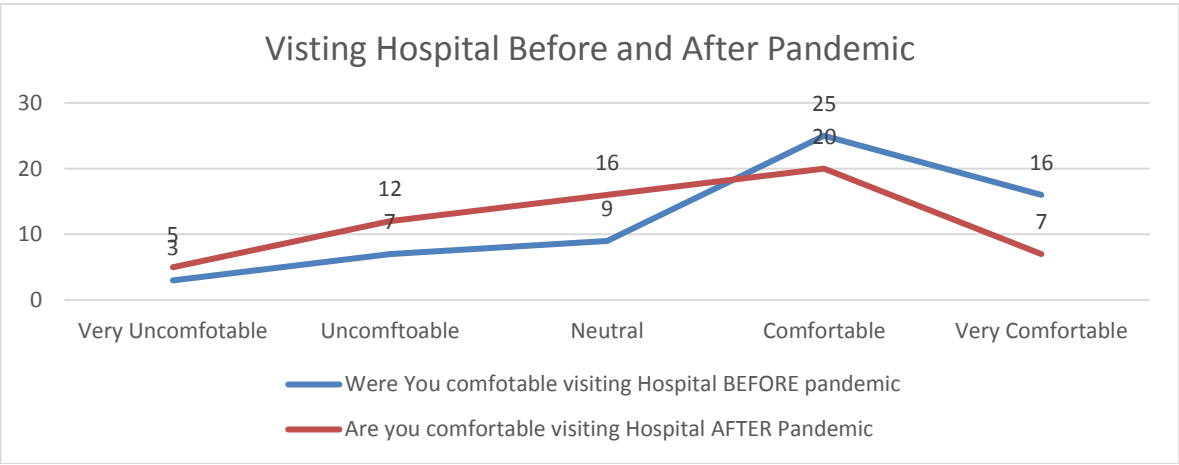

Figure 35: Perception about visiting or getting admitted in a hospital

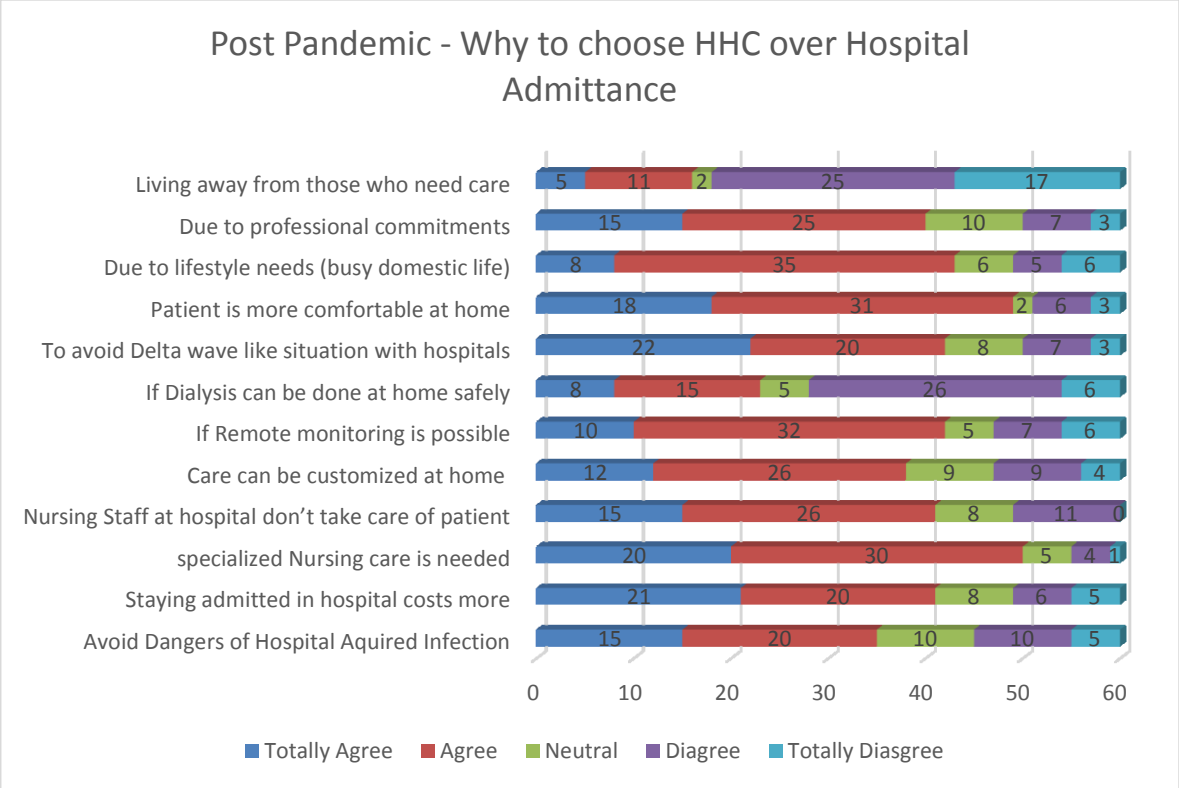

Figure 36: Reasons why to choose HHC over getting admitted in hospital

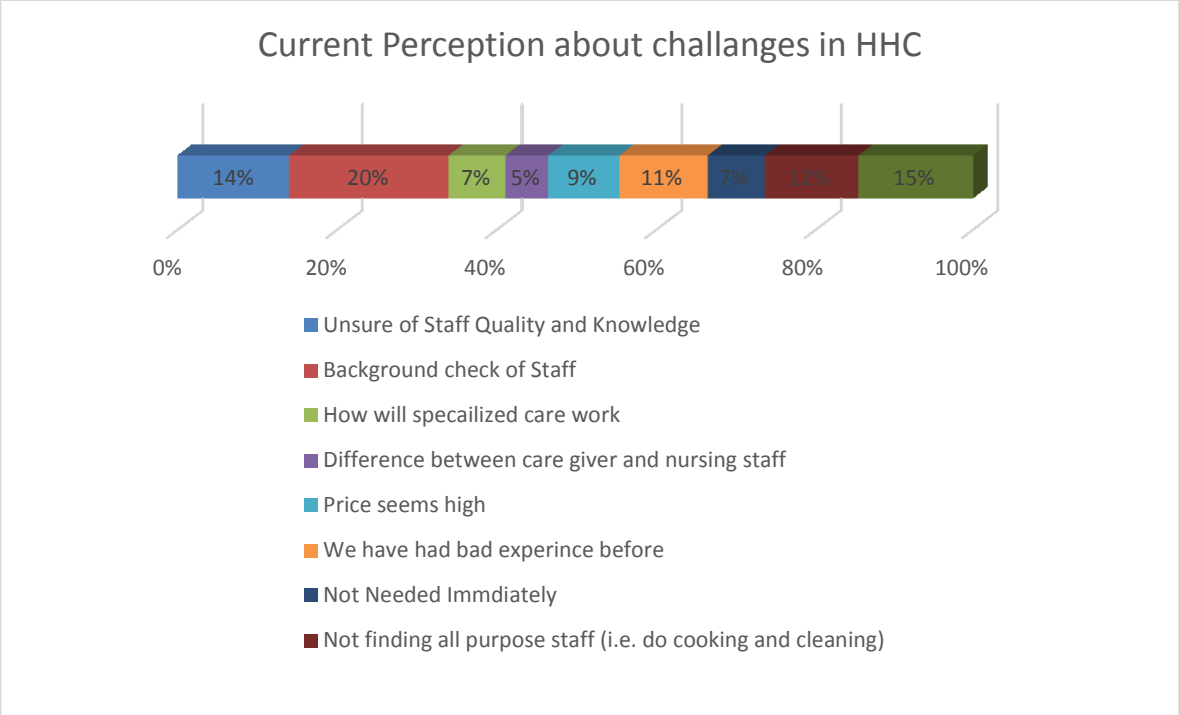

Figure 37: Current challenges faced by client

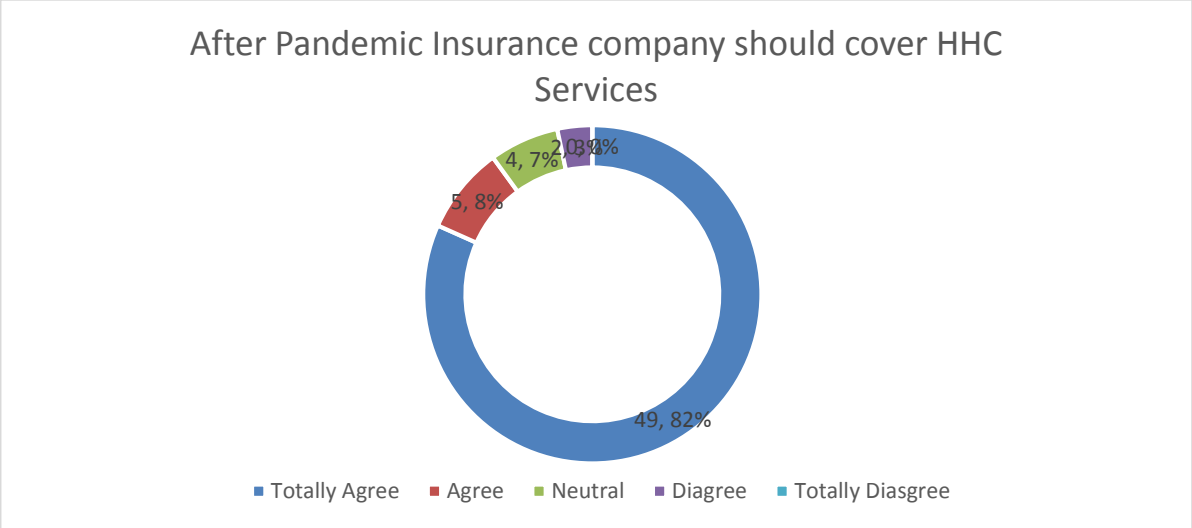

Figure 38: Perception about insurance coverage

Telephonic Interview with health care service provider

Telephonic interview was with service providers and nursing staff that have been associated from Jaipur city since 2019

Variable	Characteristics	Frequency	%
Gender	Male	8	40%
	Female	12	60%
Role	Nursing staff	15	75%
	Staff Provider	5	25%
Marital Status	Unmarried	6	30%
	Married	12	60%
	Divorced	2	10%
	Widow	0	0%
If you are a Women, are you primarily a housewife	Yes	4	33%
	No	8	67%
Years of Experience in Nursing field	0 to 2	8	40%
	3 to 5	6	30%
	5 to 8	4	20%
	8+	2	10%
age group	18-24	4	20%
	25-30	5	25%
	31-35	7	35%
	36-40	2	10%
	45-50	2	10%
	50-55	0	0%
	56+	0	0%
Do you also working another job other than Sewaarth	In Hospital	8	40%
	Another Service provider	3	15%
	I am also studying	7	35%
	I only work with Sewaarth	2	10%

Table 6Demographic Data of HHC Provider and Staff (N=20, source: Primary)

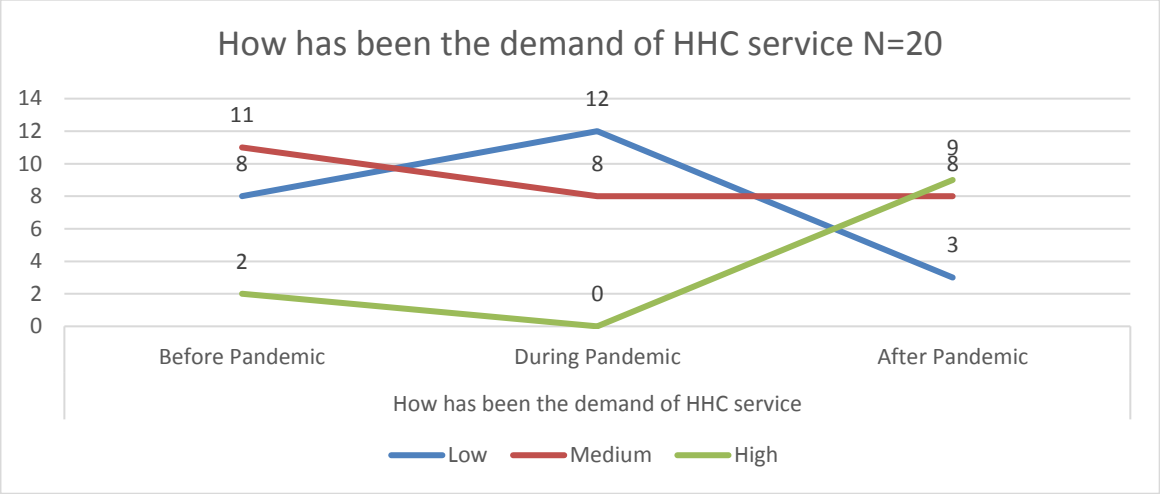

Figure 39: Demand of HHC services as per HHC provider and professionals

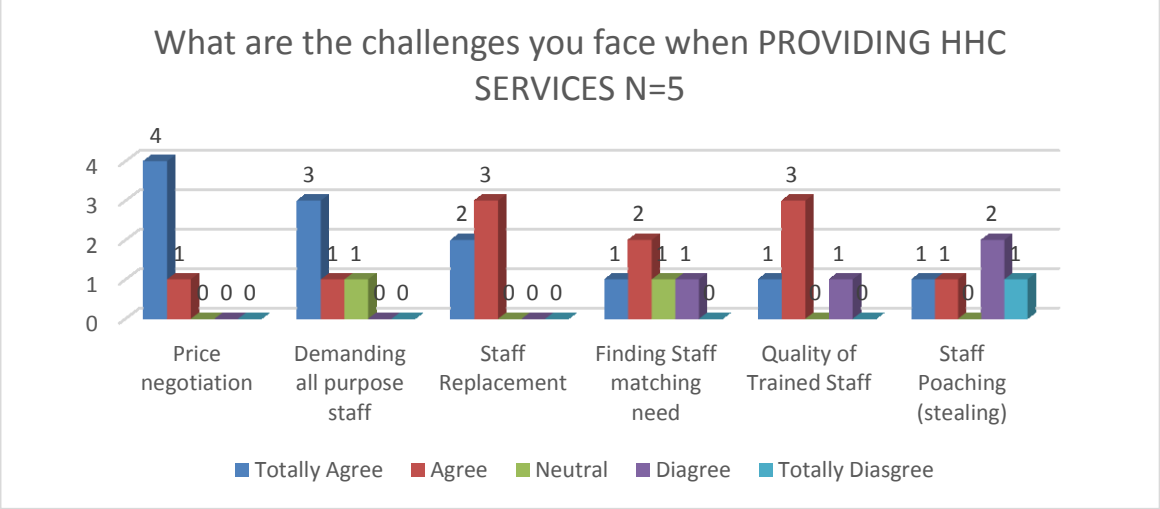

Figure 40: challenges faced by Service provider (n=5, source primary)

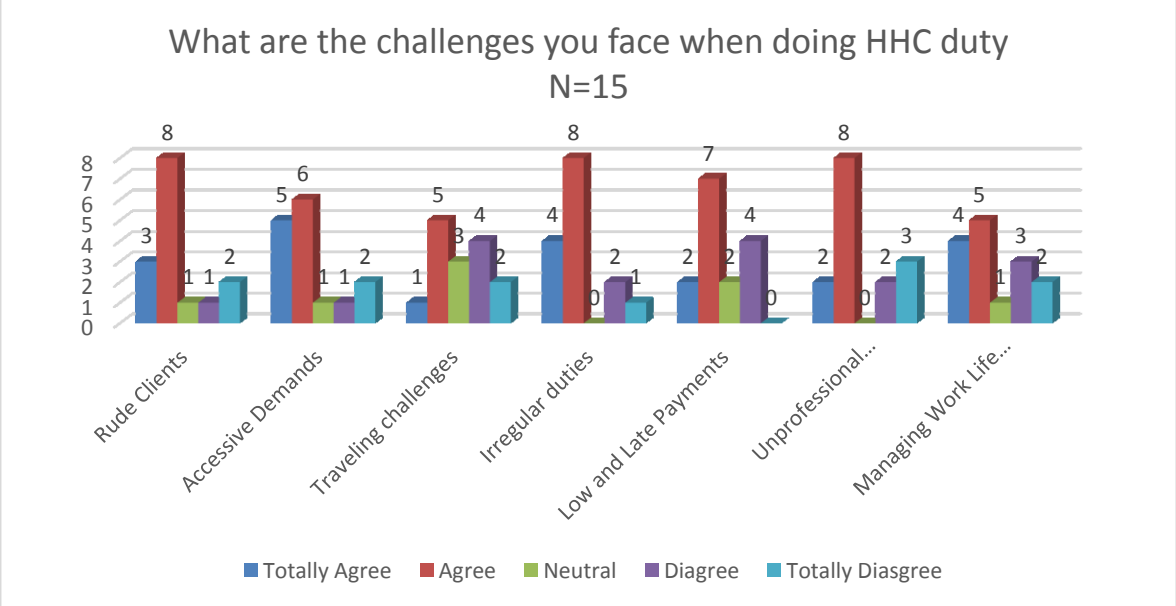

Figure 41: challenges faced by HHC staff (n=15, source: primary)

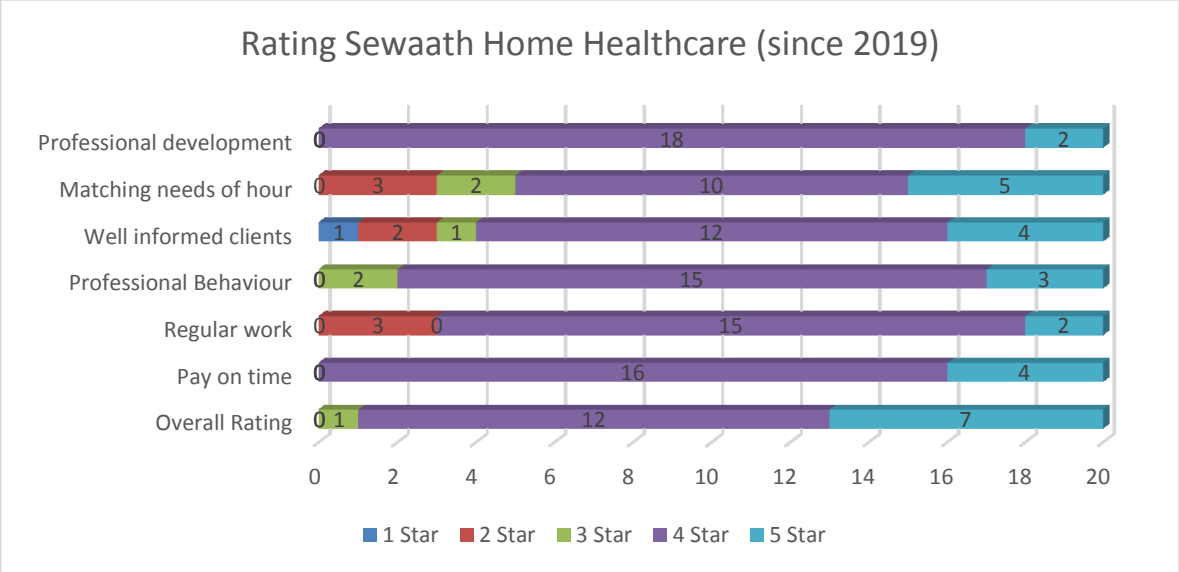

Figure 42: Rating overall services given by Sewaarth to its provider and staffers

SYSTEMATIC INTEGRATED LITERATURE REVIEW:

Topics that were covered under Literature review:

Staffing and Scheduling	**Mostly secondary data**
Insurance and UHC	Mostly secondary data
Training & Leadership	Mostly secondary data
Technology and Digitalization	Mostly secondary data
Quality and Certification	Mostly secondary Data
Medicolegal	Mostly secondary data
Sectorial Growth	Mostly secondary data
Public Policy and Financing	Mostly secondary data
Level of Healthcare Delivery	Mostly secondary data

Table 7: Scoping Literature Review focus areas

Since Sewaarth was needing technology R&D as part of management consulting and my work as research it was important to give an extensive research on technology: We also felt that technology was the binder and catalyst of having all the other areas work as well as raise the credibility to ensure that it can be covered as well as incorporated in our public policy. There are already a lot of social entrepreneurs who have come up with healthcare start up that are working in various states taking help from start-up India and various other government start-up grants and fellowships. On top of that the NDHM has accelerated the digital Bharat's dream of unified healthcare system where all the building blocks can reach out to everyone fulfilling the 3A's

Technology

Author (year)	Study Location	Sample Size	Sample Technique	Abstract and Salient Features
Thanos G. Stavropoulos, Asterios Papastergiou, Lampros Mpalta doros, Spiros Nikolopoulos and Ioannis Kompatsiaris (2020)	Switzerland		Literature Review	Wearables, smart home sensors, cameras, microphones, and indoor and outdoor tracking are all prominent examples of IoT technologies. Assessment of cognitive function, frailty, and other conditions, as well as support, help, and fall prevention, are among the main goals. [29]
Jeffrey Soar, Lei Yu(&) , and Latif Al-Hakim (2020)	Austraila	537 Studies with 34 papers reviewed	Literature Review	Older individuals have mostly accepted and utilised assistive technology. More market demand research is needed to determine the acceptability of the use of assistive

				technology. [30]
Valsalan, Prajoona Baomar, Tariq Ahmed Barham Baabood, Ali Hussain Omar	Oman		Literature Review	The new practical approach for remote patient monitoring is ImOT. [31]
Lakmini P. Malasinghe, Naeem Ramzan, Keshav Dahal (2019)	India		Literature review	The use of remote monitoring for diabetes, the neurological system, heart disease, and mental health was discussed. Additionally, the presented suggestions for further research [32]
Ienca,Marcello Lipps, Mirjam Wangmo, Tenzin Jotterand, Fabrice Elger, Bernice Kressig, Reto W. (2018)				By examining the opinions and attitudes of important health professionals in dementia and older adult care, detailed knowledge on the clinical translation of IATs can be gained. IATs currently have prospects and limitations in the clinical setting. [33]
Vaneeta Bhardwaj, Rajat Joshi, and Anshu Mli Gaur (2022)				The IoT-based health monitoring system makes it simple for clinicians to get real-time data. High-speed internet access enables the system to continuously monitor the parameters. Additionally, the cloud platform enables data storage so that earlier measurements may be accessed soon. This approach would aid in the early detection and treatment of specific COVID-19 patients. [34]
Mlađan Jovanović , Marcos Baez (2020)	US , Serbia	158 publicly available chatbots	systematic analysis	This article focuses on the Human-AI interface features and the transparency in AI automation and decision making to examine how these developing Chabot address design problems pertinent to the provision of healthcare services. [35]
Ben Henson (2021)	US	Article		Chatbots are assisting HHC in addressing a variety of issues, including regulatory, infrastructure, safety, and preference issues. [36]
Lee, Soo-Yong , Nelson Filip (2020)	Sweden		Qualitative Method	The sentiments toward the use of assistive technology in geriatric care are generally favorable. Although issues were found that had a negative impact on their views about specific technologies, the necessity of using

				technologies in the workplace was acknowledged. The technology's malfunctions are primarily to blame for the bad opinions about it. There are no issues with the technology' overall goal.. [37]
Suchada Vichitvanichphong, Amir Talaei-Khoei			Literature Review	The paper's conclusion is that although while a lot of research in this field focuses on providing direct assistance to elderly citizens, the successful application of technologies to preserve seniors' physical and cognitive capacities needs further study. This may open up opportunities that would enable elderly people to function freely. [38]
Yu-hsiang Chou, Shu-yung Brenda Wang & Yi-ting Lin (2018)			Literature review	Robots can be helpful in hyper-aging societies like those in Taiwan and Japan, however they are more often used for entertainment than for support or assisted living. To be trusted and incorporated into society for healthcare needs, this requires legislative standards and other areas. [39]
Bhaita R. (2020)	India		Empirical Study	Studying the pre- and post-COVID-19 circumstances as drivers or facilitators for various telehealth programmes in India. The study's conclusions state that "individuals' healthcare demands," "accessibility," "tech use," "info seeking," and "usefulness and ease of use of telemedicine" should receive the most of attention. [40]
Anthony (2020)			Literature review	The author's goal was to advise healthcare professionals on how to handle the COVID-19 using telemedicine services. According to the research, telemedicine services increased in price, but few healthcare providers actually used them. The author has highlighted that there is a need to provide training for a better care delivery [41]
Garg S, Gangadharan N, Bhatnagar N, Singh M Dam sky, Raina S K, Galwankar (2020)	India		Literature review	"A review of the use of telemedicine during pandemics and its effects on public health in lower-middle income nations, such as India." "Challenges and barriers to telemedicine acceptance and the future" [42]

Table 8: Technology Sector LR

Staffing and Scheduling:

Authors	Study Location	Sample Size	Sampling techniques	Abstract and Salient Features
K.Harish, S.Sathiya Naveena, S.Rathika (2020)	IVF hospital (bloom)	200	Simple Random Sampling	It was noted that a few of the causes associated with a high attrition rate included job shift timings, new job prospects, health concerns, remuneration and other benefits, and personal issues. [43]
Anoop Jain, Dilys M. Walker, Rasmi Avula, Nadia Diamond-Smith, Lakshmi Gopalakrishnan, Purnima Menon, Sneha Nimmagadda, Sumeet R. Patil & Lia C. H. Fernald	MP	554	Cross sectional study	Overall, we find that even if a smartphone-based app is provided and AWWs have been given the option to forgo using the paper registers, they still devote a significant portion of their work time to completing out their paper registers. This is a problem that the government can solve because it could prevent them from spending the required amount of time making house visits and helping adolescent girls, pregnant women, and nursing moms. Second, we discover that, in order to better reflect the work realities of AWWs, the present standards for the amount of time that should be spend on core task should be optimized so focus can be given on delivery. [44]
Edwin Chamanga, Judith Dyson,Jennifer Loke, and Eamon n McKeown (2020)	Systematic Literature Review	NA	NA	According to data, organizational and personal problems including management's lack of appreciation, an unbalanced work-life balance, and emotional tiredness are what most affect community nurses' ability to stay in the field. [45]
Thephilah Cathrine R (2019)	Saveetha Medical College and Hospitals, Tamil Nadu, India.	50 nurses who resigned the job.	Simple random sampling method	The data showed that the attrition rate among unmarried and new nurses was higher than that among married nurses and experienced nurses, with 38% of the 21–25 year old staff nurses having high attrition rates with the majority of them being female. [46]

Table 9: Staffing and Scheduling LR

Quality & Certification:

Author (year)	Study Location	Sample Size	Sample Technique	Abstract and Salient Feature
Carol Hall Ellenbecker; Linda Samia; Margaret J. Cushman; Kristine Alster	USA		Evidence based Handbook	This is an quality training manual to educate the staff about cases and evidence based learning. Various case studies are dicussed to review the literature and how things needs to measured and calculated. These standards can be implemented and practised by home healthcare service providers from India. [47]
Wachtel TJ, Gifford DR	USA		Systematic Review of literature	The demand for home care services will increase as the older population grows and acute care hospitalizations decline. Physicians should be informed of the present eligibility requirements for such

				services and should take part in advocacy efforts for criteria that are expanded to allow patients to get necessary services that are not covered by current Medicare laws. [48]
Corporate Author QAI (2018)	India		REPORT and accreditation standards	QAI provide the standards and practise to be followed for the quality management of HHC services. [49]

Table 10: Quality and Certification LR

Training and Leadership:

Author (year)	Study Location	Sample Size	Sample Technique	Abstract and Salient Feature
Soo JungChang	Korea	11	Qualitative study	There were nine themes found. The findings of this study supported the mixed feelings that senior residents of nursing homes frequently have. Nursing home residents' families should receive education from nurses so that they may better respect the residents' ideas and offer them the necessary support. Additionally, nurses need to focus more on the nursing home's surroundings so that the senior residents can feel at home there in addition to offering dependable assistance, resources, and acting as advocates. [50]
Santham Lillypet (2016)	Rural Banglore	302 AWW 350 RDW	Descriptive cross sectional study	Most of the AWW and ANM staff lacked adequate knowledge to read with RDW and hence discouraged the HH to take services from these public service. Thus to get a positive attitude and using these services from ASHA teaching and training programs should be conducted to incline people to use public health services thus improving health indicators as well as rural development. [51]
Leslie Neal Boylan (2011)	BOOK	70	Case study method	A valuable tool for advanced practise nurses and graduate students who want to analyse, diagnose, and manage cases in family and primary care is Clinical Case Studies for the Family Nurse Practitioner. The book gathers years of knowledge from

				professionals in the field and is made up of more than 70 cases that range from typical to unusual. It is arranged chronologically and uses a standard method based on the SOAP format to present instances ranging from neonatal to geriatric care. A set of critical thinking questions suitable for self-assessment or classroom usage are included, along with a differential diagnosis. [52]

Table 11:Training and Leadership LR

Insurance / UHC:

Author (year)	Study Location	Sample Size	Sample Technique	Abstract and Salient Feature
Zodpey, Sanjay, Farooqui, Habib Hasan	India			According to research from around the world, social health insurance and tax-based financing are the most progressive ways to pay for healthcare services, whereas OOP spending is the most regressive. To ensure competition and choice in the healthcare industry, it is advised that the regulatory framework, institutions (such as the Insurance Regulator and Development Authority and the Competition Commission of India), and public health facilities be strengthened. The goal of AB-NHPM and Health and Wellness Centre synergy is also recommended because it would ensure complementarity between the comprehensive primary care provided by Health and Wellness Centres and the secondary and tertiary care services covered by AB-NHPM, as well as prevent demand-side moral hazard and rising healthcare costs. [53]

Table 12: Insurance /UHC LR

Medico Legal:

Author (year)	Study Location	Sample Size	Sample Technique	Abstract and Salient Feature
Mukesh Kumar Bansal (2021)	Delhi	2107 cases	Retrospective study	Points at number of cases that were witnessed and their characteristics. And what can be the ways to prevent these cases [54]
Prakash Kulkarni & R. K. Pandey (2021)	Aurangabad	4245	Retrospective study	This study demonstrates that most medical and legal problems have unintentional causes. The majority of medicolegal cases involve men and younger age groups. Due to death and incapacity, human resources are lost as a result. To stop this, driving licence applicants should undergo rigorous testing of their knowledge and skills. Traffic laws should also be strictly enforced. It will also help if medical legal cases are handled promptly. [55]
Bevinahalli N. Raveesh, Ragavendra B. Nayak, and Shivakumar F. Kumbar	India		Systematic Literature review	Preventive measures are the best method to deal with medico-legal concerns, and this article aims to list them in order to protect the doctor from a negligence lawsuit. Significant changes are being made to medical law. The evolution of the law surrounding professional negligence and misbehaviour is not sufficient. The laws are insufficient and therefore do not cover every aspect of medical malpractice. By ensuring patient satisfaction, sticking to policies and procedures, providing patient-centred care, and being aware of measures to defend against malpractice verdicts, lawsuits for medical malpractice can be reduced or prevented. In today's litigious environment, having adequate professional liability insurance is essential. [56]

Table 13: Medico Legal LR

Healthcare Delivery Systems:

Author (year)	Study Location	Sample Size	Sample Technique	Abstract and Salient Feature
Emma Sacks, Melanie Morrow, William T Story,Katharine D Shelley, D Shanklin, Minal Rahimtoola, Alfonso Rosales, Ochiawunma Ibe, Eric Sarriot (2019)	Kazakhstan		Evaluation based on the framework and building blocks of healthcare	Beginning with the identification of the crucial factors that produce health, this study proposes an enlargement of the WHO building blocks. It presents an expanded framework that explains the need for committed human resources and high-quality services at the community level, situates community resource organisation and mobilisation strategies within the framework of health systems, positions health information as a component of a larger block devoted to information, learning, and accountability, and acknowledges societal partnerships as crucial connections to the public health sector. This framework intends to educate efforts to locate community health within national health systems and global guidance to attain health for all by making clear the sometimes overlooked investment needs for community health. [57]
Md Zabir Hasan, Shalini Singh, Dinesh Arora, Nishant Jain & Shivam Gupta (2020)	India		Systematic review of literature and public health documents	To move toward UHC, an integrated primary, secondary, and tertiary health care approach is crucial. In order to support PSI in India, policy decisions, legal and financial frameworks, adjustments to the way health services are organised, the use of information systems, and the orientation of health teams would all need to be informed by the findings of this scoping review. This study will act as the basis for modelling and putting PSI's efforts under the AB programme into practise. [58]
Arvind Kasthuri (2018)	India		Editorial Review	The public's health in our illustrious nation is threatened by the five issues listed. It addresses these and other problems as we get ready to face a future that is both full of opportunity and unpredictable in equal measure, keeping in mind that the fight against disease is the struggle against all that is damaging to humanity. [59]
Ankit Singh (2017)	India		Review Article	The growth of HHC market in India in private sector shows growth and potential but these services are missing in for elders through public sector. Accessibility to these services will be a challenge and reason for failing of market due to market barriers such as high cost and challenge with human resources. [60]
Proctor P. Reid, W. Dale Compton, Jerome H. Grossman, and Gary Fanjiang (2005)	USA		Book	One of the planning of the organization's most important tasks is to communicate the overall process and sub goals to people and groups at all levels. Another important responsibility is to encourage and recognise people for their contributions to ongoing operations improvements at all levels. The healthcare system will need to be overhauled, and it won't be quick or simple. Leaders in the healthcare industry, especially practitioners in all care settings and leaders in engineering, will need to use their creativity and dedication to achieve the long-term

				objective of enhancing the health care system. [61]

Table 14: Healthcare delivery system LR

Public Policy and Financing:

Author (year)	Study Location	Sample Size	Sample Technique	Abstract and Salient Feature
UNICEF report A Vision For Primary Health Care In The 21st Century (2021)	Global		Annual Report	UNICEF report on Towards universal health coverage and the sustainable development goals [62]
MHFW report on RMNCH+A (2013)	India	Using NFHS 4 data	Quantitative Analysis and research report	The well-established connection between mothers and children survival and the employment of family planning techniques is yet another convincing argument in favour of investing in an integral approach throughout life phases. The objective is to provide practical instructions to apply this approach during the following phase of the NRHM (2012-2017) and an awareness of the holistic approach to enhancing child survival and safe motherhood. The document gives programmers instructions that, if taken seriously, would result in a notable improvement in adolescent, female, and child health. The document primarily discusses the actions performed thus far to enhance the health of mothers, women, and children. [63]
Andrew H. Talal, Elisavet M. Sofikitou, Urmo Jaanim¨agi, Marija Zeremski, (2020)	New York	12 OPOID centre	Tele monitoring (both Qualitative & Quantitative)	Provide a plan for establishing a vast, dynamic, patient-centred telemedicine network that will be used by 12 opioid treatment programmes (OTP) spread out across New York State (NYS). is the important knowledge gained through putting into practise a thorough, dynamic, patient-centered telemedicine system among an OTP network throughout NYS as applied to a vulnerable population that can be extended to other hard-to-reach Populations. [64]
Pat Conway, Heidi Favet, Laurie Hall, Jenny Uhrich, Jeanette Palche, Sarah Olimb, Nathan Tesch, Margaret York-Jesme, Joe Bianco (2017)	Ely community , USA			The lessons learned from this case study imply that in order to more successfully engage organisations in multi-sectoral networks, it is essential to deal together at whichever level each company is willing and able to contribute. Organizational engagement may change over time. Additional possibilities to learn more about the model's components—such as community features, local resources, and residents with complex care needs and their families—are presented by the model's application in rural communities, which will lead to better patient outcomes. Enhancing the evaluation of outcomes by include a more personalized measure of change, such as achieving patient goals, will help set reasonable expectations for those taking part in care coordination. [65]

Table 15: Public Policy and Financing LR

Special Reports

Author (year)	Study Location	Sample Size	Sample Technique	Abstract and Salient Feature
KPMG Report "Healthcare 3.0 Re-imagining healthcare in the next decade" (2020 and articles from 2021)	India		Market research Annual Report	To identify the main trends and drivers of change that India would experience. The creation of "digitally disruptive business models," "customer purchasing behaviour," and "effect of technology" as agents of change in India's healthcare system. These elements would contribute to the UHC and the strengthening of the health system. [66]
EnY report "Delivering digital enabled home health" 2020	India		Market research Annual Report	The author has examined how COVID-19 has affected healthcare infrastructure. The effects of COVID-19 and how these current crises will be altered by the economy, society, technology, and sustainability [67]
Deloitte Report "COVID-19: A catalyst to change (2020)"	India		Market research annual report	The author has looked at the effects of COVID-19 on healthcare systems. Economic, social, technological, and environmental effects of COVID-19 and how these current crises will change as a result [68]
Deloitte Report "Changing consumer preferences towards healthcare services: The impact of COVID-19" (2020)	India	419 clients	Sample Survey	Understanding consumer behaviour and shifting demands on healthcare providers is important. Based on the analysis of the responses, key actions for medical professionals have been created to encourage consumer participation and get institutions ready for the post-pandemic world. [69]
Deloitte report " Crisis as a catalyst : accelerating transformation" (2021)	India		Market research report	More than two thirds of respondents expressed strong confidence in their company's success over the course of the next year, according to the survey, which reveals that most respondents think their businesses would recover from the crisis. They also think that most important company KPIs will rise. With 52% of highly resilient firms expressing extreme confidence in their prognosis for the next three years, compared to just 20% of those in the bottom tier, highly resilient organisations are even more upbeat about their prospects for long-term success. [70]

PWC report "Transformation of the patient journey in a virtual healthcare setup in the new normal" (2021)	India		Market research annual report	To outline the various steps taken by the Indian government and private healthcare companies to grow the virtual healthcare market while researching current trends in virtual healthcare around the world and best practises that can be derived from them. Governmental efforts to improve virtual health, COVID-19, disruption in the patient life cycle, and its difficulties. [71]
Niti Ayog (2021)	India		Book – Annual Publication	The development of private companies outside of metropolitan areas to Tier 2 and Tier 3 locations in the hospital sector is an alluring investment opportunity. Along with providing investment opportunities in sectors notably contract innovation and research, over-the-counter drugs, and vaccines, India also has the chance to increase domestic pharmaceutical production, supported by the most current PLI initiatives. The expansion of diagnostic and pathology facilities as well as miniature diagnostics is a huge opportunity in India for people involved in the medical devices industry. [72]
The Elder Special report "Universal Health Coverage (UHC) in India" (2018)	India		The Elders : The Special Market report	India desperately requires UHC since 63 million Indians live in poverty and 600 million people are unable to obtain the healthcare they require. India thus has the second-lowest life expectancy in South Asia, which is over eight years less than China. In accordance with the Millennium Development Goals, India also fell short of both its child and maternal mortality goals (MDGs). [73]
Rural Health Innovation	Texas		Case Studies	This project's main goal is to aid in the creation, implementation, and sustainability of an Accountable Care Organization with a rural focus (ACO). The Network's clinicians provide care in a region with high rates of chronic disease, enduring poverty, and a chronic scarcity of medical personnel. To lay the groundwork for the ACO, existing network programmes, such as the Diabetes Self-Management Training (DSMT), the Health Information Exchange (HIE), and the payer/managed care contracting programme, are being expanded and improved. Results of earlier government funding initiatives include the DSMT and HIE. [74]

DATA ANALYSIS (ANALYTICAL DISCUSSION)

Primary Perception Study

Digital Survey - HHC seekers

Fig. 10 from data processing section shows that there was a higher ratio of male respondents and decision makers in HH who responded to the need of HHC services with in the family that we survey. This is evident from the studies selected in the process that within the HH though the female have significant impact in decision making of taking HHC services as they will be managing the HHC staff , usually the financial decision making authroity remains the leader of the family who will be financing the HH services.

Fig. 11 showed us that usually the decision maker to the house of services ranged from age bracket of 35-65 age bracket. This can be seen from various studies that as baby boomers from 1960-80s are in their elderly care age and thus their children now in the age bracket are seeing a rise in need of HHC services. This also coincides with the data previously discussed stating the rise of geriatric group in South East Asia (and globally).

Figure 12 shows the education level of the respondents who took service from Sewaarth since 2019, it was evident when we paired this data with their area of dwelling (fig13), their income source (fig 14), size and type of family (fig 14, 15). Most of them exhibited few important characteristics which showed busy professional lifestyle or living away from parents. Due to which most of them lived in urban area where average family size was between 5-8 including living with their elders. During working with Sewaarth this was observed as a trend however it needed evidence based finding which this survey proved. Most of them had higher education and were having stable economic status either as a professional or business owners. Some of the Sewaarth clients (Sample Size N – 200, Responded = 60) were those who were living abroad or in a different metropolitan. This coincides with the observational learning as well as study suggesting rise in alternatives to accessing to healthcare easily and economically such as tele consultation, medical tourism. Recent reverse migration and change in family systems due to lockdown where people were forced to stay home and lived together for close to average of 400 days together out of 730 days of period from 2020 to 2021 covering the two waves of corona pandemic.

Figure 17 and 18 above represents the use of HHC and teleconsultation services by the 60 responders since the year 2019 till date of survey. The purpose of using these questions were to see trend and use of these services when “lockdown: was initiated. It takes 21 days to form a habit and with people in lockdown, challenges with lifestyle management, not able to get

care in hospital or prices being too high or social stigma there was a rise of services both HHC and tele consultation being taken or being considered. This proved that there were changes in health belief system and how we avail treatment. By the end of pandemic since 2022 more people have taken the services than 2019 when there was no pandemic. This shows more people have become used to or comfortable with HHc services and teleconsultation with their healthcare professional (doctor, diet, counselling etc). Those who did not take the service were divided between those considering it and those with no as a clear response. This breakdown showed rise of those who might consider in services in coming future. This coincides with various studies and researches as part of the research work that pointed out change in perception and rise in use of services. The initial hypothesis and interview with providers and professionals also pointed towards perception being a main reason for people to consider or not consider taking these kind of services instead of traditional ones till now. There was sharp drop of HHC services and inverse to that rise of tele consultation services (During lockdown)

Fig. 19 pointed in direction of which services related to HHC were taken by the respondents. ePharmacy showed maximum popularity in which was followed by use of sample collection services and medical devices such as C-Paps and Oxygen concentrators. During pandemic there was drop in home visits for therapy from outside. This coincided with the lockdown period both in first and second wave. During wave two as there was shortage of oxygen supplies there was a sharp rise in need of medical devices and sample collection services. The adoption rate suggested that by end of wave two 2021 more people have adjusted and shifted to using these services on regular basis. Though the demand for mobility equipment remained low and moved up very slightly the need for these kind of products will rise as the cases rise of comorbidity, NCD in geriatric age groups

Fig 20-26 looked at the perception of use of RPA technology that Sewaarth is also testing out. As the lockdown period saw a change in perception and improvements in adoption of various new methods of healthcare delivery system, there has also been improvement in legal compliance / approvals on use of such technology. Though eMRD privacy is still a need to improve in terms of privacy and security respondents showed inclination towards using and referring technology for their family and friends. The responded belongs to professional or business background which may also suggest that they are aware of such technologies because of kind of information exchange and social status environment that they are in. As mentioned about the economic status of families was eliminated from survey after majority

of them answered “prefer not to answer”. It can be inferenced from the other data provided by the respondents that they are aware of newer technologies coming in the field of healthcare. Use of wearable watches or inclination towards using smart patches are key to understanding that the audience from this demographic age group and professional environment are using latest innovations.

Fig 27,28 pointed towards change of perception and measuring its degree of change. Change in awareness and perception was high which coincided with higher measure of change. This data correlated to fig 17-19 where eventually post pandemic the number of people using services since 2019 have settled on a higher frequency measure. While various reports suggest the same positive trends we explored if in fact people will continue to take HHC services in future. Out 60 respondents we got 73% wanting to continue taking these services in future (fig 29). With those who said no or did not commit to take these services showed that many were considering to taking these services. This coincided with the data of those who have taken services since 2022 and results showed consistency in respondents attitude towards the perception of HHC services.

When asking the respondents which services they would prefer taking going forward from HHC services in long term and short term formats we saw that most of the services that were desired where short term except for when needing elderly care and companion. These close ended questions were enforced to address if services where to be taken what will people like to take and in which term size. Other than elderly care, it was pleasant to see that respondents wanted RPA technology for longer terms use. A large portion of this ties in with people living away or having busy schedule and not being able to devote time for those who need care. The awareness and curiosity of RPA technology could give them an opportunity to better monitor and take care of the health of loved ones.

Figure 31 and 32 shows the effect of these perception changes amongst respondents, with the comfort level of utilizing these services from since 2019 to 2022. Before and after shows in the audience which were comfortable and very comfortable going to the hospital had dropped. When correlating this with why they would choose HHC services over hospital we could see that people have not forgotten the chaotic experience of delta variant when hospital beds either were not available or were costing too much. Also vast majority of them felt that their patient was comfortable at home where they could be given nursing care at home. People also thought that remote monitoring can a reason why they can trust and take HHC services. Respondents also showed that due to lifestyle challenges (domestic

help) and cost of hospitals stay costing more they would likely to choose HHC option. However for specialized care such as Dialysis patients preferred not to take HHC services. Most of them did not live away from their loved ones or were in joint family in our sample respondents hence living away from family was not the reason. However this data coincides with sample data of those living away from family.

Challenges based on past experiences or unawareness about services related to HHC fig 33, data showed that majority of them were unsure about the quality of services and staff. The other factor was past bad experiences with other HHC providers and challenges in arranging the right staff. In our observational learning at Sewaarth we observed that many of them were wanting an all-purpose staff and clear distinction was not there between what a domestic help and HHC care or nursing staff does. Sewaarth had done well to promote healthcare services with right IEC material for clients to understand and signoff on agreement documents.

Thought most of our clients had health insurance they were not aware of if their insurer provided HHC service as part of their plan. However vast majority believed that it should be part of health insurance package. Those who disagreed when asked over phone why they did not want it to be covered by insurance their answer was simple “premium will go up”. However, it showed lack of awareness and perception belief in small group of people of benefits of having HHC services covered under insurance. (Fig 34).

According to the pre-existing literature that was reviewed, lack of awareness and right information exchange among healthcare professionals and patients, healthcare institutional (public and private) burden, communication gap, and uncertainty regarding duties and responsibilities were all cited as challenges in home health care

This survey looked at understanding the knowledge and perception of HHC service and if COVID-19 pandemic has boosted the awareness. Most of the participants being from urban area showed more awareness of HHC service when looking at cross sectional data of respondents.

Thought mostly the services where taken for elder care people were aware of the fact that services can be availed by anyone. This was also observed during operations as out of every 10 leads 2-3 of them were for special needs person, critically ill patient or for pregnant women / nursing mothers.

Some questions were cross checked by placing similar question at the middle or end of survey to ensure that the responses were recorded consistently. Majority of them showed positive

signs of utilizing HHC services post pandemic. With people going in isolation and quarantine at home when suffering from covid-19, the perception has changed and people have started believing that with a proper care giver at home adequate amount of recovery can happen. As observed from the survey most of the cares are for elderly care or for therapeutic services there is small but positive growth in use of assistive technology as well as medical equipment's. To avoid hospital based infection to elders such services like c-pap, rehabilitation can all now be achieved confidently from home. Again pandemic has shown people the way that this is very much possible. When it came for critical care related needs like home ICU or smart home solution the complexity of situation lead to lower inclination. Though over all people have dropped in numbers who would like to visit hospital without feeling any discomfort or hesitation in that environment.

Telephonic Interview – HHC providers and staffer

Referring to table 5 While telephonic interviews was done with the staff and providers it was clear from demographic data that service providers were all male and majority of the staffers were female. With most of the staffers or providers where working with some other hospital (40%) or were students (35%). This is a reason why it is hard to find stable long term staffers as either HHC is their secondary job or they are doing this part time while studying for their own field.

When asked about HHC services and its demand (fig 35) the data suggested that prior to pandemic in 2019 the demand was tending towards medium while during pandemic time the demands were low and after pandemic the demand has gone up and tending towards higher side. This data coincides with the literature where during pandemic due to fear of infection many households did not take or allow outsiders to come inside the house. Though companies like Sewaarth which were supplying specialized covid care staff and medical devices saw some level of consistency during the pandemic period.

When asked from the Service providers (n=5) about challenges they faced in providing HHC services (fig. 36) providers agreed in unison on challenges like negotiation, demands and staffing (quality, hiring) remained a major challenge for the providers. These challenges also relates to the studies that were conducted that showed wrong perception of client and human resource issues were key to solving problems of HHC service provider.

When asked to the staffers (n=15) what challenges they faced onsite when doing their duty, a lot of them faced bad behavior from clients and unprofessional service providers. As the reports also suggested that staff tends to lose their level of commitment and motivation when

not given right environment at work and onsite. A lot of them pointed toward irregular work hours where there is demand but the provider is unable to match the needs of clients. It is hard to negotiate with client when they want domestic helper (and price point) and ask for patient care giver staff.

Lastly we asked for the staffers and providers to rate their experience with Sewaarth to see what Sewaarth is doing right or can improve upon and overwhelming of them saw staffing and scheduling as their area of concerns with Sewaarth. While Sewaarth is trying to best match this they realize without client approval at times they are rendered helpless if client is not liking the staff or want a type that is an all-rounder or price is high for client. However, with efforts rounded up by Sewaarth in improving the care practise both for client and staff has earned them an average rating of 4.3 out of 5.

Secondary Study – Systematic Scooping Literature Review

When working on scooping literature review we broke down the areas of search into 10 segments. Perception (primary) study was conducted to understand the role covid pandemic has played in accelerating the role of HHC, telemedicine in the field of healthcare.

The other nine areas of focus were done via the Systematic Scooping literature review to find the area of challenges and opportunity when looking at a holistic scope of HHC in India. These areas of HHC provides both challenges to reaching Indian Healthcare systems goals as well as opportunity in various sector for the market players to introduce their services. While for some it could be technology, for some it could staffing, training and operations of sales, support and scheduling home healthcare. We will now analysis the information data that has been collected from multitudes of paper reading and classifying them into respective categories.

Technology

Technology is going through a tremendous transformation and due to pandemic has been a big enabler in each and every field we are involved in today. In healthcare it has defined and shown everyone that technology is one way to reach to our goal of 3A's which eventually will lead us to meet our 2025 targets of NHP and SDG targets by 2030. In public space it plays even a more major role but due to the complexity of the healthcare system it is difficult to attain success in short duration. It requires perseverance and generations of administrative personnel to reach to the level which can be compared at part with the developed worlds in west, Europe or even in Asian pacific. We further broke down technology in various different sectors.

1. Telemedicine
2. ImOT
3. Assistive technology
4. Monitoring devices
5. Smart Home
6. ICT

Study on telemedicine in 2021 [40], showed the enablers and drivers of telemedicine in India. Study showed the perspective change in consumer behaviour pre and post pandemic. Aspects like macroeconomics, technology, demographic data was understood from a customer's point of view. With a doctor to people ratio being 0.77 per 1000 is much lower than many countries including china (1.49 per 1000). To reach to the level where other developed nations are there India would need approximately 600,000 doctors and 2 million nurses additionally. [75]. Adding to this bring the challenge of out of pocket expenses which is average 70% for the Indian subcontinent (1.02% vs global average of 9.20%) : as per CBHI. Various

organizations are coming up with telemedicine platform with over nine pharma companies investing in telemedicine. Though to fulfill the gaps in public health domain a study [42] found that there were barriers to entry and there after challenges such as digital literacy, network connectivity, unawareness about such service. It concluded by point out how the risk of failure during implementation can be reduced by training, change management. Additionally, the most important challenges related to connectivity with public HER and telemedicine platform is retrieval of eMRD, regulatory approvals and vendor licencing. This becomes more complex when dealing with vulnerable population. [10] . This when applied in HHC setup for a patient especially elderly or with physical or mental challenge, one has to be equally careful for the privacy, ease of practice that patient finds conventional and easy to understand. Data privacy and regulatory improvements post pandemic will help the scalability and integration of telemedicine with HHC. [10]

HHC services always had assistive technology a critical part of its core support feature. As we observed from various reports that Aging population is growing [6] [62] [13]and the need for assistive technology will also grow with it. It was estimated that by CAGR of 4.9% by 2023 to a size of $20 Billion.

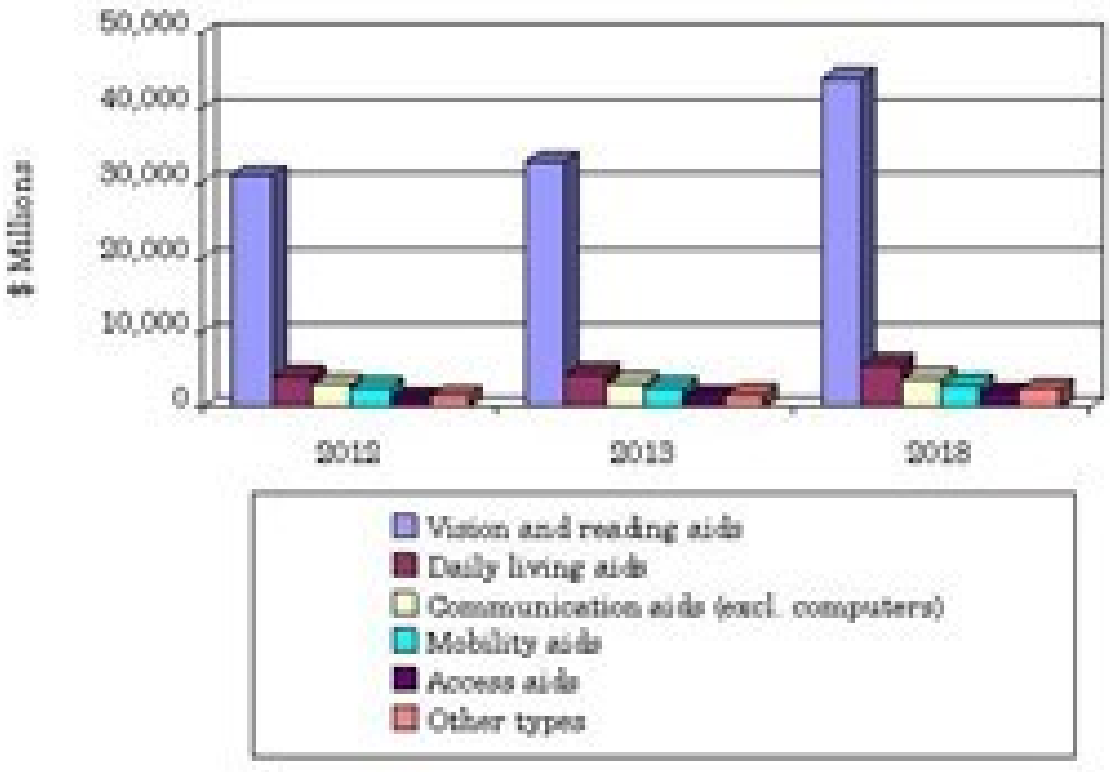

Figure 43: Types of assistive technology and their market size (Source: Frontiers in Public Health)

The major problem of technology is the usability and negative experiences. Though people

have had positive outlook on having technology to be used for eldercare in HHC setup. This has led to easing the concerns of use of technology through ImOT and robotic technology that reduces the workload on staff, patient or even the family members easing their duties in the household. Also having remote monitoring devices attached with the assistive technology will be key to ensuring that in case of need the patient can be helped in HHC setup. [30] [37]

An article [29]on ImOT technology assed and categorized various technology to better understand their nature of assistance, effectiveness for accessible and acceptable HHC service. The article particularly looks at the elderly population and various diseases that are in health focus and then further using various ImOT technology available reviewed them over multitudes of criteria. With elder care at home it was realized that the spectrum of healthcare issues includes everything from normal eldercare to AAL to chronic illnesses, including AD as well as other types of dementia, PD, frailty, and CVD. Wearables, smart home sensors, cameras, microphones, and indoor & outdoor tracking are all prominent examples of IoT technologies. [31] [29]

These wearable technology is not only being helpful with assistance but also helping with monitoring and emergency response in healthcare at home or in hospital. Research [32] on diabetics and mental health related monitoring, as well as systems relating to the heart and blood, fall detection, the neurological system, and brain suggest common ailments and challenges with aging population with comorbidities. Recent advances in contactless camera-based techniques are having a significant impact on both society and the scientific community. The results of growing need in HHC is also improving smart technology to assist care giver and family members better take care of loved ones.

As we up the ante in HHC technology, the market is tilting towards autonomous and smart solutions. With use of chatbots in conventional healthcare setup the scope is emerging as a capable option for accessing and delivering of healthcare services. The evidence is in the growing number of publicly visible chatbot companies are aiming at taking an active role in prevention, diagnosis, and treatment services. These are both useful in private and public healthcare setup where the need for elderly care or care for mother and child can benefit from such smart solution like chat bots to connect with care giver or family member. As chatbot technology is still evolving and becoming smarter it will capitalize in near future on opportunities that require showing social intelligence to tackle vulnerable scenarios and mitigate the risk of potential life threatening event. [35]

To culminate all the various different technology available for the use in field of HHC sector

we look at smart home solutions that integrate all the various different technology such as assistive, remote monitoring, ImOT, chatbots is the final frontier which is smart home solution for patients. Post pandemic the growth in wanting to stay home to recover or get care is growing. They are mainly intended to monitor elderly subjects with motor, visual, auditory or cognitive disabilities. Figure 43 shows the basic flow of these smart home solution. [17] . Smart home solution in HHC setup in Indian scenario is still a farfetched dream since the adoption rate of technology in India is lowest in asia pacific region [76] . However such solution can be useful both in public and private health monitoring system in India to reduce the burden. The article also highlights the fact that there needs to be more comprehensive study on the habits and intentions of patient, legal, ethical and prescribed system integration to ensure it can be integrated in construction.

Figure 44: Mind map of digital technologies used in the public-health response to COVID-19 (source: nature medicine)

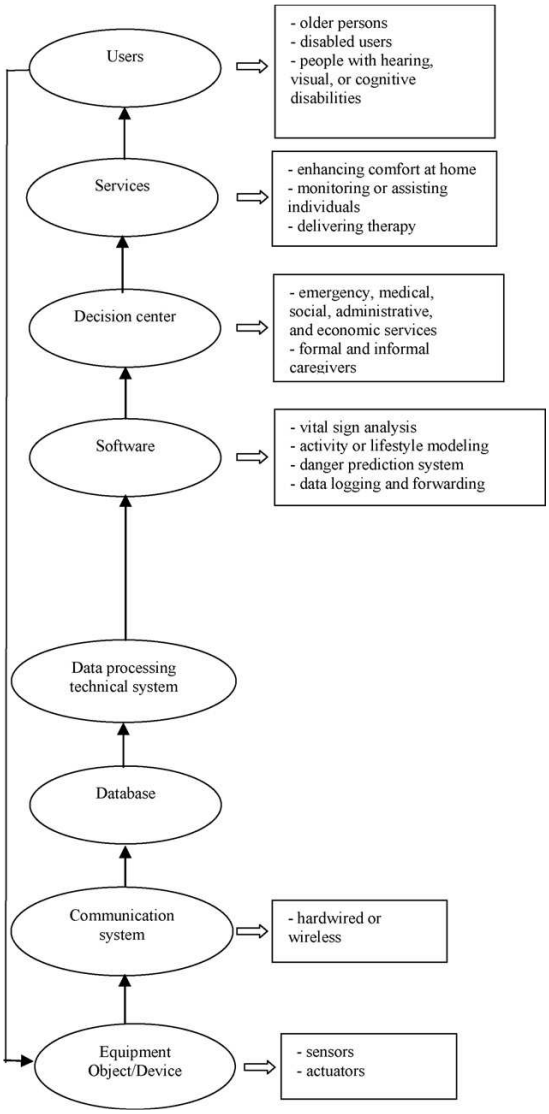

Figure 45: Flow of Smart Solution (source: Journal of CMPB)

Staffing and Scheduling

While India contributes to 20% of global disease, 6% of global hospital bed and 8% of doctor and nursing population [19] (ICMR report) India is still lacking behind in the global standards of number of doctors and nursing staff per 1000. With need of over two million nursing staff and half a million doctors the Indian healthcare landscape is overburdened by demand and stressed with lack of qualified human resource capital. However it has become a challenging task for HHC service providers as there healthcare industry is plagued with increasingly high rates of attrition and lack of good retention. According to the reports by National Association for Home Care & Hospice, the attrition rate for all home health employees reached at percentage of 22.18 in 2020 compared to 21.89% in 2019. The most prominent causes of attrition among nurses providing home healthcare are a lack of suitable financial advantages, an imbalance between work and personal life, and dynamics in superior-subordinate

relationships. The business of home healthcare companies may be significantly impacted by this attrition trend. The organisation, along with the hrm teams, must have comprehensive plans in place to tackle the rising high attrition rates. Additionally, businesses should implement regulations that specifically affect staff stability and retention. [77] . The other challenge that was also seen during the interview conducted with the staff was that they were either unmarried or studying because of which when they had change in their status there was higher chances of drop out (in other words attrition for HHC providers).

There are many areas that need to be improved in relation to the organization's members, management's support, the organization's commitment, training, work culture, policies, and procedures, as well as benefits, pay, recognition, and employee referral can be looked as part of the policy change. These can be moulded into areas such as support from the management, commitment by the organization, work culture (following the 6 S's of work environment), training given to the employees, reward and recognition programme. In India scenario the HHC sector remains largely unorganized and areas of upskilling, perks and salary hike and policy procedures remains unsatisfactory. Bad paymasters were another reasons to have staff demotivated to work and give extra.

The findings strongly suggested that lack of growth and low salary coupled with work life balance and communication gap, difficult working conditions (and hours) are the driving factors for attrition in the organization. Thus the salary increment, incentive, work life balance, guidance from the management and workplace safety are the key factors for retention of nurses in the organization. [45]

The idel time and scheduling of shift is another area of concerns which is why areas like fixed, regular salary in other words regular work is still setting in with demand. As HHC seekers are realizing the norms and standard the telephonic interview and the data from articles shows us that there is a challenging in scheduling the work load of staff effectively. Most of the time the care provider is struggling to meet the demands of seeker and thus the time is lost in scheduling a care after negotiations and sensitising the seeker on kind of duties the staff will do and not do. [45] . In public sector also when dealing with rural population ASHA and ANM staffers have to deal with a lot of paperwork. It takes time away from their work that needs to be done in field and thus the duties get neglected. [44]. Thus technology should be developed in such a way that will assist the care giving staff to report, record and improve care not take away time from them to take care of patient.

Quality and Certification

As the market of HHC is becoming more and more in demand it is important to focus on quality and overall governance (regulations) that come into picture. Organizations like QAI helps the HHC provider to streamline the services and quality. [49] Just like NABH the quality standards of HHC services should also be internationally at par. Research reports suggest that such quality of care directly affects the clinical outcomes of the treatment. It has found to elevate the psychology of the patient recovering or being assisted that the care around them can be trusted and is safe to use. This becomes even more important as the number of cases with complex comorbidities are growing and the need to complex care requires careful delivery otherwise there can be medicolegal entanglements. Quality can be perceived over all the different domains under healthcare and thus requires to break it down into various aspects such as technology, insurance coverage, and quality of care. ADL and ICDL were important factor for QOL improvement in patient such as phycology, physical and environmental however for social indicators more had to be done via remote monitoring system or interaction with members of family and staff. If the quality of functional ability is improved the health outcome improves. [25] . The quality of care can be divided into three different sectors, Macro, Micro and Meso level. [23] This will help us build VBHS model that is oriented to provide quality care to the patient at home. Also the coordination from various different service providers / stake holders should be very natural and synergetic. At agency level, more training can be conducted to ensure quality is maintained. This might also require restricting the organization. At executive level people should be advocating for changes in regulations (such as Insurance coverage) that may adversely affect the care at home. At the public legislative level to make changes in the law to have HHC services be part of healthcare infrastructure. This will help strengthen the role and improve the standards as it becomes part of the system and more people can have accessibility via UHC. [24]

Training and Leadership

In scope of HHC one of the major challenges in India remains is the quality of staff and their knowledge. On the other hand even the providers lack the fundamental management acumen to help staff learn and grow. If the staff sees their future and growth in an organization they will definitely stay otherwise the average time for a staff with an organization in India (especially nursing is 1-3 years). Various case based/ scenarios based studies [52] are available where nursing staff can be trained and made aware of how to deal with such situations. When given training the staff is able to build a power relation with patient and

tackle various challenges such as negative emotions of HHC seeker. Training programs will help nursing staff to deal with patient's family to assert the role in care giving by educating them over how to treat patient needing care. Training can also help staff not only provide reliable support, quality resources and serve as advocate but also become more smart to study the HH environment to orient the care to the patient's needs. [50]. In public sector the knowledge of ASHA and ANM workers can be critical in their help being taken by the HH in RHT areas. A descriptive study [51] suggested that poor knowledge of the ASHA worker results in poor utilization of services. If HHC services were to be provided to the women and elders through public sector then the staff must be trained and prepared for leadership. Currently skilled human resource capital in India is its biggest strength and is growing at a constant rate. The gaps in number of doctors and nursing staff can be fulfilled.

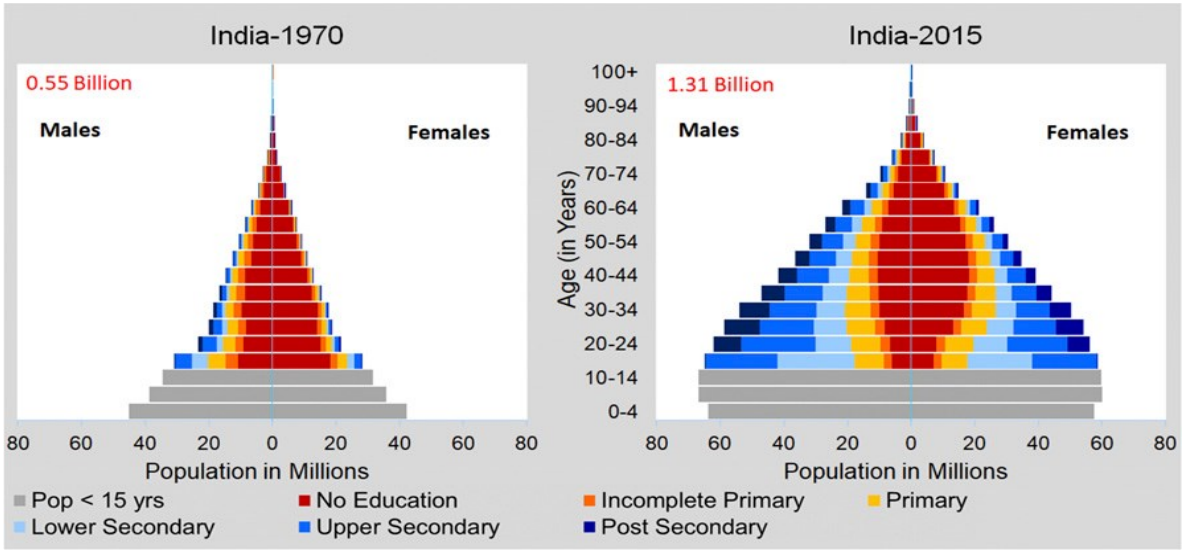

Figure 46:Age and education pyramids for India 1970 vs 2015 (source: Wittgenstein Centre Data explorer)

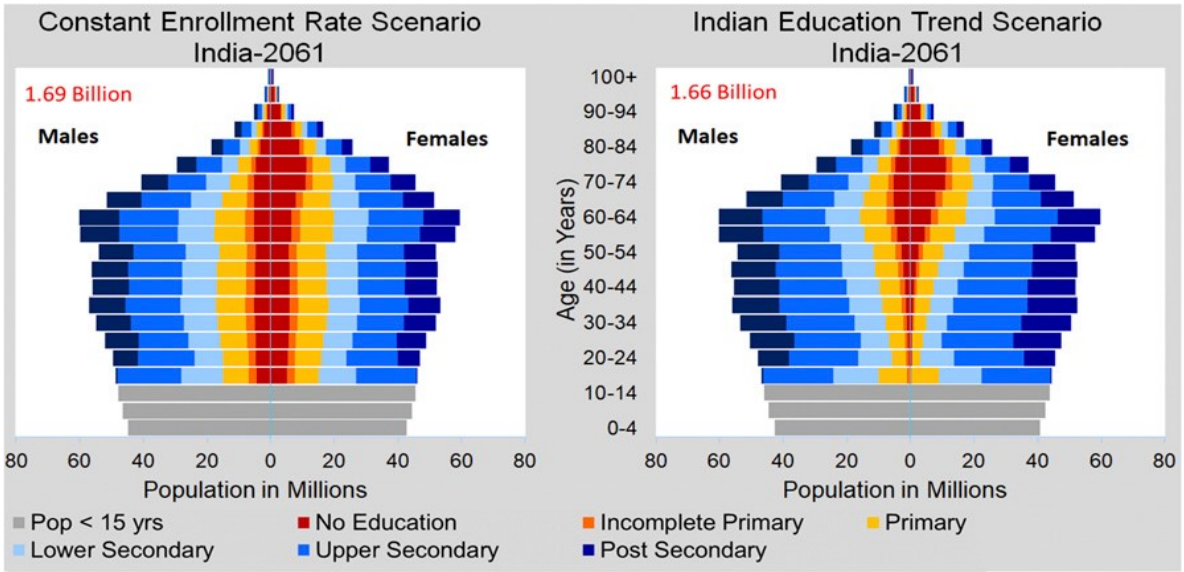

Figure 47: Education and age pyramids for India as projected to 2061 (source: Wittgenstein Centre Data explorer)

Insurance/ UHC

Various studies [66] [68] has identified the drivers of change. `The developing "digital disrupted business models", "consumer buying behaviour", and impact of digitalisation as levers of change in healthcare in India. As India is aiming to raise their per capita spending on healthcare the forces transforming future Indian Healthcare system, would be big leap towards UHC, system strengthening, and digital health through the NDHM. HHC services as of now in India is not covered under insurance due to the loosely bound regulations and human resources capital being unstructured and under trained. Not only in private sector but also in Public sector the VBHS model that enables insurance to be used for HHC services should be adopted. This way more and more workers will be encouraged to assist pregnant women and encourage families for institutional delivery. The public insurance or private insurance just like remittance towards hospital admittance will allow faster availing of services if the insurance companies start to cover regulated and certified HHC services (impanelled). These insurance services when expanded to take care of needs of special groups such as elderly who are on long-term medication support through outpatient services, support for children with special needs, people requiring long-term rehabilitation and victims of road traffic accidents chances are a hybrid model can be created. This can work in favour of hospitals as well who can manage their patient and bed utilization workload. [53]

Medico Legal

Thought medico legal field is quite active and prominent in private and public hospital sector, there is a lack of regulatory compliances in field of HHC. Whiles searching for cases and current judgments can be hard. Regulation and standards including verdicts can be reviewed from western, European countries where HHC is part of the healthcare delivery system. Medical negligence events will grow in HHC sector as the need for care becomes more and more complex. There should be a digital database system [78]to help and assist provider and legal professionals to tackle and help the HHC providers and seekers in case of legal proceeding. While topics related to medico legal claims are available for three level of healthcare delivery (namely Primary secondary and tertiary) no such information is easily accessible on HHC services.

Healthcare delivery System

In terms of healthcare delivery system we must understand that in India a large part has to be played put by public health system as more than half of Indian population lives in rural India. Due to lack of fair financing and equity on healthcare our delivery system needs

strengthening. Our healthcare delivery systems are over burdened with lack of doctors, nurses and beds for the density of population that we have. On top of the as per the reports given by NRHM There are 7821 SCs which are upgraded as Health and Wellness Centre-Sub Centres (HWC-SCs) out of total 157541->1,57,921 (2020) SCs functioning in rural areas of the country, there are 24855->30813 (2020) PHCs functioning (i.e 16613 PHCs and 8242 HWC-PHCs, only 10453 PHCs as24X7 facilities) in rural areas, there are 5335-> 5649 (2020) CHCs and 3204 FRUs functional in rural areas of the country as on 31st Dec 2020 [79]. There is an upgradation of 8242 of PHCs as HWC-PHCs. Percentage of Sub-Centres functioning in the Government buildings has increased from 43.8% in 2005 to 75.3%, Percentage of PHCs functioning in Government buildings has increased significantly from 69% in 2005 to 94.5%, The % of CHCs in Govt. buildings has increased from 91.6% in 2005 to 99.3%, 95.7% of the FRUs are having Operation Theatre facilities, 96.7% of the FRUs are having functional Labour Room while 75.3% of the FRUs are having Blood Storage/ linkage facility. We have a huge shortfall of these centers and staff. When integrating HHC staff at primary and secondary healthcare level in low and middle income countries including India the study suggests that is an essential strategy to transition toward UHC [58]. Also at primary and secondary level when have integrated services with on field staff the use of home visits by the staffers are part of their protocol. They report the updates on pregnant women and various others aspects under RMNCH+A programs. Another article possess the challenges of achieving the 3 A's by pointing out towards challenges like Awareness, Access, Absence, Affordability and Accountability. In order to meet these we have to take proactive measures such as training, IEC materials, Standardization of prices through UHC and proper allocation/optimal utilization of budgets at public level. [59]

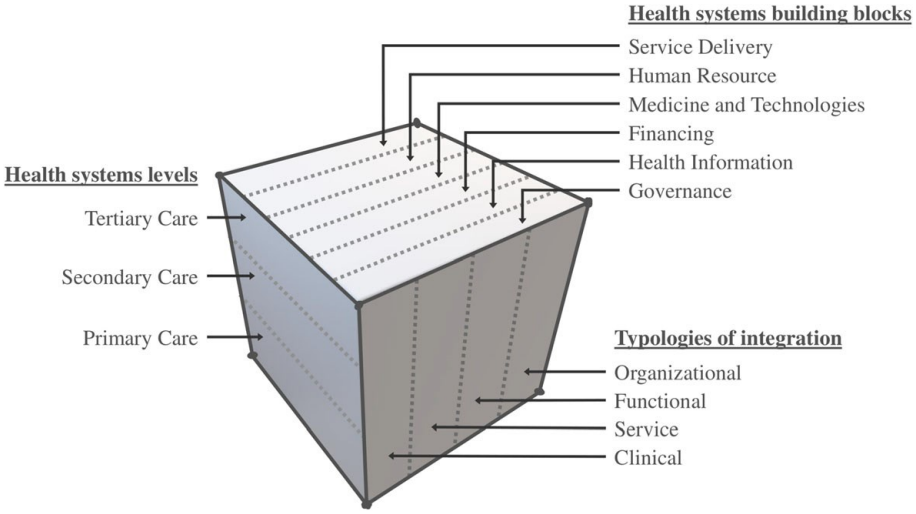

Figure 48: Complexity of vertical integration within health systems (source cited: [57])

Study that points out towards the missing link in the health delivery system for Indian elderly population suggest that home healthcare system is that missing link. If a patient can't go to hospital we have the potential to let the healthcare reach at home via HCW in public sectors. This is one way where the gap of two million nursing staff can also be fulfilled to provide HHC assistance to growing elderly population [60] . One other study suggests that integrating community roles into our health care frame work can help us achieve health goals for all and meeting NHP , SDG targets. This would require planning and consideration of multi sectorial players and agents of change. While we do have community involvements and ASHA ANM , mid wife workers are from the community itself their integration with upskilling and technology will play a vital role in improving the community involvement in collectively achieving the goals. [57]. Finally the book "building better delivery system : A new Engineering /Health care Partnerships " [61] suggest that PPP is a crucial area of public health becoming more accessible and affordable. Policy makers and leaders can only do so much with complexities in public domain thus having PPP partnership allows to engineer better delivery system which can be applied to HHC setup both in private sector and engaging private sector into public framework.

Public Policy and Financing

Various public policy documents [63] [5] [2] [62] suggested that there needed to be more than needs to be done in growing need and burden on healthcare. Public policy evidently lacked the use of home health care services in most of the public document at this point of time. This showed that the policy makers in Indian have not even turned their heads towards the growing demand of HHC and rise of elderly population, NCD, co-morbidities. Still there is lack of fair financing and UHC has not fully reached everyone. As per Niti ayog a report in ET states that almost 30% of Indian Population (42 crore) don't have any health coverage. Public policy and financing is what will design and restructure our healthcare delivery system. Community is the key asset for the public policy and financing to take place. This not only boost involvement but also builds trust, awareness, utilization and resourcing the tax payers money back to them in form of employments. [57] .

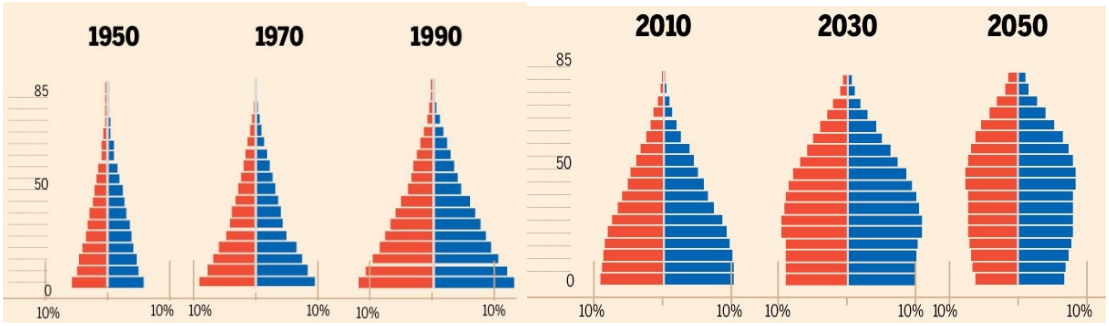

Figure 49: Population Pyramid India 1950-2050 (source: Indipedia)

The goal should not only be able to meet the SDG goals by 2030 collectively but also proactively tackle the situation of growing population (aging) in India. [62]. Care coordination studies from across the world can be studied particularly done in rural area such as the Ely community [65]. This coordination study showed better response from the people when locals were used for care coordination and improved utilization. Used as a successful pilot to test out a frame work that can work in other communities as well.

Sectorial Growth

Report from the big four firms [70] , [67], [66] outline the advantages of digitally connected home health and hypothesised justifications for why it has become crucial for healthcare providers and the private sector to support the rapid expansion of this initiative. The conventional home-based model, its fundamental determinants, advantages, and disadvantages, as well as how a conventional setting might be transformed into a digitally enabled home health, have all been thoroughly examined in these studies. When talking about sectorial growth according to reports published [12] [71] the pandemic has made a mixed impact on the home care market at a global level which could also be seen via perception as the lockdown forced people to not allow others from outside until and unless very dire need. On the other hand the HHC auxiliary services or an independent sector in itself the products or equipment market has seen a positive upswing as health monitoring and testing products like temperature gun, blood glucose monitors, oxygen concentrators, pulse oximeters were in demand. Such things remained in demand and HHC service providers were supplying and providing these as part of their additional services to pivot their models. According to ET report, home healthcare in India has the potential to reduce upto 65% of useless hospital visits thus cutting hospital expenses from OPE by 20%. Offering affordable and accessible patient care at hospital is becoming more and more difficult since the number of hospital admissions has increased with beds being limited. For mild - to - moderate disease severity, home health is expected to replace the hospital OPE cost by approximately 15% to 30%.

The reports also suggest that the downturn can be temporary and the service lines will get back to normal in the coming future as people are recovering from COVID-19 [12]. A similar trend was seen in a research study done in Massachusetts which highlighted that the home care agencies experienced a decrease in demand for home visits attributing to clients' concern of infections or aides being unavailable for work [79]. Reports suggest tele consult platforms saw 500% jump in transactional volume and many new startups came up to provide these services. It was reported that 60 percent users of diagnostic or pharma delivery at home were first time [13]

Some of the trends that were captured from various reports [12] [13]suggests hyper growth which can lead to regulatory challenges as well as rise in medicolegal cases. However, the need of the hour are supported by various trends that point towards an overall growth of Healthcare sector with a CAGR or 8-12% [68] [71] overall. The recent trends suggested that Corporate Hospitals who implemented teleconsultation services prior to covid like HIS (formerly fortis) , manipal group have seen an average of 10 % shift in OPD consultations towards teleconsultation platforms even before COVID-19 era this number has jumped and normalized to 15% post covid.

With this hike in teleconsultation services, there was a 'decline of 67 percent' in physical visits. Maternal consultation by gync doctors were one of the most requested services on tele medicine platform suggesting the importance of its implementation in public sector as well to boost the successful delivery of RMNCH+A programs. During lockdown 80 percent of doctors are using audio calls, texts/video calls, to connect with the patient for providing care. E-pharmacies will account for 10%-12% of overall sales in the next five years. Online pharmacies in India have also reported an increase of 50%-100%. The Indian home care industry is anticipated to rise due to reasons like growing consumer acceptance of home healthcare, according to a recent analysis report by MarketsandMarkets. Other considerations include improving insurers' willingness to pay for home care costs, increasing doctor approval of home healthcare, and a substantial development potential when compared to the growth patterns of industrialised economies. This sectorial growth has also been due to low patient to bed, low doctor and nursing staff to patient ration. Adding the fear of HAI S(25% Indian get HAI when visiting hospitals) people have experienced care and precaution can be arranged at home during quarantines and isolation experiences with self and family. Realizing that the cost of care at home can be cheaper compared to INR 5-20K for rooms and 35K to 50K per day for an ICU level care. All these factors along with care being provided

at the comfort of the home and personalised on nature at low cost, home healthcare is only expected to boom in demand going forward. Figure 45 (below) shows the technological boom that has been driving the Healthcare marekt. It is interesting to observe most of these services can be implemented within HHC services.

Chapter 5: Results and Conclusion

RESULTS

Customers post pandemic are progressively choosing to have healthcare needs meet remotely, and in the privacy of home. There is a growing focus on information security, safety and control protocols and use of client data privacy. Programming languages such as AI, ML, NLP are assisting ICT technologies to become smarter and more autonomous. This positive experience will create a long-term engagement with service providers just how it has been with hospitals till now due to trust and confidence that healthcare needs will be met and outcome will be mostly positive. User experience, User Interface innovative in the field of HHC industry are adopting to these lessons learnt, patterns and developing digitally enhanced smart solutions to cater to various scopes of home healthcare which has shown a rapid growth in last two year and will continue to grow for the foreseeable future, till the business model matures and reaching a learning and innovation plateau. HHC service is a form of VBHS which is flexible enough to be customized as per the client needs. Thus it becomes important to understand their needs and segregate them into standardized conditions and SOPs. This will reduce turnaround time and assist sectors like insurance, health care delivery models to improve the quality of service.

Perception

Data analysis discussion suggested that we have moved into a new era where teleconsultation and home healthcare will become norm to substitute hospital and doctor visit. The results of primary as well as secondary study suggest that consumer perception amid COVID-19 which suggests that significant people agreed that they were afraid to take the hospital visits for any kind of treatment and diagnostic facilities. Many feared to go to the hospital because of COVID-19 infection (HAI). Thus, the perception was the key to it all and reduces the rigorous process of educating the client. When there is awareness the care can be provided at home and is a good substitute then the scope of home healthcare has lesser entry barriers.

Results also suggest that currently, even though the demand has gone up the providers are facing challenges related to price negotiations, excessive demands with customers. They also face challenges with their staff due to high attrition rate and growing need for high salaries and better standards. Service providers seem to be under the most stress within this industry and thus the scope of our research entails these different segments that a provider has to cover or can cover both in public and private healthcare space.

With over 80% of respondents showing positive outlook on topics like RPM, ImOT , Medical devices, online pharmacy delivery and test/collection at home, HHC sector overall has a lot

to offer. With integrating client and staff perception the provider can work on integrating technology, improving quality of delivery, training and upskill staff and working on various angles of partnerships.

Increase in number of care is the resultant of improved perception and healthcare belief system from the seekers as they are ready to accept technology for affordability, accessibility and assurance of healthcare.

Key Points from HHC survey with seekers

- 65% of the Decision Makers in HH were male (due to financial control or say)
- 89% of the Audience was from the age range of 26-65 with 38% being from 45-55
- Most of them were educated above collage graduate level (83%)
- Most of them were living and wanting care in urban area (83%)
- Most of them were working professionals or business owners who could afford the services or understood the value for quality concept (78%)
- Most of the family size was between 5-8 relating (67%) to nuclear families with elders (60%)
- The HHC service in usage moved up by 133% from 2019 to 2022 (12 to 28) while people not taking services reduced to 50% of respondents. Those considering it also showed positive movement of 27%
- Teleconsultation jumped up by 180% from 2019 to 2022 and those considering it jumped up by 100%, and those not wanting these services reduced by 64%
- When it came to using auxiliary services (100%) most used was online pharmacy , followed by diagnostic (180%) , with a healthy growth showing in home visit services for therapy
- Many wanted their insurance company to cover HHC but were not aware if they had it covered (20%) about 75% did not have it covered
- About 53% of them were using smart watch with about 17% considering to get one.
- About 13% used smart patch and 33% showed inclination to use them
- Only 12% of the people were aware of RPM technology available in Jaipur
- About 92% people showed positive change in attitude with 64% people showing reasonably positive change
- 75% are now wanting to use HHC for long term care giving services while for majority of others they are showing inclination to short term or sporadic usage

- Majority of them stated that due to professional commitments or lifestyle challenges, comfort of patient, HAI as well as need for nursing care for critical patient was most common reason to take HHC service, a Positive reason to choose services was use of RPM in Jaipur (55%)
- Majority of the clients pointed towards quality of services and Trust as the challenges in HHC service they find.

Key Points with Telephonic interview with HHC providers and Staff

- Staff members were majority females (60%)
- Majority of them were married and were housewives (67%)
- Majority of the staff carried 0-5 years of work experience
- Majority of them belonged to age group of 25-35 yrs
- About 40% of them working with hospitals and about 30% of them studying
- Majority of them felt that compared to 2019 during pandemic the demand was low medium and now is medium high post pandemic
- Some of the major challenges faced by providers were price negotiations and demands of customer (i.e. all purpose domestic help)
- Major challenges faced by staffers where Unprofessional providers , irregular duties and rude customers. Also staffers resented getting late payments
- Sewaarth received an overall rating of 4.3 / 5

IT Technology

The above extensive review and primary study made us come to a few results that it is important for people to adopt technology and for that the technology should be progressive enough to work with the need of patient. It should be not hard to understand otherwise the user tends to reject it. Technology such as Telemedicine while will be vital for delivery of services, tools like ImOT , RPM, chatbots can be important in assisting and aiding patients , staff and the family members to provide care at home. Resultant data showed that technology for HHC sector was primarily researched and divided into 7 categories; general purpose ICT, social media, games, robots, online information services, smart home and remote care, and supportive devices. It was found that general purpose ICT and smart home and remote care were the technologies that most of the interventions have been focused upon as in developed nations that is the level of care they are on.

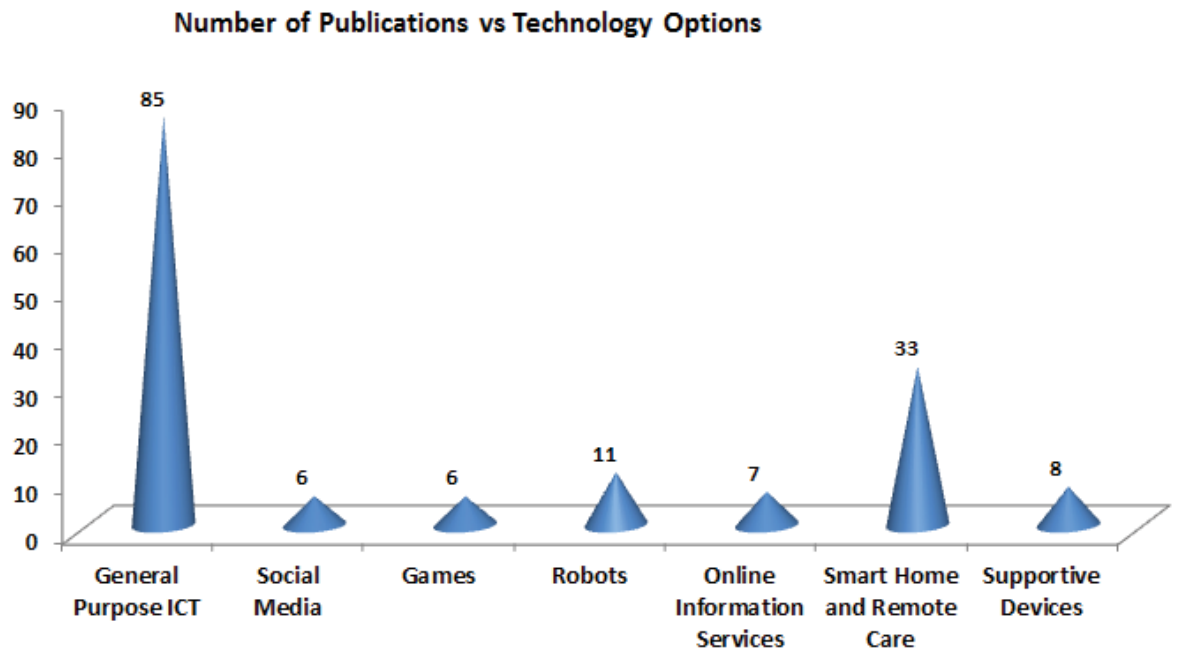

Figure 50: Technological Areas in HHC vs Areas of focus for research

With research suggesting positive outcome globally when such technologies were used; a clear scope within the Indian Healthcare system emerges where things like ImOT, RPM can be implemented at lower cost and improve the experience of care. This will definitely also assist in QOL when the care giver is able to use such assistive technology to communicate and monitor the environment of the patient at home. While smart home integration might take another 2-3 years, use of wearable devices can be just right start. It can be linked with technology software to create monitoring and response communication in case of patients need. RPM can saves time and lead to immediate medical professional's response. However repeated/periodic test, false reading and scope of improvement in sensitivity technique were the drawbacks in India as the technology is still not high quality

In public sector another layer of challenge is added when multiple layers of stewardship in Indian Healthcare building block have to accept that they have to adapt and imbibe technology. Financing technology is not hard but implementing and making it work for such a large scale audience is a challenge and thus it has to be driven by smart data, reliable infrastructure and skilled/trained human resources. Technology can help build shared responsibility and coordination within the HHC seeker and provider. Results show that there remains challenges in public sector stemming from improper/ delayed allocation of budgetary resources. Sometimes due to late reporting. Public sector also lacks proper eMRD system that can be used as a referral cycle document all the way from Primary care given by ASHA

ANM worker to tertiary care. HHC services can integrate at primary level so that growing elderly population and poor fertility rates (unplanned, unspaced pregnancies) can be tackled by provide home healthcare services and using technology like tablets and mobile devices to reduce operational burden. A VBHS can be created around home healthcare in public sector and technology can aid assist the FFS system where clinical outcome is rewarded (thus has to be reported).This will also solve the challenge of out of pocket expense as curative and proactive care can be given at grassroots level. In public sector another challenge that technology can solve is bridging the gap of discoordination within various stake holders. Technology can assist in the successful implementation and utilization of UHC as well for elderly care as well as pre and post-natal care for mother and child.

Staffing and Scheduling

Result of the review suggested that staffing is one of the Achilles heels of service provider. To find right staff is a continuous process for them but to also keep them satisfied with regular work is another. Results have shown that when there is too much idle time the staff tends to move on to finding more stable career growth and thus seeing high attritions. Also while staffing clear induction and Hr policies are not in place or not communicated thus causing the staff to drop out due to poor management. Such challenges can be handled by applying advance technological advancements in care scheduling. Result of literature review suggested that the challenges remains around work place policy and challenges in mismatched demands that causes for either idle time or customer wanting replacements for the staff. Thus retention remains an area of concern for HHC provider.

Quality and Certification

Resultant literature review showed that HHC sector in India is still very much unorganized and unregulated. There were no such regulations or certifications that were available in India to tackle quality related challenges. As the number of care grows to avoid medicolegal challenges and innocent lives being lost due to care neglect focus on quality and certifications such as QAI should be given. Result of these as per various studies show longer care and more trusted relationship between provider and seeker.

Training and Leadership

Resultant literature review suggested that one of the other main reason for staff attrition and lack of awareness amongst care seekers is due to poor training of the staff itself. Even thought the HHC staff who also work in hospitals carry their certification but they lack skills like empathy and how to tackle complex cases at home. Thus for HHC services it was observed

from literature that the result of training and building leaders/managers can assist in longer term retention of staff seeing career growth as well as less complains and improved quality of care. This can also mitigate the chances of legal liabilities and complains from seekers seeking replacement of staff.

Insurance/UHC

Resultant literature review point out in direction of HHC service being standardized before they can be integrated /empaneled with the insurance company to cover the care. There are various other regulatory challenges and blockades in achieving this. Literature has suggested that HHC providers improve and standards their quality and adopt technology then the accountability will allow growing demand from clients to force their insurance company to open the market happily to cover care at home like developed nation.

In public sector as well the literature suggest that UHC can be a vital catalyst when plugged with technology to access care at the primary level. Technology can enable monitoring and UHC will enable reduction in OPE for rural population. Places which are remote if the care can reach at home and reported via technology the UHC can cover HHC services via public domain and improve the life expectancy of mother and child. HHC can be vital cog in the wheel to creating VBHS services that can be fully or partially covered under UHC.

Medico Legal

The lack of resultant literature on cases in HHC sector showed the early stage this sector is in when it comes to regulations. While medicolegal cases in India have risen sharply there are hardly any reported cases in HHC vertical. Categorizing the cases in hospitals where nurse negligence is observed can be further reviewed to create modified case scenario based learning to prepare staff in dealing complex situations. Resultant scarcity of literature suggest that both at public and private constitutional level more clear guidelines to define HHC services by the government and providers should be done. This can be indicative of the quality parameters and certification requirements needed for a HHC service provider. As these assistive technologies are growing the need for better regulation data privacy is also growing. Use of ImOT, RPM devices creates challenges around data privacy and its interlinking with our sources system that will require strong security and privacy rules so that the data is not misused.

Healthcare delivery system

The resultant literature points out towards the need of change in healthcare delivery system of India. And to make these changes enablers are technology and UHC. The healthcare

delivery system has not moved on from Primary, Secondary and Tertiary level to adding quaternary level with the advent of pandemic. However, the scope of HHC is yet to be defined properly in the primary level. There is a shortfall of 46140 SCs (24%), 9231 PHCs (29%) and 3002 CHCs (38%) across the country as per the Rural Health Statistics (RHS) 2020. If properly mandated it can help in boosting training of ASHA, ANM staff, bolstering awareness and VBHS FFS model to delivery health outcomes. With roles HCW in field can play if HHC is incorporated with in delivery system many who don't have access to care, the care can reach out to them.

Public Policy and Financing

Resultant literature points out towards changes in public policy to enhance accessibility while health delivery system, UHC are hand and glove with policy making. There should be improvement in public spending where there is underspending. Lack of functional healthcare PHC, CHC in various areas opens the opportunity for public policy and finance to be directed towards HCW giving care at home and benefiting from rewards received after the health outcomes are met. UHC and bringing care to the house hold under public policy and financing can help brined the gaps in Indian healthcare system and help achieve the 2030 SDG goals.

Sectorial Growth

The resultant literature and special reports suggests change in consumer behaviour, readiness to explore more economical care, without limitations of time, place, or commute. This has enhanced consumer compliance and openness toward home healthcare and its prices. Though still the stigma remains due to sector still reforming from being unorganized and moving towards organized sector. Due to COVID-19, patients suffering from comorbidities, chronic diseases who couldn't get access to hospital facilities were forced to look for options and home health services provided them with one. It has forced the insurance company to respond to growing willingness and request to have HHC services covered under the insurance

Another growing trend is of pharma companies investing in tele-medicine platform and are trying to better integrate home services. Almost all major players have tied up or invested in remote technology and advance diagnostics and portable testing systems as well. COVID-19 has resulted into a tremendous shift in the adoption of these services in India. The positive outlook on HHC and technology amongst the consumers, a need for value based personalized healthcare delivery, better network connectivity and smarter systems like wearable tech has boosted the sectorial growth. Many start-ups have come up in last two years which are being funded by private and public players both through grants, fellowships, equity buying or debt

financing. HHC services which covers all the various healthcare services that are delivered at home is going the change the way we access healthcare. This also will force both private and public healthcare service providers to reduce their overheads and focus on creating value based care that can be customized per patient at their home itself. The sectorial growth also looks at some of the demographic trends of the seekers where nuclear family structure, busy professional and personal life style, rise in elderly population is driving the sector upwards for home healthcare market and its auxiliary services.

Key Points from Scoping Literature Review

- Most notable technology in HHC market was found to be RPM and assistive technology paired with ImOT devices or wearables
- Technology is an important catalyst for providers and public HCW to improve quality of care, reporting and compliance.
- Technology helped with improving the health care outcomes and reduced the world load on staff as well as family members. By pairing ADL with technology HHC services QOL was drastically better
- Staffing and scheduling was one of the pain areas of HHC provider as neither quality staff was available nor regular hours were possible all the time – hence many leave or drop out, also poor management leads to staff management gaps
- Quality is not the focus in India as demand is also of low quality staff even if staff is trained customers doesn't want to pay. Quality is one key reason why customer doesn't trust pricing. HHC services unlike developed nation lack standardization and regulatory requirements to get certified .
- Training – Staffs members are certified but still lack knowledge nor regular trainings are provided. It was seen that poor training , resulted in poor usage of public health facility. Training can be major catalyst . Training also played a vital role in dealing with difficult and critical situations and can prevent legal complications
- Insurance / UHC – Insurance companies have started covering for HHC services however still regulations need to come into play with more regulation for HHC providers (thus quality is important). In Public Sector UHC can help take care of mother and child as well as elderly thus it is critical to implement UHC with fair financing all across India. It can help created a VBHS using HHC service (FFS) to utilize current and future ANM, ASHA workers

- Medicolegal cases in Indian HHC sector is very infant and is needing more papers and work. There is a need for more research and study to be done in this sector so that it can aid regulation. Our legal system is very reactory and thus until and unless we don't see a major case or challenge we might have to wait when government turns their head towards it.
- Healthcare system in India is needing strengthening and by hiring and training HCW , using VBHS based HHC service can be provided. Also even in urban areas they can be regulated so that private hospitals start adopting it as well.
- Public policy and financing points towards UGC again and again – there is major challenges of unfair financing or major disparity amongst different states. UHC is important so that people can have access to healthcare and then only such services will work but it is the missing link in our healthcare delivery system (maybe bigger than technology for seekers)

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RESULTS AT SEWAARTH

Based on the research and data accumulated (both public and paid) including market specific competitive analysis (propriety to Sewaarth) following implementations have taken place

1. Technology is being redeveloped to keep data integrity in mind of customer
2. Telemedicine platform along with ImOT based technology has been tested out (alpha) with select few customers
3. Over the period of 3 months 3 training session (soft skills and case based learning) was conducted to train staff)
4. Selected staff was also trained on technology being tested out
5. Sewaarth got selected for international incubation program from California and was selected to present to Global Jury expected to be end of july 2022.
6. The care average has tripled in last one year since focus has been on quality and customer feedbacks. From averaging 5 care prior to April of 2021 today they are averaging 15-18 cares per month.
7. Focus is on implementing lean six sigma process indicators to improve the standard of delivery.
8. Sewaarth as of now has started filling for various accreditations and certifications under quality and startup India program

RECOMMENDATIONS

The purpose of this research was to find the gaps/challenges and change in perception. While upcoming future offshoots of research from this work will deepen the understanding and learning of building a comprehensive solution which can be tailor made for both public and private sector. It would be important to sustain it these models and thus it will be important to integrate a monitoring and evaluation model that will be used by the learning team to have continuous process improvement and maintaining standard quality of home health care in India. This will be vital especially in public sector as the change at large also comes at a high cost. Thus, options of failures have to be minimized and implement a proper PPIE. These learning team data will then actually also help the training and leadership goals as lessons learn will be vital to gear up new staff in field. Another critical feature of this evaluation and monitoring would be to apply lean six sigma strategy to measure the health outcome and cost that will then be beneficial in appraisal of work done by HCW. HHC services have been liked with being cheaper than hospital and more flexible. Thus with the way healthcare model will operate in isolation and under limited monitoring generating data and training staff to accumulate this data without hindering their duties will be vital.

The gap in number of doctors and nurses per 1000 people will take time to fill and we might miss out on SDG targets. If the public policy will incorporate more PPP model with HHC services in public sector as well many mothers, infants, adolescents and growing elderly population; the patients can be treated and taken care of using HHC services. This building a strong bridge within community and with private players benefit Indian Healthcare System.

Perception

1. To ensure client perception becomes a habit or a belief the focus of HHC provider and staffer is to educate the seeker with IEC material to ensure challenges they face regarding pricing and responsibilities can be addressed.
2. To change the perception of nursing staff towards elderly care or being in difficult situations with demanding clients should be to train them and prepare them with proper skills to tackle difficult situation related to wrong perception about care or staff.

Technology

1. Technology should be enhanced in the way that it can be more smart, autonomous and simple to use for the care giver and care seeker requiring minimum interventions.
2. Care and precaution should be given during the construction of technology to

incorporate control procedures and security feature to ensure there is no data leak and privacy of the patient is maintained.

3. In Indian HHC sector the focus should be on simple and affordable areas such as ICT, RPM and ImOT using wearable tech like smart watches, or tech like RHeMoS
4. Technology should also look into improving the quality of sensory technology that will be used in periodically monitoring the patient getting care at home.
5. eMRD should be integrated with the hospital or doctor that patient regularly consults in care of need.

Staffing and Scheduling

1. SOPs and policies should be put in place to maintain the quality intake of staff including checks and certifications. Testing staffs knowledge is a key way to scope the level of work staff can do.
2. Scheduling remains a challenge and can be solved using ICT as well as data science to optimize the scheduling.

Quality and Certifications

1. The HHC service provider should look to get quality certification in India. It is about time that the industry gets regulated so it is best to get the business streamlined
2. Not just using technology for marking quality indicators but also teaching and training the staff to capture such vitals (TAT, service hours etc) to ensure quality of care is provided.
3. Use of lean six sigma to improve the work place environment (using 6S's)
4. Using the control charts to improve scheduling and process improvements all the way from generating a lead to fulfilling a lead to completion of care.

Training and Leadership

1. Upskilling the staff will be a key in retention and better quality of service delivery
2. Training will also reduce the number of replacement request from the seeker.
3. In long term care to avoid fatigue and various other social challenges the staff team should be ideally refreshed and replaced with a new one every few months.
4. Promoting leadership in workplace with boost the motivation of the staff to see their long term future with HHC service provider.

Insurance/UHC

1. HHC service providers should streamline their services and register themselves to be empaneled.

2. Insurers should start covering HHC services and device a way so that the protocols are made aware to the party on how to get reimbursement from insurance company for HHC services.

Medico Legal

1. Train staff to avoid legal liabilities. (case based learning)
2. Formally document the care provided to the seeker
3. If needed cover your business with insurance coverage to transfer risk
4. Ensure data privacy and security if technology is in play for eMRD and payments

Healthcare delivery system

1. Recognizing and Mandating HHC system at the primary level of care so that it can be then incorporated in the policy and planning for public as well as private health.

Public Policy and Financing

1. The government can apply the scope of home visits by ANM and ASHA workers as part of home healthcare services especially for elderly and pregnant women/nursing mother. It can be covered for the UHC (PMJAY) holder and the HCW can be rewards based on the health outcomes.

Sectorial growth

1. The accelerated pace at which the sector is growing both innovators/start-ups, or funding party have to be very careful and specific about the sustainability of the sector and proper rules and regulations to be followed with data privacy and money being poured in through enforcing due diligence, and using right technology architecture that ensure data security and privacy.
2. Importing technology and knowledge from the established market can help ensure the growth Indian home healthcare sector is seeing can be sustained.

LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

This research has taken into account any or all public information that is available under the scoping literature. In term of primary data sampling we felt that more data can further define the results and stronger correlation to perception. Since data was taken from Jaipur the social and demographic contouring of this region has defined the answered given by respondents. With various biases and time limitation on the research the data could have been overlooked (unintentionally) to further substantiate the assertions and results.

It is to disclose that Sewaarth care's paid market research work and specific survey data which is essential and critical for their market advantage and innovation (IP) cannot be shared and made part of this research.

Approvals

They were gracious enough to allow some part of these reports that are publicly available on the abstracts of the websites.

ALL parts of this survey that are related to this research work has been published as results and Approved by Sewaarth Care

Funding

This research work was funded by Sewaarth Care including my management consulting fee on monthly basis for last three and half months. Any data purchased or market competitive data gathered was directly funded by Sewaarth for me to execute my work as Management consultant.

Future work:

Due to timing limitations this research was limited to scoping literature review instead of rapid review. The goal with the future work would be to define these scopes in form of framework. The work is being currently condensed to be published as a paper. Rapid review will allow us to deepen the knowledge for each sectorial findings post covid. The work will entail covering any limitations in methodology that might have forced omission of papers and data. The data will encompass much bigger sample size and pan India data.

For Funding my research to help contribute in creating better healthcare system in India please contact me at pulkit.j20@iihmr.in , pulkitraturi@gmail.com , +91-701-479-1161 , +1-647-269-4018

Conclusion

In conclusion, this extensive research work installing both primary and well as scoping secondary study has highlighted various key gaps in the scope of HHC services in India. With growing elderly population, NCD, co-morbidities instances in individuals due to lifestyle, professional, family changes have led to focus shifting on care that is accessible, affordable and assured level of delivery. **Our Hypothesis based our observational learning** at Sewaarth Care that perception of people have changed for good due to pandemic was proven right. However, as suspected we also found challenges that comes with increasing demand of HHC services. However, another key factor was reviled in this process that HHC service already plays and can play even a bigger role in public sector especially with three groups (mother, child and elders). Thus the main and primary focus of HHC services in India should be to focus on keys areas such as: **Staffing and partnerships** – ensuring human resource capital is appropriate to deliver HHC service a provider is providing. Management has to do a better job in creating work place environment more conducive for both staff and care seeker. As well as public policy to incorporate PPP models in HHC to overcome HR gaps. **Training and development** – With HHC becoming more complex it will be important to train inducted certified staff to keep upskilling and learning. Case based sessions and developing communication skills will be vital during this hyper growth period of HHC service in India. **Technology** – Focusing on ImOT, RHeMoS, RPM will be a step towards moving towards build a more comprehensive healthcare system at a smart home. **Quality Assurance** – HHC service provider must focus on quality and capturing their data (enabled by technology) to provide quality and trusted care to seekers. These practises will also help in achieving necessary certification by QAI, ISO, and Lean Six Sigma. With standardization and quality coming into picture the growing demand of insurance companies (including UHC) to cover HHC will automatically become a standard operating procedure. HHC service should be looked at from the perspective of being a type of VBHS which can be customized and made affordable. A structured and professional care can meet a patients psychological, social, physical care needs right at home. It is a complex multi stakeholder process that requires continuous learning and improvements. With maximum pressure being soaked by the HHC provider in the middle they have to ensure that they keep both their clients as well as their human resource capital intact. As India moves towards wellness and proactive healthcare (NHP 2017), I believe that smart technology & UHC linking HHC services is the missing link that can reduce the healthcare systems burden both on the infrastructure as well as on OPE.

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Appendix A – Survey with HHC Seeker

Appendix B – Interview with HHC Provider

Survey done with HHC seeker and telephonic interview with providers is carefully crafted work by Sewaarth Healthcare. Just like paid market reports this work also has propriety work to help them gain market traction. This survey was only shared with their customers, providers (since 2019) or potential leads generated. **As of now this survey and interview is not publicly circulated.**

ALL parts of this survey that are related to this research work has been published as results. Approved by Sewaarth Care

For Information on survey please directly contact Sewaarth Home Healthcare at: SewaarthHealth@gmail.com or call Dr. Madhu at +91-9414363233