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A Report

THE STUDY ON USAGE OF MOBILE HEALTH TECHNOLOGY APPLICATION FOR EARLY SCREENING AND DETECTION OF CANCER IN INDIA

By

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ABBREVIATIONS

S.No.	Abbreviation	Full Form
1	**WHO**	World Health Organization
2	**ICMR**	Indian Council of Medical Research
3	**LMIC**	Lower Middle-Income Countries
4	**GBD**	Global Burden of Disease
5	**CBE**	Clinical Breast Examination
6	**BSE**	Breast Self-Examination
7	**m-health**	Mobile Health
8	**CHW**	Community Health Worker

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PART A : OBSERVATIONAL LEARNINGS

Section - 1:
INTRODUCTION

With medical technologies, solutions, and services leading globally, Medtronic is committed to alleviating suffering, restoring health, and lengthening life. Over a range of medical issues, Medtronic India seeks to build a technologically powered, whole healthcare system that enhances accessibility, affordability, and results. By cutting-edge technologies, data analytics, and patient-centric solutions, Medtronic India's strategy tries to improve the Indian healthcare delivery system. Using a cooperative, linked, digital empowered platform that promotes early diagnosis, precision medicine, remote monitoring, and long-term care management, the company aims to democratize access to excellent treatment.

Emphasizing creating integrated care networks that enable graduated treatment approaches from community-level diagnostics and screening to tertiary-level interventions like surgery and sophisticated pharmaceuticals, Medtronic's care delivery strategy This model makes sure non-complex and chronic cases are treated nearer to the patients residence, thus helping specialized hospitals, improve accessibility, and reduce travel and productivity losses for both patients and their families. Medtronic makes this possible by investing in digital infrastructure: a centralized, cloud-based platform, clinical decision support systems (CDSS), AI-enabled diagnostics, and remote patient monitoring tools.

These comprise the foundation of this care ecosystem. Besides enhancing treatment adherence and optimizing clinical processes, these technologies enable smooth data integration from several sources to aid customized, evidence-based care pathways.

Medtronic India hopes to speed innovation in the next areas as data maturity rises from organized clinical and diagnostic data gathering: Technological systems for diagnostics, device integration, and predictive analytics. Shared services infrastructure for ongoing R & amp; D in health outcomes and medical device

applications, clinician training, and virtual assistance. Medtronic India strongly holds that technology is the main facilitator of decentralizing specialized treatment and making it accessible to patients. Its aim is to work with stakeholders all throughout the healthcare value chain to change the future of India smarter, safer, and more inclusive care delivery.

Organization's Mission:

Inspiring the Extraordinary

For over six decades, Medtronic has been driven by a purpose greater than profit — to transform lives through innovation in medical technology. Our Mission guides every decision we make, inspiring us to push boundaries and improve healthcare outcomes worldwide.

- To contribute to human welfare through the application of biomedical engineering in the research, design, manufacture, and sale of medical devices that alleviate pain, restore health, and extend life.
- To focus our growth in areas where our biomedical engineering expertise is strongest, continually advancing these fields through education, innovation, and collaboration, while avoiding areas where we cannot make meaningful and unique contributions.
- To ensure financial sustainability, generating fair profits to meet our obligations, support our growth, and achieve our long-term vision.
- To value and empower our employees by fostering a workplace culture that offers personal fulfilment, job security, growth opportunities, and shared success.

Organization's Vision :

"Transforming healthcare through bold innovation that improves outcomes for patients around the world."

Medtronic envisions a world where medical technology plays a pivotal role in enabling people to live fuller, healthier lives. Guided by its enduring Mission, Medtronic strives to **unlock the full potential of healthcare by combining advanced technology, data-driven insights, and patient-centric care models**. The organization is committed to leading the way in addressing some of the most pressing global health challenges — from chronic diseases like cancer and diabetes to improving access in underserved communities.

Services Provided by the Organization:

1) Digital Health & Remote Care

Increasingly used to help patients throughout their whole care journey, integrated health monitoring platforms and mobile apps improve accessibility and continuity of care. Powered mostly by artificial intelligence, these platforms provide customized patient experiences via intelligent engagement tools and educational materials customized for individual needs. Allowing for early detection and timely management of clinical problems, telehealth and remote monitoring solutions also reinforce this system by allowing patients and healthcare professionals to communicate in real time.

2) Screening & Preventive Care

By combining sophisticated technologies for early diagnosis and treatment of main health problems, the healthcare effort emphasizes a holistic approach to preventive care. It helps early diagnosis and fast therapy by targeting tumours of the breasts, colon, and cervix using cutting-edge diagnostic techniques. Moreover, the project seeks particularly non-communicable disease (NCD) risk assessment for diabetes, hypertension, and cardiovascular diseases by means of data-driven analysis and continuous monitoring. These initiatives, whose goal is to encourage lifestyle changes and raise public health knowledge, are supported by traditional wellness programs including metabolic risk profiling, body mass index (BMI) assessment, and doctor-led counselling sessions.

3) Clinical Expertise & Multidisciplinary Support

Through access to a strong network of oncologists, radiologists, and other specialty practitioners, the initiative provides thorough cancer treatment. It helps evidence-based treatment planning through Multidisciplinary Tumour Boards, therefore guaranteeing that patients get professional-led clinical choices.
Along the care path, sophisticated diagnostic tools like imaging, histopathology, and lab services offer still more backing. Moreover, geared to improve patient quality of life as well as treatment outcomes, the program provides important therapeutic services including palliative care, chronic disease management, and day-care chemotherapy.

Section - 2:

INTERNSHIP EXPERIENCE AND LEARNING OUTCOMES

Working with the Product Management Team during my Medtronic India internship as a Health Data Analyst (Intern), I helped on projects about Medtronic's digital health efforts aimed at oncology and patient-centric care solutions. The main goals of this internship were to get hands-on experience to Medtronic India's operations, learn the architecture and processes of a worldwide medical technology firm, and acquire a more thorough knowledge of how technology could be used to battle cancer.

As part of my role, I had the opportunity to:

- To properly understand the oncology care path, include patient diagnosis, treatment, monitoring, and survivorship within the Medtronic ecosystem.
- Work with product managers, clinical experts, and technology teams to meet customer needs with product characteristics.
- Participate in the development and improvement of early detection, treatment coordination, and long-term management of cancer-oriented digital technologies.
- Create decision-support tools and awareness aids to help patients and doctors fight cancer more swiftly and intelligently.
- Gather and record corporate needs and workflow processes that facilitate digital health delivery, particularly in semi-rural environments with few resources.
- With an eye on cancer care developments, undertake a competitive landscape analysis of healthcare technology start-ups in India and elsewhere.
- To grasp trends in patient involvement and gaps, investigate the use and acceptance of healthcare applications, especially those aiming at oncology, in India. Help early detection and prevention of cancer technology features' planning and design, therefore assisting better treatment outcomes and lower healthcare expenses.

By combining theoretical understanding with real uses in digital health, this internship aided me in honing my technical and analytical abilities and in supporting Medtronic’s goal of transforming cancer care via creativity and compassion.

*GOOGLE DATA ANALYTICS PROFESSIONAL CERTIFICATE :

Scheduled to be completed during the first two weeks of my internship, I effectively earned the **Google Data Analytics Professional Certificate** as part of my internship. Created by Google, this thorough certificate program consisted of eight planned courses meant to foster fundamental and practical abilities in data analytics.

Curriculum included-

- *Foundations: Data, Data, Everywhere*
- *Ask Questions to Make Data-Driven Decisions*
- *Prepare Data for Exploration*
- *Process Data from Dirty to Clean*
- *Analyze Data to Answer Questions*
- *Share Data Through the Art of Visualization*
- *Data Analysis with R Programming*
- *Capstone Project: Complete a Case Study*

These modules strengthened my knowledge of the whole data analysis process, which comprises data gathering, cleaning, analysis, and visualization. Key business technologies including Spreadsheets, SQL, Tableau, and R programming also enhanced my proficiency. The hands-on, practice-based evaluations improved my capacity to make data-driven judgments and clearly convey insights. Aside from improving my analytical skills, this certification enhanced my Health Data Analyst internship experience.

Section - 3:

GENERAL FINDINGS ON LEARNING: DEPARTMENT-WISE OBSERVATIONS

1. Handling of Clinical Information
Observation: Most clinical data gathered from diagnostic systems or hospital networks was semi-structured or unstructured, hence exhaustive cleansing and preprocessing were needed before to analysis. **Critical factor:** Lack of data entry and EHR format standardization across departments presented integration and longitudinal study difficulties as well as critical factor. **Learning:** By means of technologies like Excel, SQL, and R, I got practical experience in converting raw clinical databases into analysable formats, hence expanding my knowledge of health informatics and data normalization.

2. Programmes in Digital Health / Remote Monitoring
Observation: Mobile health (mHealth) systems and remote monitoring devices produced high-frequency data that called for effective real-time dashboards and alarm systems. **Critical factor:** Gaps in health monitoring resulted from inconsistencies in patient involvement and data syncing. **Learning:** I learned how to use data visualization tools such Tableau and Power BI to monitor patient adherence, treatment response, and flag abnormalities for early interventions.

3. Analysing and Reporting Public Health
Observation: Timely reporting mechanisms were missing from aggregated data from initiatives for cancer screenings, NCD clinics, or vaccination campaigns. **Critical Factor:** Low digital access in rural areas and manual data gathering techniques delayed reporting and lessened the reliability of some health indicators. **Learning:** I realized how crucial accurate, timely data is for public health initiatives and policymaking. Furthermore, assisting in producing summary reports guiding programme planning choices was me.

4. Health Economics and Result Research
Observation: Insight into resource use, cost-effectiveness, and treatment outcomes based on rising data-driven knowledge was demanded. **Critical Factor:** In many cases, limited access to local, genuine data drove reliance on global or modelled estimates. **Learning:** I became interested in basic cost-benefit studies and outcome measurement systems as well as came to value the part of data analytics in value-based healthcare.

Section - 4:

CONCLUSIVE LEARNING, LIMITATIONS AND SUGGESTIONS FOR IMPROVEMENT

CONCLUSIVE LEARNING

My internship as a Health Data Analyst gave me a thorough understanding of how health data is collected, kept, analysed, and used to assist in driving clinical and operational decisions in the healthcare system. Excel, SQL, R, Tableau, and Power BI assist me in getting real world experience with patient data, screening results, and program monitoring standards.

Working on digital health, chronic disease monitoring, and public health reporting also made me aware of the complexity of healthcare delivery in both urban and rural settings.

Moreover, helps me to evaluate sources of data. By illuminating my understanding of healthcare procedures, the experience helped me to see how data-driven insights may maximize program effectiveness, steer strategic decisions, and improve patient care.

LIMITATIONS

- **Policies governing privacy and confidentiality:** reduced access to complete or patient-identifiable datasets, therefore reducing my ability to do more complex statistical or predictive research.
- **Unstandardized Data:** Many datasets had missing or mismatched entries, which underlined actual issues in clinical documentation and field data gathering inadequate and unstandardized data.
- **Time Restrictions:** Because the internship was only a few weeks long, I could not fully assess the effect of data treatments or keep up with long-term data trends.
- **Tool Constraints:** Although I had access to visual and analytical tools, access to some proprietary systems or sophisticated analytics platforms was restricted by internal access limitations or licensing.

SUGGESTIONS FOR IMPROVEMENT

- **Structured Onboarding on Data Sources**: Early orientation on the data architecture, sources, and flow helps interns to learn quickly and become more productive.

- **Sandbox Access to De-identified Data**: Making simulated datasets or sandbox settings with de-identified patient data can allow interns to investigate more sophisticated analysis methods while still adhering to privacy regulations.

- **Standardization of Data Collection**: Data quality can be raised and cleaning time reduced by means of standard formats and instructions for healthcare providers and field workers on digital data input.

- **Integration of Real-Time Dashboards**: At the point-of-care or program level, real-time dashboard integration can speed decision-making and shorten response time.

- **Longer Intern Engagement in Key Projects**: Longer intern participation in significant projects enables interns to significantly assist continuing health efforts or data projects by lengthening internship duration or enabling remote follow-ups following the internship.

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PART B: PROJECT REPORT

“ The Study On Usage Of Mobile Health Technology Application For Early Screening And Detection Of Cancer In India.”



PROJECT TITLE

The Study On Usage Of Mobile Health Technology Application For Early Screening And Detection Of Cancer In India.

ABSTRACT

Background: Mobile technologies and applications are fuelling the worldwide change in healthcare provision more and more. Especially in low- and middle-income nations (LMICs), where mobile penetration is quickly increasing, mobile phone use in healthcare may more efficiently extend services to people in low-resource environments than conventional methods. Post-COVID-19, mobile health (mHealth) technology usage has surged; however, awareness and adoption of healthcare apps remain limited. **Objective**: The current study sought to rate the people in terms of awareness for several facets of mobile health use and cancer screening using the app among the population of India. **Methods:** A pre-structured online questionnaire guided cross-sectional study was carried out. Among the inhabitants of India ranging from 18 to 60 years old, the survey sought to evaluate their knowledge about mobile health technologies and cancer screening. **Results:** From the 392 replies we received for the survey, 4 were eliminated following the exclusion criteria and 388 respondents were examined. Only 11.7% were aware of any app providing early cancer screening, and only 18.3% had ever used a self-assessment instrument. Participants mostly utilized healthcare apps for ordering medicines (77.3%). Only 61.7% had. Though awareness was minimal, 70% of respondents showed readiness to use a cancer-focused app and 78.4% showed interest in features like cancer care content and risk assessment instruments. **Conclusions :** The mobile health technology showed an average of knowledge and awareness, although cancer early detection through any healthcare app had poor uptake.

Keywords: Mobile Health, mHealth, Cancer Screening, Early Detection, Digital Health Technology, Health Awareness, Health Apps.

BACKGROUND

Originally describing tumours shaped and developing like crabs, the Greek words carcinos and carcinoma used by Hippocrates gave rise to the term cancer [1]. Karkinos, used to characterise malignant growths, then emerged from these phrases [2]. A wide group of illnesses distinguished by the unchecked proliferation and spread of aberrant cells in the body is cancer. The main cause of cancer-related deaths is this process known as metastasis[3]. Usually manifesting as malignancies or malignant tumours, the illness can start almost in any organ or tissue [4].

According to Divya Khanna et al., around 75-80% of patients in India show at advanced cancer stages (Stage III or IV), indicating a worldwide failure in early diagnosis [5]. Primary preventive measures such as lifestyle changes, anti-tobacco efforts, and cervical screening are cost-effective but underutilized [6]. Roughly 50% of all male tumours in India may be attributable to tobacco alone [7].

Global Burden of Cancer

Patients, families, and healthcare systems worldwide bear a great physical, psychological, and financial burden from cancer. Most LMICs are poorly prepared to handle this rising demand because of delayed diagnosis, constrained access to treatment, and subpar infrastructure [7][1]. Early detection, better treatments, and post-treatment care, however, have led to higher survival rates in nations with strong healthcare systems [8]. Rising life expectancy and better control of infectious diseases in low- and mid-income countries have changed the emphasis toward non-communicable diseases like cancer [9].

Cancer in India

In 2020, India reported 679,421 male and 712,758 female cancer cases; the most frequent types were lung (men), breast (women), mouth, cervix, and tongue cancers [10].

- One in nine Indians is likely to develop cancer before age 75.
- Every eight minutes a woman passes of cervical cancer.
- Half of newly diagnosed women with breast cancer will pass away.
- Tobacco-related illnesses claim the lives of more than 3,500 daily [7].
- Every year, India's cancer deaths number roughly 784,821 [10].

Given the budgetary limits of mass screening programs, self-examination, cervical hygiene, breast self-examinations, and community education campaigns should take front stage to enable early diagnosis [11]. Effects of COVID-19 on Cancer

Care Particularly in low- and middle-income nations, the COVID-19 epidemic greatly disturbed cancer services all around. Health system overload caused India to have extensive screening, diagnostic, and therapeutic delays [11]. LMICs are expected to have more than two-thirds of all cancer cases by 2040 [12].

Importance of Early Detection

Significance of Early Detection Early detection through screening saves money on treatment and increases survival [13]. Although most screening initiatives focus on certain age groups, risk-based models improved by mHealth applications provide a more inclusive, accessible solution [5][14]. Particularly for breast, cervical, and colorectal cancers, mHealth treatments have shown potential in raising cancer screening rates [15].

Research Gap

Many cancer studies in LMICs centre on treatment instead than prevention, early diagnosis, and digital intervention [16]. Research in India point to poor knowledge and erratic practices with respect to Breast Self- Examination (BSE), Clinical Breast Examination (CBE), and mammography [17]. Knowing how mHealth solutions can help bridge this gap is absolutely essential.

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RATIONALE

Underexplored still is the Indian embrace and influence of mHealth solutions for cancer screening. Although there are more health apps available, their awareness, use, and claimed value—especially for cancer prevention—are still somewhat constrained among the general population. Especially in the context of cancer awareness and early intervention, there is also a lack of evidence-based knowledge on how various demographic groups see and interact with such technologies.

Hence, this study aims to investigate the knowledge, attitudes, and patterns of mobile health application use for cancer screening and detection among Indian population aged 1860 years. Furthermore, strives to uncover the obstacles to adoption and the population changes in beliefs about mHealth technologies. Doing this helps this study to provide insightful information to direct public health plans, digital health innovations, and awareness campaigns intended to lower the cancer burden via early detection and prevention. Better knowledge of user behaviour will enable legislators, health tech developers, and healthcare providers to create mHealth solutions that are accessible, acceptable, and effective, therefore improving cancer outcomes in India.

RESEARCH QUESTION

How mobile health technology application is useful for early screening and detection of cancer in India and what is the perception of people for using mobile health technology?

RESEARCH OBJECTIVES

• To understand the knowledge and perception that people have for the mobile health technology for cancer and its early screening methods in the age group of 18-60 years.

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REVIEW OF LITERATURE

According to the analysis of the literature, global changes in the delivery of health services are being driven by improvements in mobile technologies and applications. Cancer prevention, public awareness, and early detection remain neglected priorities in India's healthcare system. Mobile phone use for healthcare services may be able to reach more individuals in settings with less resources than conventional healthcare delivery techniques due to the exponential growth of mobile phone penetration in low-and middle-income nations.

Table 1: Salient features gathered from literature review

S. No	Title of Study	Authors, Publication year	Study Type, Study Location, Sample size	Key Findings	Link/DOI
1.	**Mobile technology and cancer screening: Lessons from rural India**	Shreya Bhatt, Rita Isaac, Madelyn Finkel, Jay Evans, Liz Grant, Biswajit Paul, David Weller ; 2023	**Study type**- Cross-sectional Study; **Study Location-** RUHSA (Tamil Nadu), Mungeli (Chhattisgarh), Padhar (Madhya Pradesh) **Sample size-** 8,686, with the majority (98%) screened for oral cancer	1. The social status of the CHWs providing the interventions has improved as a result of using the mHealth prototype. 2. Cancer screening can be aided by mobile health techniques in underdeveloped rural communities with poor levels of health literacy. However, they fall short of eliminating the numerous social, cultural, and financial barriers to screening and follow-up. 3. Mobile health, often known as "mHealth" has recently been suggested as a solution to the inadequate infrastructure of health care information in many LMICs. 4. Over 97 percent of people globally have access to a mobile device, compared to about 70 percent of Indians who have a cell phone subscription (with only minor variations between urban and rural areas).	10.7189/jogh.08.020421

2.	**Oral cancer screening using Mobile phone-based (m-health) approach versus conventional oral examination approach**	Krishnakumar Thankappana, Praveen Birur, Manu Raj, Sandjar Djalalov, Sujha Subramanian Subramani Iyer, Moni Abraham Kuriakose; 2020	**Study type** - Cluster-Randomized Clinical trial; **Study Location-** Ernakulam district, Kerala, India **Sample size-** 9,696 participants were enrolled across 6 clusters, with enrolment occurring over an 18-month period	1. The study suggests an m-Health method based on mobile phones to help community health workers (CHWs) in rural areas detect and identify oral cancer at an early stage and to increase patient compliance with follow-up following oral cancer screening. 2. Precancer lesion detection can help patients receive better care by preventing the delay in mouth cancer diagnosis. The long-term advantages include enhanced access to specialised care, early diagnosis of oral cancer and precancer lesions by CHWs, increased awareness of oral cancer risk factors among rural residents, and lower costs for patients and the healthcare system.	10.1016/j.isjp.2020.07.001
3.	**Mobile phone apps for quality of life and well-being Assessment in breast and prostate Cancer patients: Systematic review**	Esther Rincon, Francisco Monteiro-Guerra, Octavio Rivera-Romero, Enrique Zubiete, Carlos Luis Sanchez-Bocanegra, Elia Gabarron; 2021	**Study type** - Systematic Literature review; **Study Location-** Spain and Norway **Sample size-** 644 patients	1. The QoL and/or well-being assessment of patients with breast and/or prostate cancer has not been subjected to rigorous testing, despite the existence of hundreds of researches employing cancer-focused mobile phone apps. 2. Cancer patients should only be given apps that are easy to use and have received quality assurance. Cancer patients are typically receptive to treatments that might ameliorate their condition. 3. Mobile app developers and healthcare teams working in oncological settings should take extra prudence and	10.2196/mhealth.8741

				patient-centered design principles when making apps that will be used and assessed by this population, most likely as a result of this.	
4.	**mHealth Interventions for cancer care and support systematic literature review**	Samar Zuhair, Rasha Assad Assiri, AL Riyadh, Riyadh, Samar Zuhair; 2020	**Study type** - Systematic Literature review **Study Location-** Global **Sample size-** Comprised of 57 individual studies; total pooled participants across these studies = 112,196	1. Several issues must be taken into consideration while creating mHealth interventions for cancer patients. For instance, privacy and security concerns were emphasised. 2. The complexity is another problem that has to be addressed because several patients found it difficult to use features like private messaging, decision aids, and login screens. Additionally, cancer survivors and parents were more motivated and likely to use an intervention that was appropriate for their situation.	doi:10.31838/srp.2020.9.104
5.	**Impact of Covid-19 Pandemic on cancer screening in India: Current situation, Challenges and way Forwards**	Md. Abu Bashar and Nazia Begam; 2021	**Study type** - Systematic Literature review; **Study Location-** Varanasi (UP) and Haryana (India) **Sample size-** Not applicable (Perspective article with no primary data/sampling)	1. The windows of possibility for creative approaches to cancer screening and prevention opened by the systematic disturbance and devastation COVID-19 has inflicted on patients, practitioners, and healthcare systems globally. 2. We require both flexible long-term plans that take into consideration the unpredictable, expensive, and lethal nature of cancer as well as its intersection with other major health issues, such as viral diseases akin to the present epidemic.	**10.31557/apjcc.2021.6.S1.145-150**
6.	**Cervical Cancer:**	Ravi Mehrotra and	**Study type** - Systematic Literature review;	1. In order to provide effective cervical cancer screening	10.1007/s40944-021-00602-z

	Formulation and Implementation of Govt of India Guidelines for Screening and Management	Kavita Yadav; 2021	**Study Location-** National-level review across India **Sample size-** Not applicable (Perspective article with no primary data/sampling)	programmes and community-level activities to increase community engagement and knowledge of cervical cancer and screening programmes, India must strengthen the capacity of its health system. This can only be accomplished by training a workforce of paramedical and health professionals who are informed about screening. 2. In addition to infrastructural obstacles, a recent study found that stigma, lack of awareness of the benefits of screening services, humiliation or anxiety associated to the screening process, and fear of being evaluated for lack of modesty were other common obstacles to screening uptake.	
7.	**Investigating barriers to early cancer detection for rural Indian women: A qualitative analysis of cancer outreach in Dehradun, Uttarakhand**	Blair Burnett, Dr. Azim khan, Dr Rajeev Prasad Bijal wan; 2020	**Study type** - A Qualitative analysis **Study Location-** Dehradun district, Uttarakhand, India **Sample size-** Not applicable (Perspective article with no primary data/sampling)	1. There is a knowledge gap since proper health education is not readily available. 2. Obstacles to cancer identification in a neighbourhood that has not yet received outreach from a sizable tertiary centre that provides cancer care. 3. The majority of the women who were asked about the fundamentals of malignancies that specifically affect women did not know the risk factors, symptoms, or diagnostic procedures that are employed for early cancer detection.	10.1007/s40944-021-00602-z
8.	**Cancer awareness and attitude towards**	Sahu, Dinesh Prasad, Subba, Sonu H., Giri,	**Study type** - A Narrative Review	1. As a crucial part of the cancer control programme, raising awareness of the disease requires careful	10.4103/jfmpc.jfmpc_145_20

	cancer screening in India A narrative review	Prajna Paramita; 2020	**Study Location-** AIIMS Bhubaneswar, Odisha, India **Sample size-** Not applicable (Perspective article with no primary data/sampling)	assessment of the information source. 2. Given that there is less public awareness of cancer and less advertising, outdoor patients may represent an opportunity to raise awareness of the disease. Campaigns to raise awareness may be a more effective strategy to inform the public. 3. The importance of cancer education in the community must be emphasised. Utilizing the internet and the media effectively can help spread awareness.	
9.	**Social media and m-health Technology for cancer screening: systematic Review and Meta-analysis**	Arlinda Ruco, Fahima dossa, Jill Tinmouth, Diego Llovet, Jenna Jacobson, Teruko Kishibe, Nancy Baxter; 2021	**Study type** - Systematic Review and Meta analysis **Location-** Global, including a focused subgroup analysis in LMICs **Sample size-** 39 studies (35 involving mHealth, 4 involving social media)	1. The use of mHealth interventions, notably for breast cancer, cervical cancer, and CRC screening, may have a considerable impact on cancer screening participation. 2. To boost screening participation, screening programmes should consider the usage of mHealth interventions. As there was inadequate data available at the time of this evaluation, more research on social media interventions for cancer screening participation is required.	10.1136/bmjopen-2019-035411
10.	**A novel mobile-health approach to early diagnosis of oral cancer**	Birur N, Dr Sanjana Patrick, Dr Suchitra Bajaj, Dr Shubhasini Raghavan, Amritha Suresh, Sumsum P Sunny, Dr Radhika Chigurupati,	**Study type** - Systematic Literature review; **Study Location-** Bengaluru, Karnataka **Sample size-** 42,754 individuals	1. Early identification can help lower the high incidence of oral cancer in India. 2. Early detection of oral cancer can improve prognosis and treatment outcomes in terms of morbidity and death, with 82.8 percent of patients surviving 5 years after diagnosis. 3. The majority of oral malignancies are	10.5005/jp-journals-10024-2392

		Dr Petra Wilder Smith, Dr Keerthi Gurushanth, Ms Pratima Rao, Dr Moni Abraham Kuriakose; 2019	(between 2010–2018)	discovered after metastasis, when the 5-year survival rate is only 278.7%. 4. Due to the asymptomatic nature of oral cancer and its companion diseases, such as oral potentially malignant disorders (OPMDs), the majority of patients do not seek treatment until a late stage has been reached.	
11.	**Preventing breast cancer in LMICs via Screening and/ or Early detection: The real and the surreal**	Subhojit Dey ;2019	**Study type** - Systematic Literature review; **Study Location-** Low- and middle-income countries (LMICs) globally **Sample size-** Not applicable (review-based, no primary sample)	1. In LMICs, policymakers are still not as aware of the benefits of early detection and screening as the "best buy" option to cut healthcare expenses. 2. Due to this, the majority of LMICs lose a significant number of women at a young age, which is unfair from the standpoint of human rights and also results in the creation of "cancer orphans," in addition to a lack of research regarding cost-effective screening/early detection methods and little community awareness.	10.5306/wjco.v5.i3.509
12.	**mhealth In Screening For Non-communicable Diseases: The Untold Tale**	A Suguna, A Surekha; 2018	**Study type** - Commentary (Letter to the Editor); **Study Location-** Tamil Nadu, India **Sample size-** Not applicable (expert commentary/letter format)	1. Mobile technology can enhance access to information, as observed in other mHealth promotion examples from various disease areas — maternal and child health, for instance. This might be applied to NCD screening to raise awareness of the value of screening and the process for receiving the service. 2. A high-income nation trial that used information sent via SMS to note a 23 percent rise in female	10.4103/ijpvm.IJPVM_92_18

				screening rates shown that this can be done successfully. 3. Mobile technology might be useful for NCD screening if it is well-designed and used.	
13.	**Perceptions and knowledge towards mobile health among the college going students in Coastal South India**	Prasanna Parthaje, Bhas karan Unnikrishnan, Rekha Thapar, Nithin Kumar, Elizab Panikulam, Geroge, Prajw al Pai, Vaman Kulkarni, Ramesh Holla, Bhagwan Bhagyamma Darshan, Avinash Kumar, Rohil Mehta; 2019	**Study type** - Cross-Sectional Study **Study Location-** Mangalore, Karnataka **Sample size-** 627 college students	1. The use of mobile phone technology will eliminate or lessen the need for patients to physically visit the hospital in order to receive counselling or advice about medications, among other services. 2. Numerous studies have documented the different benefits of mHealth, but none have addressed young people's awareness, acceptance, or willingness to use the technology. 3. Planning and making policy decisions regarding boosting mHealth awareness among the younger generation and identifying the elements that make mHealth applicable depend on this. 4. Although there was a good degree of knowledge regarding mHealth and its different features in our study, there were disparities between the courses in terms of a number of elements.	10.4103/0976-9668.175078
14.	**Barriers to the use of Mobile health in Improving health outcomes in developing countries**	Clemens Kruse, Jose Betancourt, Stephanie Ortiz, Susana Melissa Valdes Luna, Inderdeep Kaur Bamrah, Narce Segovia; 2019	**Study type** - Systematic Literature review; **Study Location-** developing countries in Africa, Asia, and Latin America	1. Low-cost mobile technology can help poor nations with their health care demands. Short message service (SMS) text messaging, mobile apps, and phone conversations can all be utilised as a means of exchanging health information in order to improve health	10.2196/13263

			Sample size- Not applicable (it's a meta-analysis synthesizing multiple independent studies)	outcomes. This is known as mobile health (mHealth). Patients' health condition can be communicated, stored, retrieved, and reminded using a simple text. 2. It can also convey messages that encourage healthy habits and decisions. It is a low-cost technique that can lessen health disparities in Underdeveloped nations.	

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METHODOLOGY

We conducted a descriptive cross-sectional survey using a standardized, self-administered internet survey. The demographic and economic component focused mostly on collecting personal level information including age, gender, and employment status.

A. **Research Study Design-**
Descriptive Cross Sectional Study Design

B. **Research Approach-**
A structured questionnaire was distributed, and responses were collected via online mode using google forms at platforms like WhatsApp, Facebook.

C. **Study Population** – Residents of any Indian city or state.

- **Inclusion Criteria**

- Residents of India aged 18–60 years.
- Access to a smartphone and internet.
- Willing to provide informed consent.

- **Exclusion Criteria**

- Healthcare professionals or those working in digital health companies.
- Individuals outside the defined age group.

D. **Sample Size** –
A sample size of 384 has been calculated using the Cochran formula with a 95% confidence level and a 5% margin of error, assuming a 50% response distribution.

$$n = \frac{Z^2 \cdot p \cdot (1-p)}{e^2}$$

Given the lack of prior published studies explicitly evaluating this result in the Indian context, the computation presumes a 50% knowledge of mobile health (mHealth) technology for cancer detection. This conservative estimate guarantees adequate representation and maximizes sample size.

E. **Sampling Method** –
Given the online character of the survey, convenience sampling was applied. Among people 18-60 years old throughout India, the questionnaire was distributed via email and social media channels (WhatsApp, Facebook,).

F. **Period Of Study** -
(10^{th} MAY – 21^{st} JUNE 2025)

G. **Study Setting** -

Virtual research was done throughout many areas of India.

H. **Mode Of Data Collection-**

Data collecting was done via an online self-administered survey generated with Google Forms. Email as well as social media channels including WhatsApp, Facebook and Instagram sent the survey link.

I. **Study Variables -**

- Independent variables: Age, gender, education level, income, urban/rural residence, smartphone usage, prior awareness of mHealth apps.
- Dependent variables: Knowledge about mobile health technology, perception of mHealth usefulness in cancer screening, usage patterns of mHealth apps.

J**. Data Collection Tools-**

The primary data collection tool was a structured and standardized questionnaire developed specifically for this study. The questionnaire consisted of multiple sections:

- Demographic details (age, gender, location, income, education, employment).
- Technology usage (smartphone use, internet access).
- Awareness and perception of mobile health (mHealth) applications.
- Experience and patterns of mHealth app usage for cancer screening and health monitoring.

K**. Ethical Consideration –**

Each participant has signed an informed consent form before answering any of the questionnaire's questions; the results of this study will help us determine how people in India feel about m-health technology and whether it is helpful for early cancer diagnosis there. During the inquiry, all ethical guidelines will be followed.

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OPERATIONAL DEFINITIONS

• **m-heath Technology**: mHealth is the application of mobile and wireless devices (cell phones, tablets, etc.) to improve health outcomes, health care services, and health research, according to the National Institutes of Health (NIH). mHealth, sometimes written m- heath, is the use of mobile and wireless technologies to enable someone to reach health objectives, according to the World Health Organization. Mobile devices including smartphones, tablets, PDAs, and computers allow for the practice of medicine and health care via mHealth.

• **Cancer**: Cancer is a disease wherein certain cells of the body grow uncontrollably and spread to other regions. Almost anywhere in the human body, which houses trillions of cells, cancer can arise. Usually, human cells grow and multiply (a process known as cell division) to produce fresh cells as needed by the body. New cells replace dying or damaged cells. Sometimes this organized process breaks down and results in the proliferation of aberrant or damaged cells when they shouldn't. Tumours, which are lumps of tissue, can develop from these cells.

• **Screening**: Screening is a preventative health approach using tests or evaluations to find persons at risk of or in the early stages of a disease, such cancer, among those not showing symptoms. mammography, Pap smears, or app-based risk assessments are examples.

• **Risk Assessment Tool**: Usually through a set of screening inquiries or algorithms, a function in an mHealth app assists consumers in evaluating their likelihood of having or contracting a certain illness (e.g., cancer) based on symptoms, medical history, and behavioural data.

• **Digital Health**: Including wearable devices, telemedicine, electronic health records (EHRs), mHealth, and other technology-driven healthcare solutions targeted at enhancing patient outcomes, accessibility, and system efficiency, digital health is a broad field.

• **Acceptability**: refers to how suitable, satisfactory, and culturally relevant individuals using a specific mHealth solution find it for their needs, so affecting acceptance and continuing use.

• **User Engagement**: Often measured by frequency of use, feature adoption, time spent on the app, and readiness to act on recommendations, user engagement is the extent to which users interact with and use the features of a mobile health app.

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DATA ANALYSIS & RESULTS INTERPRETATIONS:

Our online survey received responses from 392 individuals in total. However, 4 responses were excluded from the final dataset due to the following reasons: two were incomplete or blank submissions and two did not meet the inclusion criteria (e.g., were below 18 or above 60 years). As a result, the final analysis was conducted on 388 eligible and complete responses.

* Consent by the Respondents :

All 388 participants (100%) freely agreed to participate in the study.

* Sociodemographic characteristics

- **Age Distribution**:

The majority of the 388 respondents, 72%, fell between the ages of 18 and 30 years, with 11% falling between 50 and 60 years old.

- **Gender Distribution**:

45% of the respondents were males; 55% were females.

- **Employment Status**:

Regarding employment status, roughly 10% were freelancing or contract workers; 26% were students; and 51% were employed full-time.

- **Industry Classification**:

Examining the employment categories revealed that 51% of the participants came from the healthcare field, then 19% were from the IT and software industry.

- **Social Media Usage**:

Each used by over three-quarters of participants, Instagram (76.3%) and WhatsApp (77.8%) are the most preferred, therefore underlining their major part in daily communication and information sharing. Snapchat (1.5%) is the least utilized, indicating little relevance for this demographic, while LinkedIn (41.2%) and Facebook (20.6%) show less popularity.

[These patterns clearly indicate that for top user engagement and outreach, WhatsApp and Instagram should be given top focus in awareness campaigns and mHealth app promotion]

Table 2 : Participant sociodemographic characteristics (n=388)

Sociodemographic Characteristic	Category	Number of Respondents	Valid Percentage
Gender	Male	190	49%
	Female	198	51%
	Others	0	0%
Age	18–30	279	72%
	30–40	27	7%
	40–50	35	9%
	50–60	43	11%
Employment Status	Employed full-time	198	51%
	Employed part-time	19	5%
	Freelance/contract employee	39	10%
	Self-employed	23	6%
	Unemployed	4	1%
	Student	101	26%
	Retired	4	1%
Working Industry	Healthcare Industry	198	51%
	Technology/software	74	19%
	Consulting	27	7%
	Services	23	6%
	Educational Department	35	9%
	Others	43	11%
Social Media Used	Instagram	260	67%
	WhatsApp	310	80%
	Facebook	109	28%
	LinkedIn	147	38%
	Others	4	1%

*Awareness of various healthcare apps

The research reveals that individuals both use several healthcare applications and are cognizant of them. The study found that 61.7% of the participants had used the healthcare applications thus yet. Only thirty percent are individuals who have never used the healthcare app.

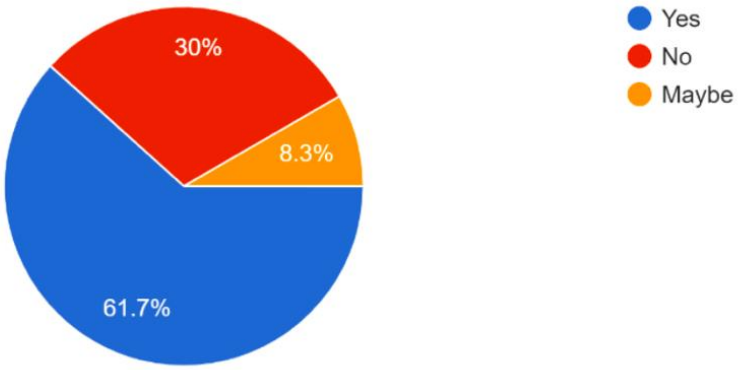


Fig 1: Ever used healthcare apps

* If yes, Which app have you used?

PharmEasy (59.3%), Tata 1mg (54.1%), and Apollo 24/7 (49%), followed by Practo (33.5%), are the most used healthcare apps among respondents. Less than 5% reported using applications like Netmeds, Karkinos, or Ecogreen, hence showing a definite preference for leading mainstream services. These results show that most users prefer well-known applications providing thorough medical care. Future app interventions can profit from studying the features and techniques of these high performers.

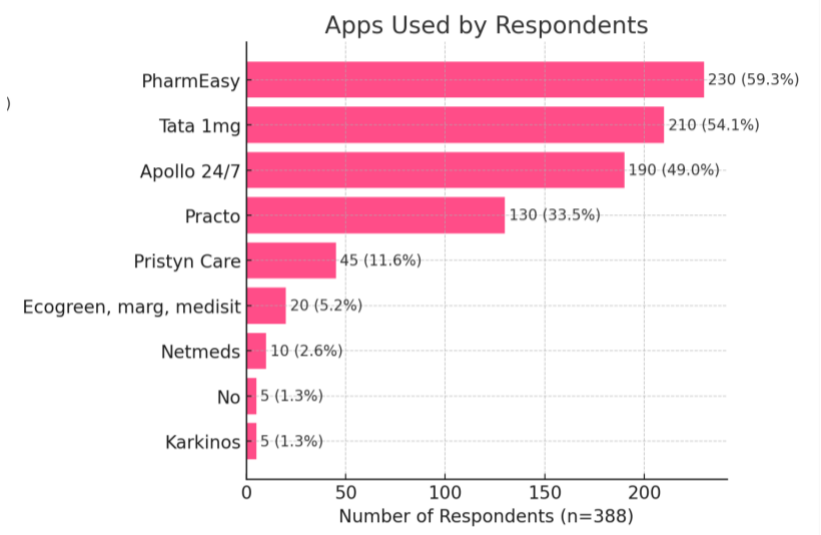


Fig 2: App used by respondent.

* What is the purpose for using that app?

Ordering medications is the most often stated reason respondents utilize healthcare apps; about 300 (77.3%) chose this option. This suggests users highly favour digital pharmacy convenience. Important uses also include teleconsultation or video consultation (54.9%) and gathering healthcare information (54.1%), indicating that consumers place importance on remote access to doctors and educational content. Only around 87 users (22.4%) reported using the apps to arrange lab tests, therefore making it the least used tool among the four.

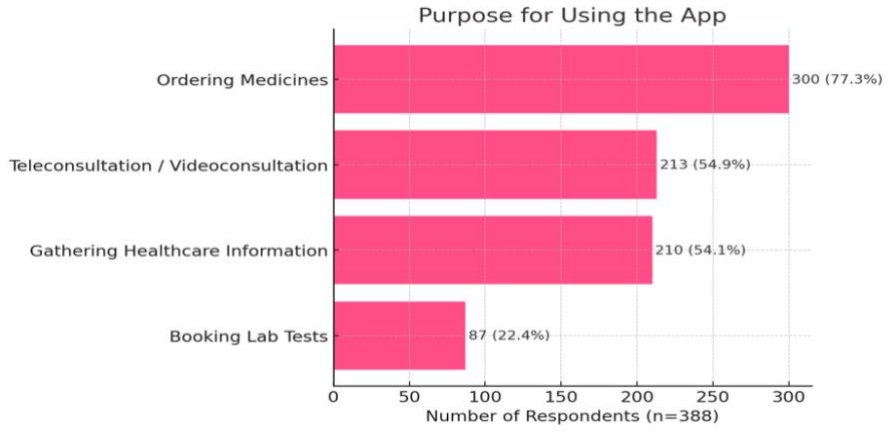
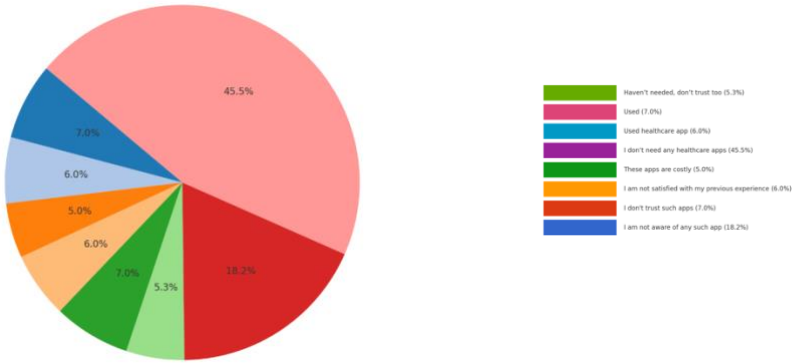


Fig 3: Purpose for using the app.

* Reason for not using healthcare apps

There are several arguments against using the healthcare apps, as seen in Figure 4. 45.5% of respondents in general believe they do not require any healthcare applications; 18.2% are unaware of them. Therefore, it proves that among the people there is not enough knowledge of the value of healthcare apps.

Fig 4: Reason for not using healthcare apps



*Early screening and detection of cancer through apps

Few applications offer the features needed for cancer care. The research shows that many of the responders are ignorant of any such healthcare software offering cancer treatment via app. 80 percent of the respondents gave answers that they are not conscious of early detection of cancer care provided through apps. Just 11.7% of them are familiar with early screening and detection of cancer achieved using apps.

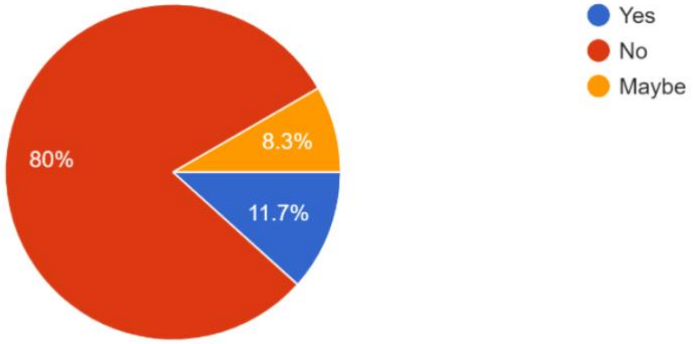


Fig 5: Awareness of mobile health app for early detection of cancer

* Can you name any mobile healthcare app for early detection of cancer ?

Low awareness is underlined as around 10% of respondents said Don't know or No when asked to identify a cancer detection app. Just around 4.9% mentioned apps like Karkinos, Practo, or gave hazy replies, pointing to a definite understanding gap in mHealth instruments for early diagnosis.

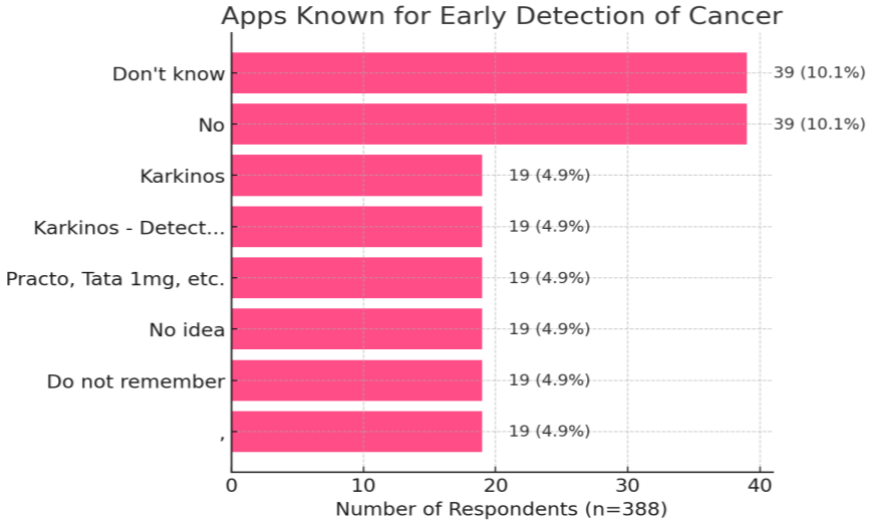


Fig 6: Few mHealth apps for early detection of cancer known to respondents.

* Ever taken the self-test through any mHealth apps

The respondents are similarly unaware of the self-test via several applications accessible since awareness of early screening and detection is less. Here self-test refers to symptoms-based testing using smartphone applications for your health. Sometimes referred to in some programs as self-test, it is also known as risk assessment. Detected early, minor symptoms can save a person considerable time, energy, and money. They have said they know of no such application from which they may take self-test and guarantee they are disease free. It is very important to educate people about early cancer detection via apps so they may simply self-examine themselves for the first stage using these mHealth programs. 1.7 percent Ever tested oneself using mHealth apps shown in Fig 7.

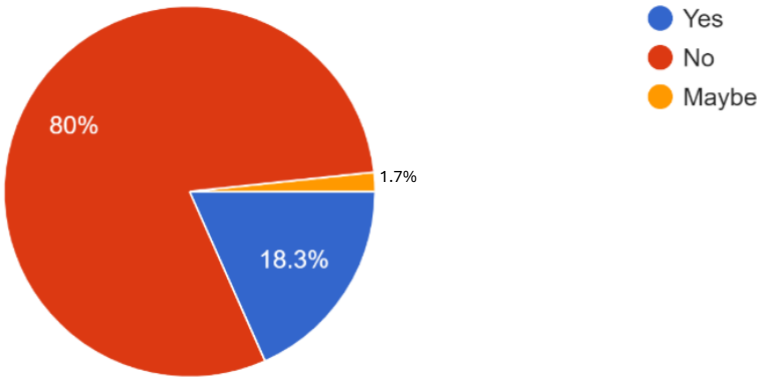


Fig 7: Ever taken the self-test through any mHealth apps

*Reason for not taking self-test

Lack of knowledge—70.2% of respondents said they were not aware of such apps—was the main cause for not taking a self-test through healthcare applications. Other obstacles were never feeling the need for a risk assessment (10.6%), preferring an in-person consultation to digital techniques, not understanding how the app works (12.8%), and hesitancy to take one. This shows that user-friendly app interfaces and digital health education are quite important.

Fig 8: Reason for not taking self-test



*** If you get any app that gives you all the information about cancer, would you like to use it?**

According to the chart, 70% of respondents stated they would use an application offering thorough cancer information. Only 10% of respondents said No, showing a great interest in educational mHealth solutions, whereas 20% said Maybe.

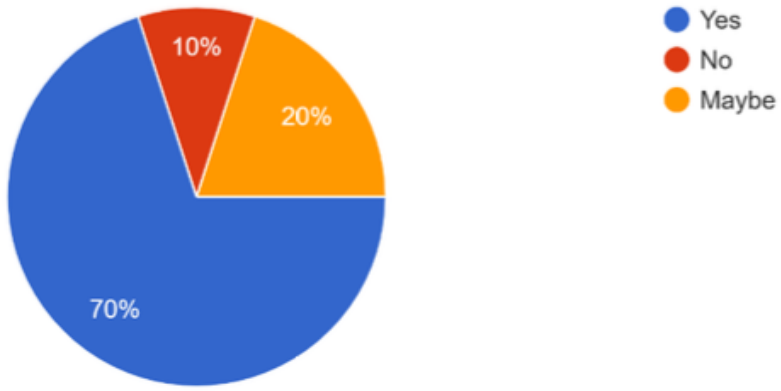
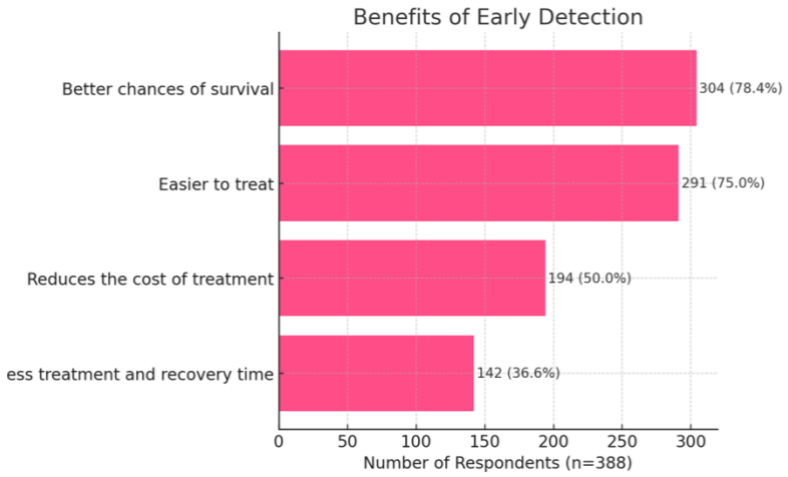


Fig 9: If cancer care apps are provided, respondents will use that or not

*** Benefits of early detection on the basis of respondent's viewpoint**

According to the respondents, early detection of cancer improves survival chances, simplifies treatment, and lowers the cost of treatment. 78.3% of respondents believe early detection raises one's chance of survival. And 75% consider early diagnosis makes it easier to cure a patient as against advanced stage. Should the person dismiss the little symptoms also, treating that at an advanced level becomes very important.

Fig 10: Benefits of early detection on the basis of respondent's viewpoint



* What would you like to have in that app?

With 78.4% choosing knowledge on cancer care and 75% picking risk assessment tests, the most sought-after features in the app were medical record tracking (60.1%), activity tracking (58.2%), and teleconsultation (54.9%). Only 1.8% of respondents selected choices like nothing or generic infographics, demonstrating great interest in functional, health-focused features.

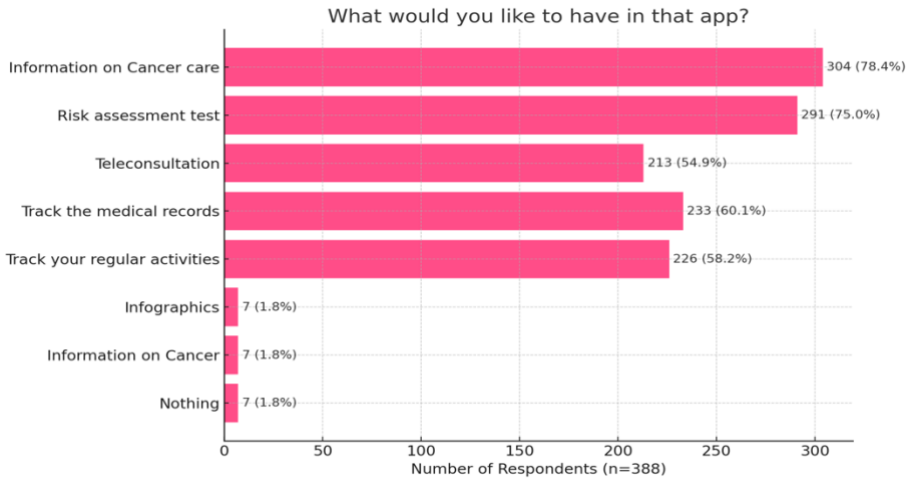


Fig 11: Feature the respondents want in App.

SUMMARY OF THE DATA THAT WE ANALYSED

Data analysis provided important understanding of Indian people between 18-60years of age in terms of mobile health (mHealth) technology awareness, use, and perceptions. Strikingly, 61.7% had utilized healthcare apps mostly for medicine orders (77.3%), video consultations (54.9%), and health information access (54.1%). Only 11.7% of people, however, were aware about using such programs for early cancer screening; 80% of those had never come across an application providing early detection.

Lack of awareness (70.2%) and unfamiliarity with app features (12.8%) were cited as major obstacles; fewer participants (18.3%) had taken any form of self-assessment using apps.

Still, nearly 78.4% of respondents wanted cancer care content and risk assessment tools in mHealth apps, while a promising 70% expressed readiness to utilize a cancer information app. These results emphasize a digitally active yet under-informed population that has great adoption potential if awareness and app usability are deliberately improved.

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DISCUSSION

This research sought to examine how mobile health (mHealth) technology might be used for early cancer screening and diagnosis in India.

KEY FINDINGS :

- **Digitally Active, Yet Unaware:** While 61.7% of respondents had used healthcare apps, most used them for ordering prescriptions or consultations. Only 11.7% were aware of apps for early cancer detection, and just 18.3% had ever used a self-assessment tool. This is consistent with results from Prasanna et al. who observed that while mobile health awareness is increasing among South Indian young, there is still a gap in functional knowledge and application, particularly for specialist health needs like cancer screening. [7]

- **Lack of Awareness Mirrors National Trends:** The 70.2% of respondents who cited lack of awareness as the primary reason for not taking a self-test mirrors the trend reported by Bhatt et al. who stressed that social and informational obstacles impede cancer screening uptake even in rural areas where mHealth prototypes are used. [8] Burnett et al. discovered, as well, that most women in rural Uttarakhand had little to almost no knowledge of cancer screening methods or risk factors. [9]

- **Reluctance and Preference for In-Person Care:** Consistent with Kruse et al., who found trust and usability issues to be significant obstacles to mHealth adoption in developing nations, the hesitancy to utilize digital tools for risk assessment (10.6%) and the preference for conventional consultations noted in this study[18].

- **High Receptiveness to Cancer-Focused Apps:** Seventy percent of respondents expressed an enthusiastic willingness to use programs providing cancer information; 78.4% favoured risk assessment tools. This fits with Rincon et al.'s discovery that cancer patients are usually receptive to mobile apps provided they are simple, reliable, and user-friendly. [10]

- **Comparative Evidence on Early Detection:** Our results support worldwide trends emphasizing the need of early detection based on comparative data on early detection. Thankappan et al. demonstrated, for instance, that mHealth treatments enhanced early oral cancer diagnosis and patient adherence in Kerala. Similarly [9], Early oral cancer diagnosis by means of mHealth resulted in greater 5-year survival rates (82.8%), as Birur et al. proved. [15]

- **Social Media & mHealth Synergy:** High usage of Instagram and WhatsApp (76-78%) for communication and information backs Ruco et al. who urged combining mHealth programs with popular social media sites to increase knowledge and app uptake especially for breast and cervical cancer screening. [5]

LIMITATIONS OF THE STUDY:

- **Limited Sample Diversity:** Most participants (72%) were between 18 and 30 years old; hence, broadness to older, rural, or less tech-savvy populations was restricted by the significant percentage with either digitally literate or healthcare/IT experience.
- **Convenience Sampling Bias:** Data was collected from internet channels (WhatsApp, LinkedIn, etc.) utilizing a convenience sampling method, which could omit people without smartphone or internet connection and hence skew the results.
- **Self-Reported Data:** Self-administered surveys were used in the study, which are vulnerable to social desirability bias, memory bias, and errors in reported app usage or awareness.
- **Cross-Sectional Nature:** This study only catches a snapshot in time; hence it limits knowledge into trends or causal connections since it does not track changes in knowledge or behaviour over time.
- **Exclusion of Healthcare Professionals:** By leaving out digital health employees and medical experts, the study misses ideas from informed consumers who might offer insight on obstacles, usefulness, and potential app changes.
- **Lack of In-depth Qualitative Insights:** Though quantitative, the study is without qualitative interviews or focus groups that might uncover more basic behavioural motivators, emotional responses, or cultural influences affecting app adoption. [18]
- **No Regional Comparisons:** Unexplored Regional Comparisons: Differences in awareness or consumption trends between metropolitan versus rural or north versus south India still go unexamined because there is no regional data analysis.
- **Technology Access Assumption:** It assumes all participants have dependable internet and access to cell phones, which may not be true in impoverished or underserved areas. [4][18]

These results emphasize the need of early screening and diagnosis, especially in remote or poor regions where healthcare access is limited. mHealth apps may help to solve these obstacles by providing affordable, scalable, and easily accessible diagnostic tools and information.

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CONCLUSION

The results of this research draw attention to the possible function of mobile health (mHealth) apps as personalized, engaging tools for raising public knowledge of cancer and promoting proactive health management. Among digital interventions, social media especially stands out as the most effective means for disseminating health information, involving consumers, and encouraging app use among young groups. [14]

Among the Indian population aged 18–60, this research uncovers a major discrepancy between the widespread application of mobile technology and awareness of its early cancer detection capacity. Although over 61% of those surveyed claimed to use healthcare applications, their participation stayed mostly limited to transactional services like online consultations and drug orders. Only 11.7% were shockingly aware that such apps might help early cancer screening, and just 18.3% had ever employed a self-assessment function.

The results highlight a major missed opportunity in using digital health instruments for preventive care. Lack of exposure, limited health-tech literacy, and reliance on in-person care models all contribute to the low awareness of cancer-specific mHealth capabilities even in a population that is digitally active and app-savvy. Still, the strong want of consumers to use cancer-related apps particularly those offering risk assessment and educational material points to great future potential [15].

Closing this knowledge adoption gap calls for a multi-pronged approach: public education campaigns; development of simple and inclusive mobile interfaces; multilingual content; more digital outreach particularly in impoverished and rural areas. Policymakers, health-tech entrepreneurs, and public health experts have to work together to completely appreciate mHealth's capacity as a cost-effective, scalable, and efficient weapon against late-stage cancers in India.

Encouraging people basically via directed awareness campaigns and user-centred mHealth solutions can turn cancer care from a reactive to a proactive one, hence lowering the burden of disease and improving outcomes across a number of communities.

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KEY RECOMMENDATIONS

Several tactical steps are suggested to boost the significance of mHealth early cancer detection and better public health results. These targets improving research quality, user engagement, technical relevance, and accessibility.

- **Conduct Quantitative and Impact-Focused Studies**: Though mHealth is attracting increasing attention, most of the current literature is narrative or qualitative. Quantitative studies are obviously needed to clarify user behaviour, effectiveness, and perceptions across various population groups. [5]

- **Expand the Study Population:** To guarantee representative and statistically significant results, future studies should aim for a larger and more varied study population, therefore allowing a greater knowledge of the perspectives of the populations on mHealth[16].

- **Assess Knowledge and Awareness Levels**: It's important to assess the extent of their awareness of mHealth technology, including its features, advantages, and drawbacks. This supports the creation of focused awareness initiatives.

- **Enhance Feature Relevance Based on User Needs:** Customize mHealth apps based on user input emphasizing affordability, accessibility, and fundamental healthcare needs; developers should include the most necessary and relevant features.

- **Promote Preventive Health Behaviour:** Early detection of and thereby reduction of the load of late-stage cancer diagnoses may be encouraged by projects within applications that promote complimentary cancer screening tools, symptom checkers, and life risk assessments—all of which encourage preventative health behaviour.

- **Improve Usability and Accessibility:** mHealth applications must be straightforward to navigate, intuitive, and user-friendly especially for new users or people with little digital literacy. Rural and semi-urban people might welcome adoption because of easier interfaces and multilingual assistance.

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ANNEXURES

Annexure A: Questionnaire

Mobile Health Technology and Cancer Screening – Questionnaire

Consent:
Your participation in this research is entirely voluntary. You have the right to withdraw at any time and for any reason. All of your information will be kept private and used solely for research purposes.

a) Yes
b) No

Questionnaire

1. Gender -
a) Male
b) Female
c) Others

3. What is your age?
a) 18-30
b) 30-40
c) 40-50
d) 50-60
e) 60+

4. How would you describe your employment status?
a) Employed full time
b) Employed part time
c) Freelance/contract employee
d) Self-employed
e) Unemployed
f) Student
g) Retired

5. How would you classify your industry?
a) Healthcare Industry
b) Technology/Software
c) Consulting
d) Services (Banking, Defense/ Army, etc.)

e) Educational Department
f) Others

6. Which social media you use mostly?
a) Instagram
b) WhatsApp
c) Facebook
d) LinkedIn
e) Others

7. Have you ever used any healthcare app?
a) Yes
b) No
c) Maybe

8. If yes, Which app have you used?
a) PharmEasy
b) Tata 1mg
c) Apollo 247
d) Practo
e) Pristyn care
f) Others

9. What is the purpose for using that app?
a) Teleconsultation/Video consultation
b) Ordering Medicines
c) Booking Lab Tests
d) Gathering healthcare information

10. What do you like most in that App?
a) Good healthcare services through the app
b) Discounts / Offers
c) Information provided on the app
d) Easy to use
e) Easy to contact the customer care

11. If no, why have you not used any healthcare app?
a) I am not aware of any such app
b) I don't trust such apps

c) I am not satisfied with my previous experience
d) These apps are costly
e) I don't need any healthcare apps
f) Others

12. Are you aware of any mobile health app for early detection of cancer ?
a) Yes
b) No
c) Maybe

13. Can you name any mobile healthcare app for early detection of cancer ?
_____

14. Have you ever taken the self-test through any of the healthcare app for any symptom you are facing?
a) Yes
b) No
c) Maybe

15. If no, why have you not taken any self-test?
a) Not aware of the app
b) Don't know how it works
c) I don't want to take any risk assessment
d) Other

16. If you get any app that gives you all the information about cancer, would you like to use it?
a) Yes
b) No

17. In your views what are the benefits of early screening and detection of cancer?
a) Easier to treat
b) Better chances of survival
c) Less treatment and less time spent recovering
d) Reduce the cost of treatment
e) Other

18. What would you like to have in that app?
a) Information on Cancer care
b) Risk assessment test
c) Teleconsultation/Video consultation
d) Track the medical records
e) Track your regular activities
f) Other
Thank you for your valuable time and support :)

****

GOOGLE CERTIFICATION

- **Scheduled for completion during the first two weeks of my internship, I successfully earned the Google Data Analytics Professional Certificate as part of my internship.**

- **Created by Google, this eight-course structured certification program helps people to acquire basic and useful data analytics skills.**



FEEDBACK FORM

(Organization Supervisor)

Name of the Student: Dr. Laxmi Singh

Summer Internship Institution: MEDTRONIC INDIA

Area of Summer Internship: Healthcare Analytics

Attendance: Full

Objectives met: Yes

Deliverables: Project Report

Strengths: Dr. Laxmi is immensely talented, hardworking and a self-learner. She is responsible enough to understand the intensity and nature of work on herself.
Wishing her every success in life.

Suggestions for Improvement: None

Signature of the Officer-in-Charge (Internship)

Date: 28/06/2025
Place: New Delhi

(Completion of Summer Internship from respective organization)

The certificate is awarded to

Name Dr. Laxmi Singh

In recognition of having successfully completed his/her
Internship in the department of

Title Healthcare Analytics

and has successfully completed her Project on

Title of the Project

Date 28/06/2025

Usage Of Mobile Health Technology in Cancer Screening

Organisation MEDTRONIC INDIA

He/She comes across as a committed, sincere & diligent person who has a
strong drive & zeal for learning

We wish him/her all the best for future endeavors

GURUGRAM
MDTRESY MEDICAL TRAVEL PVT. LTD.
MEDTOUREASY

Organization Supervisor

Head-HR/Department Head

Medtronic

MedTourEasy ®

CIN NUMBER : U85300DL2018PTC334604 WEBSITE : WWW.MEDTOUREASY.COM
PHONE : +91 8700219382 EMAIL : HR@MEDTOUREASY.COM

DATE : 28/06/2025
REF : CER/2025/337

CERTIFICATE OF INTERNSHIP COMPLETION

This is to certify that Mr/Ms. **Dr. Laxmi Singh**, has successfully completed the Internship program at **MEDTRONIC INDIA (under MedTourEasy)** from **01/05/2025 to 30/06/2025**.

During this period Dr. Laxmi had experienced the hands on working of a **Health Data Analytics** Professional and worked under the supervision of project mentor & developed the project entitled "**Study For Usage Of Mobile Health Technology Application For Early Screening And Detection Of Cancer In India**". Apart from that, Dr. Laxmi also worked on Internal Projects of the organization.

Dr. Laxmi was found hardworking, punctual and inquisitive, during the tenure of internship.

We wish Dr. Laxmi every success in career.

GURUGRAM
MDTRESY MEDICAL TRAVEL PVT. LTD.
MEDTOUREASY

Ankit Hasija
Training Head

Medtronic

DATE : 28/06/2025

LETTER OF APPRECIATION

Dear **Dr. Laxmi Singh,**

On behalf of the entire team we would like to appreciate your dedicated efforts and performance towards the department and the never giving up attitude that you have.

We really cherish the great amount of hard work shown in completing the assigned tasks within the designated time frames. We appreciate your sincere efforts and would like to thank you for your enthusiasm to learn and deliver, hereby exceeding expectations.

Wishing you success in all your future endeavors.

GURUGRAM
MDTRESY MEDICAL TRAVEL PVT. LTD.
MEDTOUREASY

Ankit Hasija
Training Head

CERTIFICATE OF APPROVAL

The Summer Internship Project of titled **"The Study on usage of Mobile Health Technology application for early screening and detection of cancer in India"** at **MEDTRONIC INDIA** is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of Post Graduate Diploma in Health and Hospital Management for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed, or conclusion drawn therein but approve the report only for the purpose it is submitted.

Name of the Mentor: **Dr. Rupsa Banerjee**
Designation: Associate ~~Assistant~~ **Professor**
Organization: **IIHMR, Delhi**

FEEDBACK FORM
(IIHMR MENTOR)

Name of the Student: Dr. Laxmi Singh

Summer Internship Institution: MEDTRONIC INDIA

Area of Summer Internship: Health Care Analytics

Attendance: Full

Objectives met: Conducted primary research study including review of relevant literature, prepared research report

Deliverables: Internship Report on "The Study on usage of Mobile Health Technology application for early screening and detection of cancer in India"

Strengths: Sincere, committed, good technical knowledge and grasp in research

Suggestions for Improvement: –

Signature of the Officer-in-Charge (Internship)

Dr. Rupsa Banerjee
Date: 22/7/2025
Place: New Delhi

Dr. Laxmi Singh ST report

ORIGINALITY REPORT

8%	5%	3%	3%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	www.barristery.in Internet Source	<1%
2	www.researchgate.net Internet Source	<1%
3	Submitted to Texas Woman's University Student Paper	<1%
4	Radhika Chigurupati, Suchitra Bajaj, Sanjana Patrick, Moni A Kuriakose et al. "A Novel Mobile Health Approach to Early Diagnosis of Oral Cancer", The Journal of Contemporary Dental Practice, 2018 Publication	<1%
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