EXPLORING THE NEXUS OF TECHNOLOGY AND SOCIAL DETERMINANTS OF HEALTH OF THE OLDER PEOPLE: A QUALITATIVE STUDY

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Abstract

Understanding the interplay between technology and social determinants of health becomes paramount for improving overall well-being. This qualitative study investigated the multifaceted relationship between technology and the social determinants of health in older people. The in-depth interview guide was used to gather a holistic understanding of the influence of technology on older people. The qualitative study offers insights into personal experiences, shedding light on the challenges and opportunities of technology that impact accessing the health care of older people. Using a Convenient sampling technique 30 older people were involved in this study. This research contributes to the discourse on aging and technology by offering an in-depth view of the intricate relationship between technology and social determinants of health in older people. The application of the unified theory of acceptance and use of technology theory aims to understand and predict how older people accept and use technology. The findings underscore the importance of tailored interventions that bridge the digital divide, ensuring equitable access to technology resources and promoting digital literacy. Ultimately, this study informs policy formulation and intervention strategies that aim to enhance the health and quality of life of older people in an increasingly technology-driven society.

Keywords: Technology, Social Determinants, Health, Older People.

INTRODUCTION

As the global population continues to age, there is a growing imperative to find innovative solutions that not only extend lifespans but also enhance the quality of life for older people (National Research Council, 2001). In this regard, the nexus of technology and social determinants of health (SDOH) has become increasingly relevant in addressing the well-being and healthcare needs of older people.

Social determinants of health encompass a wide range of non-medical factors that influence an individual's health and well-being (WHO, 2023). These determinants include socioeconomic status, education, access to healthcare, social support networks, and community engagement. For older people, these factors can significantly impact their overall health, healthcare access, and their ability to age in place. Technology has the potential to play a crucial role in easing the special issues that older people confront concerning healthcare access for their overall well-being.

When considering older people, technological advancements can have both challenges and offer opportunities. Challenges faced by older people based on healthcare are healthcare access disparities, social isolation and loneliness, aging-in-place challenges, limited access to health information, privacy and ethical concerns, cost, and accessibility. The rapid advancement of technology, particularly in the fields of telemedicine, wearable devices, artificial intelligence, and the Internet of Things (IoT), has opened up new possibilities for addressing the unique health and social

needs of older people (Fabbrizio, 2023). This intersection between technology and SDOH has the potential to transform the way healthcare is delivered, and accessed by older people, ultimately improving their overall health and well-being. This exploration aims to delve into the various facets of the nexus between technology and social determinants of health in older people. This study will examine the challenges faced by older people related to healthcare access and how technology can catalyze positive change in these areas. Additionally, discuss the potential barriers and ethical considerations that must be navigated in the pursuit of integrating technology into older people's healthcare.

Navigating the complex landscape of healthcare for older people, it is essential to recognize that technology alone is not a panacea. It must be strategically applied in conjunction with an understanding of the social determinants of health to ensure that it genuinely improves the lives of older people. This exploration seeks to shed light on the opportunities and challenges in this dynamic and evolving field. The study emphasizes the need for a holistic approach that combines technological innovation with a deep understanding of the social factors that shape health outcomes in older people.

Figure 1: Concept of the study

REVIEW OF LITERATURE

The twenty-first century is characterized by increased digitization. As more and more routine services move online, 'offline' risks being left behind in an era of rapid digital innovation. This primarily affects older people, who are less technologically connected than youth who were born into the digital age (UNECE, 2021).

Gerontechnology plays an important role in delivering better care and a higher quality of life for older people and their loved ones; multidisciplinary research on the subject has increased in recent years (Huang, 2023). The number of older people (those 65 and over) who own a smartphone has climbed dramatically from 18% in 2013 to 61% by 2021 (Faverio, 2022). According to another study, the percentage of persons aged 65 and older who own a smartphone will rise from 53% to 61% by 2021. The figure is much higher among persons aged 65 to 74, at 71%, but drops to 43% in those beyond 75 (Pendelbury, 2021). As people live longer, technologies become more affordable, and broadband access rises, we may expect the prevalence of "plugged-in" older folks to continue rising (Kakulla, 2022). Technology in healthcare has taken numerous forms, including mobile health, health information technology, wearable devices, telehealth, and personalized medication (Food and Drug Administration, 2020). Older persons are eager to use digital technologies to better their mental health, but there are still barriers that developers need to overcome before this population can access them (Andrews et al, 2019). Given their age and reluctance to try new things, as well as their lack of trust in using modern technologies, older people may refuse to adopt them (Shahbazi, 2021). On the other side, the presence of these systems can aid in

monitoring and controlling their health. Throughout the COVID-19 pandemic, older persons quickly adopted healthcare technologies. Older adults are increasingly using telehealth, smartphone apps, and other digital health technologies to reduce barriers to care, maintain patient-provider communication, and promote disease self-management (Mace et al, 2022). Digital health offers a promising solution to improve medical outcomes and enhance the efficiency of healthcare for all individuals, including older adults (Buyl et al, 2020). The use of technologies by older people is complex, dynamic, and personal (Peek et al, 2019).

By achieving technology inclusion, can increase access, provide preventative and comprehensive care, and decrease healthcare costs for older people (Mace et al, 2022). On the other hand, Telemedicine interventions in managing chronic conditions like heart failure among older people, highlight the potential of technology to improve healthcare access (Bashi et al, 2017). There is a gap that none of the studies have explored about the interlink between the technology and social determinants of health. This study is to offer insights into the challenges and opportunities related to technology adoption based on SDOH and their impact on older people.

Statement of the Problem:

The aging population represents a significant and growing demographic globally, with older people facing a multitude of challenges related to their health and well-being. These challenges are intricately linked to social determinants of health (SDOH), including socioeconomic factors, access to healthcare, and social support networks. While technology has made remarkable strides in recent years, there is a pressing need to explore how it can effectively intersect with these SDOHs to address the unique healthcare needs of older people. The statement of the problem seeks to highlight key issues and gaps in this nexus:

Healthcare Access Disparities: Older people face disparities in accessing healthcare due to factors such as limited mobility, transportation difficulties, and financial constraints. These disparities can result in delayed or inadequate medical care, leading to adverse health outcomes.

Limited Access to Health Information: Access to accurate health information is crucial for self-management and making informed healthcare decisions. Many older people struggle to access or navigate digital health resources and information, leading to gaps in their understanding of their health conditions.

Cost and Accessibility: Access to healthcare technology may be limited by cost, leaving some older people without access to potentially beneficial innovations.

Social Isolation and Loneliness: Older people are at a higher risk of social isolation and loneliness, which can have detrimental effects on their mental and physical health. The lack of social interaction can lead to depression, anxiety, and a diminished sense of well-being.

Aging in Place Challenges: Many older people desire to age in place, remaining in their homes and communities as they grow older. However, this can be challenging due to physical limitations, safety concerns, and the need for comprehensive healthcare and support services.

Technology adoption Barriers: The adoption of technology among older people is not uniform. Some older individuals may have limited digital literacy or face cognitive or

physical barriers that hinder their ability to use technology effectively for healthcare purposes.

Privacy and Ethical Concerns: The use of technology in healthcare raises ethical and privacy concerns, particularly regarding the collection and sharing of personal health data. Ensuring the security and confidentiality of health information is paramount.

Efficacy and User-Centered Design: While there are numerous technological solutions aimed at improving older people's healthcare, their effectiveness and user-friendliness may vary. It is essential to assess the real-world impact of these technologies and ensure they are designed with the older people's unique needs in mind.

Addressing these problems requires a multidisciplinary approach that integrates technology with an understanding of the social determinants of health. It necessitates the development of user-centric, affordable, and accessible technological solutions that empower older people to manage their health effectively, reduce social isolation, and age in place safely. Moreover, it calls for a robust framework for data privacy and ethical considerations to protect vulnerable populations while harnessing the potential of technology to enhance the well-being of older people.

Need of the study:

The study on the nexus of technology and social determinants of health (SDOH) in older people is essential for several compelling reasons:

Aging Population: The global population is aging at an unprecedented rate. Understanding how technology can improve the health and well-being of older people is crucial to meeting the healthcare demands of this growing demographic.

Quality of Life: Enhancing the quality of life for older people is a fundamental societal goal. Technology has the potential to improve their physical and mental well-being, reducing the burden of age-related health issues.

Economic Impact: Improved healthcare for older people can result in cost savings for healthcare systems by preventing hospitalizations and emergency care. It can also contribute to the productivity of older individuals, enabling them to remain engaged in society.

Social Isolation: Loneliness and social isolation among older people have negative health implications. Technology-driven solutions can facilitate social connections and combat isolation, ultimately improving mental health outcomes.

Health Information Access: Access to accurate health information is critical for informed decision-making and self-care. Technology can provide older people with reliable health information, empowering them to take control of their health.

Healthcare Disparities: Older individuals often face disparities in healthcare access and outcomes. This study can shed light on how technology can help bridge these disparities and provide equitable healthcare solutions.

Policy Development: Policymakers need evidence-based insights to formulate effective policies that promote the integration of technology in older people's healthcare. This study can inform policy decisions at local, national, and global levels.

Technology Adoption: Understanding the barriers and facilitators of technology adoption among older people is essential for designing user-friendly solutions and ensuring that technological innovations are accessible to all.

Ethical Considerations: The ethical use of technology in healthcare is paramount. This study can help identify ethical challenges and establish guidelines for responsible technology implementation in older people's care.

Innovation and Research: As technology continues to advance, ongoing research is necessary to explore emerging technologies and their potential applications in older people's healthcare.

In summary, this study is needed to improve the health and well-being of older people, address healthcare disparities, promote social inclusion, and ensure that technological innovations align with the values of equity, accessibility, and ethical responsibility. It can inform healthcare practices, policies, and innovations to better meet the unique needs of the aging population.

Objectives:

1) To know the socio-demographic profile of older people.

2) To understand the level of digital usage and adoption of technology based on their social determinants of health among older people.

3) To give suggestions based on the findings to improve healthcare access and well-being based on the technology and social determinants of older people.

RESEARCH METHODOLOGY

Field of Study: Chennai

Research design: A descriptive research design was used in this study.

Sample Size: The researcher interviewed 30 older people in the Chennai district of Tamilnadu, India.

Sample Technique: Non-probability Convenient sampling method was used.

Approach: The methodology of this study is a qualitative case study analysis of 30 respondents based on their adoption of the technology and the social determinants of their health. An in-depth Interview guide was used for data collection.

Data source: Primary data source was collected directly from the respondents and the Secondary source of data was collected from UN reports, Research articles, Newspaper articles, and Government reports related to older people, aging, and technology.

Theoretical Framework of the study:

UTAUT in Technology Adoption Analysis:

The Unified Theory of Acceptance and Use of Technology (UTAUT) is a model that aims to understand and predict how individuals accept and use technology. It was developed by four researchers: Venkatesh, Morris, Davis, and Davis, in 2003, by integrating eight prominent models of technology acceptance (Marikyan et al, 2023).

The UTAUT model suggests that the intention to use technology is influenced by four key factors:
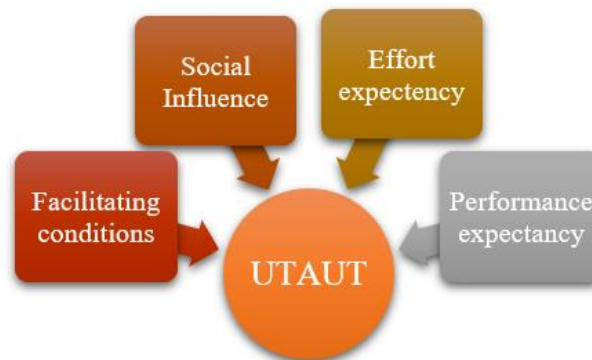
Figure 2: Framework of UTAUT

*Performance Expectancy***:** This refers to the degree to which older people believe that using a particular technology will help enhance their tasks easier.

> *"Using a Smartphone it is very helpful for me to do my work (Paying EB Bill, Buying vegetables, etc…) more easily".*

Effort Expectancy: It refers to the degree of ease associated with the use of the technology. If a technology is perceived as easy to use, it is more likely to be accepted and adopted.

> *"A few older people said they are not able to use any kind of technology and some said they are affordable but don't have digital literacy to use it. Few older people were accepted and adopted to use the technology".*

Social Influence: This represents the influence of societal factors, such as subjective norms, social factors, and social support, on an older people decision to use a particular technology.

> *"My family members are far from me but through the technology we are close and I am getting support from my family as well as my surroundings.*

Facilitating Conditions: This factor refers to the extent to which older people believe that a community and family and technical infrastructure exists to support the use of the technology.

The model further suggests that these factors are influenced by certain individual characteristics such as gender, age, experience, and voluntariness of use of older people.

> *"Some older people voluntarily willing to learn how to use technology irrespective of their age and gender".*

FINDINGS

Potential findings that could result from the study:

*Digital Divide Persists***:** 10 out of 30 older people face challenges in adopting and using technology due to limited digital literacy and access to devices and the internet. This

finding underscores the importance of addressing the digital divide to ensure equitable access to healthcare resources.

> *"I'm a retired professor, so technology wasn't something I was very used to. I've learned how to use technology for telemedicine in recent years. I'm nearing 75, and my wife is 70. My kids were living abroad. I'm not sure how my wife will handle everything once I pass away because she lacks knowledge of technology".*

*Social Isolation is Prevalent***:** social isolation and loneliness are widespread among older people (Donovan, 2020). 15 out of 30 older people said that technology often serves as a bridge to connect with family, friends, and support networks. This highlights the role of technology in combating social isolation.

> *"My husband passed away during COVID-19 when our children were living abroad. Moving on from my husband's loss after his death was tough for me. Using technology to talk to my children helped me overcome my feelings of loneliness during that period when I felt extremely alone. I used to visit surrounding temples with my family and friends".*

*Privacy Concerns are Paramount***:** 25 out of 30 older people express significant concerns about the privacy and security of their health data when using technology. These concerns can influence their willingness to engage with digital health solutions.

> *"I'm more worried about the security and privacy of my health data, even though I know how to use technology and am hesitant about doing so because I worry that someone might use my data".*

*Telehealth Facilitates Access***:** 10 out of 30 older people report positive experiences with telehealth services, particularly during the COVID-19 pandemic. Telehealth can improve healthcare access for older people individuals, especially those with mobility issues.

> *"I suffer from spine and leg problems, and it got worse for me during COVID-19. Telehealth services were really helpful to me at that time and now I'm using the telehealth services for my healthcare access and I'm teaching everyone to use telehealth service".*

Support Networks Matter: 27 out of 30 older people emphasize the importance of having a support system, including family members or caregivers, to assist them in using technology for healthcare purposes.

> *"My family is my support system, and my grandson taught me how to use mobile phones for emergencies and to use technology for medical needs".*

Digital Health Information Seeking: 8 out of 30 older people actively seek health information online, highlighting the importance of reliable and accessible digital health resources.

> *"I can get the health information online through the technology. It is beneficial for me to keep myself informed on the health issues that are currently plaguing the world and how to protect ourselves, our families, and friends from them".*

*Smart Homes Improve Aging in Place***:** 15 out of 30 older people reveal that smart home technologies, such as fall detection systems and home monitoring, enhance the safety and comfort of aging in place.

> *"We installed a home surveillance system to increase our safety and comfort in our house".*

Emotional Impact of Technology: 19 out of 30 older people expressed their emotional benefits, such as increased confidence and reduced anxiety, when using technology for healthcare and social connections.

> *"There is no one to help me or support me emotionally. So through technology I got some social connections. It helped me a lot and had a good relationship with them".*

Barriers to Technology adoption: 15 out of 30 older people felt barriers such as cost, complex user interfaces, and concerns about technology replacing human interactions as factors limiting technology adoption among older people.

> *"Due to lack of financial support I can't buy a smart phone to access the technology as well as digital literacy is not that much familiar to me. My children were using but they didn't teach me how to access the technology for the healthcare needs".*

Ethical Dilemmas and Trust Issues: Older people raise ethical dilemmas related to the use of artificial intelligence in healthcare, and concerns about placing trust in technology for critical healthcare decisions.

> *"Despite how great technology is, I can't put complete faith in it to help me make important judgements".*

Desire for In-Person Care: Some participants may express a strong preference for in-person healthcare visits, indicating that technology should complement rather than replace traditional care models.

> *"Older people were more interested in home remedies and traditional care models than modern medicines".*

Findings shed light on the nuanced perspectives, experiences, and challenges that older people face when integrating technology into their healthcare and daily lives and many older people don't have access to the technology as well. They provide valuable insights for policymakers, healthcare providers, technologists, and researchers to develop more effective, ethical, and accessible technology solutions that address the unique needs of older people while considering the social determinants of health.

DISCUSSION

The intersection of technology and social determinants of health among older people is a topic of crucial importance, especially in the context of an aging global population and the increasing reliance on technology in various aspects of our lives. Addressing this intersection involves understanding the challenges and opportunities that arise when technology is employed to improve the health and well-being of older people, considering the influence of social determinants.

Access to Technology: One of the critical social determinants affecting older people is access to technology. Disparities in access, such as internet connectivity, digital literacy, and affordability of devices, can exacerbate existing health disparities. Bridging this gap is essential for ensuring that all older people can benefit from

technological advancements in healthcare, telemedicine, and digital health solutions (Schroeck et al, 2023).

Healthcare Accessibility: Technological advancements like telemedicine and remote patient monitoring can significantly improve healthcare accessibility for older people, especially those living in remote areas or with limited mobility. By reducing the need for physical travel to healthcare facilities, these technologies can enhance older people's access to timely and quality care, thereby addressing certain social determinants, such as geographic location and transportation limitations (Haleem et al, 2021).

Social Isolation and Loneliness: Technology can also play a crucial role in mitigating social isolation and loneliness among older people. Virtual communication tools, social media platforms, and teleconferencing technologies can help maintain social connections and support networks, thereby positively impacting mental health and overall well-being (Balki et al, 2022).

Health Education and Empowerment: Technology can empower older people through access to health education and information. Digital platforms can provide resources for self-management of chronic conditions, preventive care, and healthy living. By enhancing health literacy and fostering a better understanding of healthcare practices, technology can contribute to improving health outcomes and reducing disparities resulting from differences in health knowledge and awareness (Mace et al, 2022).

Personalized Healthcare Solutions: Tailored and personalized healthcare solutions, such as wearable devices and remote monitoring tools, can help in the management of chronic diseases and the provision of individualized care plans. These technological advancements can address the unique health needs and challenges faced by older people, taking into account various social determinants, including income, education, and living conditions (Fabbrizio, 2023).

Ethical and Privacy Concerns: When integrating technology into healthcare for older people, it is crucial to address ethical considerations and privacy concerns. Safeguarding sensitive health data and ensuring that technology remains accessible and user-friendly, particularly for those with limited technological proficiency, is essential in promoting equitable and inclusive healthcare solutions (Naik 2022).

In conclusion, leveraging technology to address the social determinants of health among older people can significantly improve their overall quality of life and health outcomes. However, it is imperative to approach these interventions with a focus on equity, accessibility, and user-centered design, considering the unique needs and challenges faced by older people.

SUGGESTION

Interdisciplinary Collaboration: Encourage collaboration between healthcare professionals, technologists, social workers, and policymakers to develop holistic solutions that consider both the technological and social aspects of older people's healthcare.

User-Centered Design: Prioritize user-friendly design principles when developing healthcare technologies for older people. Engage older adults in the design process to ensure that solutions meet their specific needs and preferences.

Digital Literacy Programs: Implement programs to enhance digital literacy among older people, including training on using smartphones and other devices. These programs can empower older individuals to access healthcare information and services online.

Telehealth Expansion: Promote the expansion of telehealth services tailored to older people. This includes ensuring reimbursement policies support telehealth consultations and that older adults have access to the necessary technology and support for virtual visits.

Community-Based Initiatives: Develop community-based programs that use technology to connect older people with local resources, support networks, and social activities. This can combat social isolation and improve overall well-being.

Affordable Technology Solutions: Advocate for the development of affordable healthcare technologies that are accessible to older adults across different socioeconomic backgrounds.

*Health Data Security***:** Emphasize the importance of robust data security and privacy protections in healthcare technology. Ensure that older people's health information is safeguarded to build trust in digital health solutions.

Ethical Guidelines: Develop and adhere to ethical guidelines for the use of technology in older people's healthcare. These guidelines should address issues like consent, data sharing, and algorithmic bias.

Research Funding: Allocate research funding to investigate the effectiveness of various technological interventions on the health outcomes of older people. Longitudinal studies can provide valuable insights into the long-term impact of technology on older people's health.

Policy Advocacy: Advocate for policies that support the integration of technology into older people's healthcare, including incentives for the development of innovative solutions and regulatory frameworks that ensure quality and safety.

Telemonitoring and Chronic Disease Management: Invest in technologies for remote monitoring of chronic conditions, enabling healthcare providers to track and manage older people's health more effectively.

*Age-Friendly Smart Homes***:** Promote the development of age-friendly smart home technologies that enhance safety, comfort, and accessibility for the older people, allowing them to age in place.

*Public Awareness***:** Increase public awareness of the benefits of technology in older people healthcare and address misconceptions or fears related to technology adoption among older adults.

Caregiver Support: Recognize the role of caregivers in the care of older people and explore how technology can support caregivers in providing better care and reducing caregiver burden.

*International Collaboration***:** Foster international collaboration to share best practices, research findings, and innovative solutions for older people's healthcare across borders.

By implementing these suggestions and recommendations, stakeholders can work together to harness the potential of technology to improve the health and well-being of older people while addressing the social determinants of health that profoundly impact their lives. This multifaceted approach is essential to create a more equitable and technologically advanced healthcare landscape for older adults.

CONCLUSION

The nexus of technology and social determinants of health (SDOH) in older people represents a vital frontier in healthcare innovation. This exploration has illuminated the multifaceted nature of the issues at hand.

Older people confront disparities in healthcare access, social isolation, and the desire to age in place, all of which are intricately tied to their social determinants of health.

Technology can play a transformative role in mitigating these challenges by providing innovative solutions that enhance healthcare delivery, facilitate social connections, and support aging in place.

However, to realize the full potential of this intersection, it is essential to approach it with a thoughtful and holistic perspective. This involves user-centered design, digital literacy initiatives, ethical considerations, and a commitment to bridging the digital divide among older adults. Furthermore, the development and adoption of technology in older people's healthcare must align with principles of affordability, accessibility, and data security.

As move forward, it is crucial for stakeholders from healthcare, technology, policy, and academia to collaborate and advance research, development, and implementation efforts in this field.

Doing so can create a future where technology empowers older people to lead healthier, more connected lives, where social determinants of health are addressed comprehensively, and where aging is accompanied by a sense of dignity, independence, and fulfillment.

In essence, the nexus of technology and social determinants of health in older people holds immense promise to shape a more inclusive, compassionate, and technologically advanced healthcare landscape for one of society's most valuable demographics – our seniors.

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