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A Review of Design Implementation and Impact of Smart Cities in Smart Healthcare Delivery Systems

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ABSTRACT

The burden of the population in the country and the high increase of the World's population have significantly risen, which has pushed the traditional healthcare system into a measure of global problems. These systems lead to the need for a faster way of providing healthcare that brings people closer and is easier, while ensuring standardization. To address the traditional problems there is a necessity of developing smart cities with the help of smart technologies like artificial intelligence, cloud, etc.

Using the latest cutting-edge technology such as computing, big data analytics, block chain and more to make people's lives easier. In this review, the design and operation of smart healthcare infrastructure for the modern healthcare are discussed in detail. To achieve these, a narrative review methodology has been adopted, which includes the collection of various journals and Engaging in a proper review of scholars' work, conferences and published papers in the years 2018-2025 from A number of journals published by Google Scholar.

The findings of the study have revealed that the standard healthcare system can enhance the healthcare delivery technology with the help of the following: Real-time patient monitoring, detection of diagnosis, Remote diagnosis and treatments, standardization of diagnosis methods, Disease analysis, and emergency control systems. The study advances the knowledge in terms of understanding and achievable development, implementing, and actions in healthcare delivery to provide better solutions to problems, and exploring future opportunities related to Smart Healthcare Designation in a smart city.

Keywords: Smart City, Smart Healthcare Systems, Emergency Response Control, Digital Healthcare

1.0 INTRODUCTION

In the past few decades, the rate of increase in urban population has increased, and brought about a significance measure. Urban infrastructures, especially the health system. There are more than 50% of the world's population who reside in rural areas and it is estimated that this figure will continue to grow, to increase in the coming years. As cities become bigger, the population of traditional healthcare models will keep on shifting to the new demand care accessibility, efficiency and quality. To overcome these challenges, the concept of smart cities has to emerge and become an innovative approach that can integrate digital technology into management and public services. Smart cities keep all the information and communication technologies (ICTs) connected to enhance sustainability, resource utilization, and safeguard the quality of citizens' life (Omrany et al., 2024).

Recent published works have demonstrated how vital it is to incorporate digital health care delivery to overcome with issues of urbanization, population growth and healthcare needs (Mohammad Zadeh et al., 2023). In previous research, many applications of smart healthcare IoMT, AI, telehealth, etc. have been demonstrated as Cloud computing, telemedicine in smart hospitals.

Existing research will focus on issues in various fields. Not much focus has been shared on embedding these technologies into healthcare environments in the smart city. To review and analyze implementation process and impact of smart healthcare in smart city, there's a need of including specific aspects related to the Internet of Things (IoT), Artificial Intelligence (AI), Cloud Computing, Big Data Analytics, Electronic Health Records (EHR) and Telemedicine. The purpose of the review is to highlight challenges, development, benefits and emerging trends which have influenced the modern health care landscape. The study will add to the current knowledge body by tackling the comprehensive smart healthcare issue.

2.0 LITERATURE REVIEW

Previous research has explained several dimensions of smart healthcare delivery within smart cities. Studies on smart hospitals have examined the use of artificial intelligence systems for managing patients; the use of automated machines remains useful for their daily activities. Several researches on

telemedicine have highlighted the implications of using digital communication technologies to integrate healthcare professionals and patients across regional distances, this leads to reduced challenges and improved access to medical care. Another researcher has found that the Internet of Things in healthcare systems provides a framework that employs wearable sensors and electronic devices to support real-time monitoring of patients and their final diagnosis of chronic disease. Emergency response systems have considered a good focus regarding the use of real-time data, tracking, and new technologies to improve prompt response and coordinate emergency medical services within an urban environment (Tian et al., 2020; Mohammadzadeh et al., 2023).

The advancements of AI, in healthcare systems are a huge game-changer through their development of wireless, Internet of Things, the reduction of the challenges of communication technology, cloud computing and Sensor Wireless Networks (WSNs). A data collection procedure is now wirelessly connected to a sensor network, with cloud services, robotics and distributed automation now playing a part. Infra-structures, and analytical systems. With the help of health care monitoring and management systems, healthcare professionals were given new levels of capability to share, gather, Interpret, comprehend, and respond to patient's information. The enhancement has streamlined the processes of health-care services and also supported the goals of smart city development (Sohraby et al., 2020; Rawat et al., 2023).

The use of wireless sensor networks has been proposed to be breakthroughs in the field of healthcare services delivery, eliminating barriers. These include the cost of power Energy consumption, ensuring standard means of communication, network security, and service For network expansion and real world technological evaluations. The current research indicates that using a simulated environment for assessment may not be a true reflection of the practical situation difficulties in healthcare environments including hospitals and patients in hospitals with weak urban surveillance systems (Kourilehto et al., 2021).

The new systems of the production of new information and communication technologies are emerging and transforming the design of the city, enhancing the city with empowering activities, being environmentally friendly and improving the overall quality of landscapes.

As cities become connected to the state-of-the-art digital innovations, they develop into growth centers for economies, societies, and the environment. They are using technology to achieve their aims in their areas (Sharifi, 2020; Ahad et al., 2020).

A report by the Institute for Management Development (IMD) 2024 says that in cities that have set up clear regulations, Smart cities are known for their effectiveness and digital infrastructure which are beneficial to their cities and are recognized as prominent in the world. Academic research indicates that tech is not the answer to every problem and can't solve all the complex issues. People and the government's focus should be on approaching how technologies can serve as solutions to neglected social environments and the government's role in vital sustainable urban city progress (Allam & Dhunny, 2019; Yigitcanlar et al., 2019).

Real-time monitoring has gained importance in the implementation of smart cities in healthcare delivery systems, and Intelligence on transparent systems, Cloud data platforms, automation in waste management, surveillance networks, and significant fluctuations in the environment. These enhancements will help to resolve data accuracy, cyber security, privacy protection, and interoperability problems. (Habibzadeh et al., 2019; Ahad et al., 2020).

Thus, information and communication technologies (ICT) infrastructures and sensors are turning into strategic tools in modern cities not only for technological developments but also for the aim of promoting social, environmental and economic benefits (De Guimareas et al., 2020; Sharifi.,2020).

A number of reviews have revealed that smart city initiatives spread the use of the good sensors-based infrastructures. As with smart city projects, distributed sensor networks are chosen to manage environments, traffic controls and more. Meanwhile, numerous methods have been incorporated in health care environments, where sensors are constantly gathering data, Physiological and environmental data for patient care, disease surveillance, and resource management in healthcare (Rawat et al., 2023).

Healthcare monitoring systems using wearable sensors and wireless communications have also been explained, distant patient monitoring and the effective Zigbee based wireless sensor network controlling a robot. Patient in a remote area, which will showcase their capacity to be supervised in healthcare on a continuous basis.

There are some studies that have been done to assess Zigbee and IEEE 802.15.4 technologies as reliable solution for transfer of health data in the interior of a building. In power-critical environments, highlight their power energy efficiency for optimal use in smart healthcare environments, Unmanned Aerial Vehicles (UAVs) have been included in the wireless sensor network architectures (Chaari & Kamoun, 2020; Mraz et al., 2023).

In recent developments, Unmanned Aerial Vehicles (UAVs) can enhance the networks, create one data collection line and facilitate communication in medical facilities, and so on. Particularly in disaster response and emergency plans (Wang et al., 2020; Vera-Amaro et al., 2020; Erdelj et al., 2023). An association of other researchers says that the convergence of cloud technology in health care services and wireless sensor networks. (WSNs) enables the management, evaluation, analysis and storage of large databases. They are essential for control of distance for real time decisions, model predictions and advanced applications. The backbone of smart healthcare development in urban areas is healthcare services, which generate the bedrocks. The problems of interoperability, data privacy, cyber security, and communication effectiveness require continuous Research to guarantee long-term viability and security of healthcare delivery systems (Popescu et al., 2020; Khalifeh et al., 2019).

The present research reveals the group of Wireless Sensor Networks, cloud computing and Internet of Things are seen as having potential for improving healthcare in smart city contexts. Moreover, much investigation is needed to overcome application and implementation challenges to establish resilient, secure, and scalable healthcare delivery which can successfully contribute to the infrastructure of the future smart cities.

3.0 METHODOLOGY

The method used in this research is reviewing academic databases using the narrative method, by doing this, the researchers can look for implications in the academic databases by reading the articles that have been published in the academic journals.

To conduct comprehensive research, several databases were used, such as Scopus Index, Dimensions, Google Scholar, IEEE Xplore, and Web of Science.

These databases were chosen because they include peer-reviewed literature on healthcare informatics, smart buildings, and others, as well as being comprehensive. Applications for city technologies, the Internet of Things and artificial intelligence. The process involved using keywords in combination (Boolean) such as smart hospitals infrastructure, artificial intelligence in healthcare, telemedicine, smart cities, emergency response control systems, healthcare data analysis, and urban healthcare systems.

In addition, it was done to ensure that the methods used to capture the emerging concepts and recent technological developments were conducted. The relevance and quality of the literature review related to Health Care, The inclusion and exclusion methods were used, the conference papers published from 2019 to 2025 were selected.

The review includes peer-reviewed journal articles, review papers and high quality books. These studies include smart cities and healthcare applications, telemedicine in cities, smart hospitals and The Internet of Medical Things (IoMT), for healthcare delivery systems. Records of publications not related to healthcare systems, duplicate records, non-English articles, and local reviews were excluded.

A total of 128 journals were selected, 5 data bases including the Google scholar, Scopus indexes, Web of Science, IEEE Xplore and Direct Science. Out of 123, 23 were ruled out as duplicates and 105 were selected based on title, body of work and abstract. The 47 articles, which did not relate to healthcare or smart cities were subsequently deleted from the review after a successful selection process. 58 articles used at the level of selection, 15 were used for process evaluation and to assess suitability for healthcare delivery systems.

An additional 22 studies were excluded due to insufficient quality of the studies post application of inclusion and exclusion criteria. Lack of relevance, lack of empirical evidence or lack of discussion about health care applications in smart city context. Ultimately, 36 studies were chosen for in-depth analysis and synthesis**.**

Table 1.

Stage of Review	Number of Articles
Records identified through journal searching	128
Duplicate records removed	23
Records screened	105
Records excluded after title and abstract screening	47
Full-text articles assessed for eligibility	58
Full-text articles excluded	22
Studies included in the final review	36

Furthermore, preference was given to studies published in reputable peer-reviewed journals and conference proceedings that contributed empirical results, systematic reviews, implementation frameworks or hands-on experience in implementing healthcare technologies.

This ensured that the review was based on credible and up to date evidence that has developed since the last review. After the screening process, the selected studies were analyzed and synthesized based on the main thematic areas, including Smart Healthcare Infrastructure, Smart Hospitals, and Emergency Response Systems, Health Centered Urban Planning, and implementation challenges.

The review does not just talk about technologies, but it compares the results of various studies, looks for any common threads, and provides a summary of the technologies in one place. Identifies points of agreement and disagreement, and identifies current gaps in knowledge that need to be explored.

4.0 SMART HEALTH CARE INRASTRUCTURE

Smart healthcare infrastructure, which started with digital health projects, is now developing into a networked infrastructure that includes Artificial Intelligence (AI), Internet of Medical Things (IoMT) devices, Cloud computing, Edge computing, and advanced data analytics.

The goal of smart healthcare infrastructures is not only technological but seems to be on the whole to maintain health, according to recent literature. Modernization is not the creation of responsive healthcare systems able to provide timely, personalized and efficient services.

Mohammadzadeh et al. (2023) argued that the Internet of Medical Things (IoMT) has become one of the most influential foundations of smart healthcare because it enables continuous monitoring of patients through interconnected medical devices and wearable sensors. Their review demonstrated that Internet of Medical Things (IoMT) technologies improve healthcare accessibility by allowing clinicians to monitor patient conditions, remotely, reducing unnecessary hospital visits while enhancing chronic disease management. In a similar vein, research by Alsabah et al. (2025) demonstrated that Internet of Things (IoT) sensor networks substantially enhance the gathering of healthcare data and facilitate immediate clinical decisions by enabling continuous physiological monitoring.

While both (Mohammadzadeh et al., 2023: Alsabah et al., 2025) acknowledge the advantages of the Internet of Medical Things (IoMT), their studies diverge on which aspects of implementation should be prioritized. Mohammadzadeh et al. (2023) placed emphasis on patient-focused healthcare delivery and remote patient observation, whereas underscored improvements in system efficiency and the better allocation of healthcare resources as the key benefits

These suggest that there is a discrepancy between researchers in their answer to the challenges, which makes them have to find out how to approach the challenges, investing in the Health Care industry sectors. They can lead to better results in boosting activities within healthcare system delivery.

Application of Artificial Intelligence will help in predictive analysis, automatic decision making, disease detection, diagnosis and healthcare management. Their findings also indicate that the Artificial Intelligence in healthcare systems will soon be undergoing a transformation as it enables the processing of huge quantities of data. By facilitating early diagnosis and better treatment planning, datasets contribute to better care for children. Datasets support better care for children by facilitating early diagnosis and better treatment planning. On the other hand, the recent research on AI applications in smart city also plays an important role in optimizing services by converting unprocessed data to processed data for healthcare professionals, and transparency and accountability are still in the spotlight.

According to current researchers, the application of artificial intelligence models is a system of black boxes, ensuring that health care has no sense of its goals.

The application of artificial intelligence models is a system of black boxes, which is why, according to current researchers, health care has no idea about its goals.

Technology professionals are familiar with how technology issues can be solved .Restrictions can constrain challenges amongst health care professionals and influence solution developments for clinical decisions, and particularly in the medical environment where there is a risk of infection.

AI has emerged as a hot topic for research in the healthcare industry. The use of edge and cloud computing technologies is key and there is a benefit for smart healthcare developments. Cloud-based system offers scalable storage and computation power to handle the enormous amount of data Generated by Internet of Medical Things.

Ghadi et al., (2024) state that dependency on cloud architectures alone might result in latency problems which can affect real-time applications. To address this challenges, numerous researchers suggest introducing edge computing to health care systems, Give greater flexibility for data processing closer to the source before being stored in a central cloud platform.

This combined approach has been demonstrated to enhance response times and alleviate network congestion. A consistent theme in recent literature is the need for interoperability.

Omrany et al., (2024) found that fragmented healthcare information systems still hinder the effectiveness of smart city initiatives, despite significant technological advancements. In a similar vein, extensive reviews of smart city initiatives have highlighted the enduring challenges of interoperability, cyber security, and data governance in effectively incorporating healthcare technologies into urban settings. While there is a general agreement among researchers about the critical importance of interoperability, there is still a lack of consensus on the best standards and governance frameworks required for smooth information exchange between healthcare platforms. Recent research indicates that smart healthcare systems are most effective when various technologies work together as an integrated ecosystem instead of functioning as separate solutions. Mohammadzadeh et al., (2023) underscore the importance of the Internet of Medical Things (IoMT) in improving patient-centered healthcare delivery, while Gao et al., (2024) contend that Artificial Intelligence (AI) offers the necessary analytical tools to convert health data into practical clinical insights. Similarly, Ghadi et al., (2024) demonstrate that cloud and edge computing technologies support the storage, processing, and timely transmission of healthcare information.

These findings ensure an agreement that merging technologies is vital for achieving efficient and responsive healthcare delivery systems, some researchers are still to redefine the technological elements that deserve priority care, emphasizing on Data analysis, efficiency of healthcare systems, and data quality patient monitoring systems and more (Oueida et al., 2019).

The systems are based on various types of smart city infrastructure and the importance of equitable implementation of smart systems (Otoom et al., 2020).

Monitoring community is an important aspect of effective technologies including sensors in the Internet of Things and data analysis. Intervention and effective results in healthcare systems, health support, early diagnosis, correct documentation Data safeguard and security maintain the individual's privacy.

Data governance and privacy rules must be designed and regulations that cover ethical and regulatory issues, such as differences, transparency and accountability, are essential (Istepanian & Alanzi, 2020).

The establishment of telemedicine and distance virtual care is an important component in the development of smart cities Specialized in smart healthcare innovations. As the world faced the challenge of COVID-19 in the year 2019, digital health technologies were called upon to play a vital role in helping to integrate them into the world.

By adopting these innovations, smart cities can play an important role in healthcare systems and offer services that are more available and focused on the health care sectors (Sahatiya & Singh, 2023).

Healthcare professionals, patients and clients, government agencies and software developers must be involved in this Nominations of smart city projects related to infrastructure with the needs and values of the community (Johson et al., 2020; Nikita's et al., 2020, Neffati et al., 2021).

Additionally, a multidisciplinary approach that evaluates technical feasibility, social impact, economic viability, and environmental sustainability is critical (Cugurullo, F. 2020). Through collaboration between various stakeholders, smart cities can create healthcare solutions that are both innovative and effective, addressing the distinct requirements and aspirations of their residents. The current literature shows strong reasons regarding the integration and implications of smart healthcare developments, consistently highlighting achievements, access, operational effectiveness, emergency patient monitoring and control, and clinical decision-making.

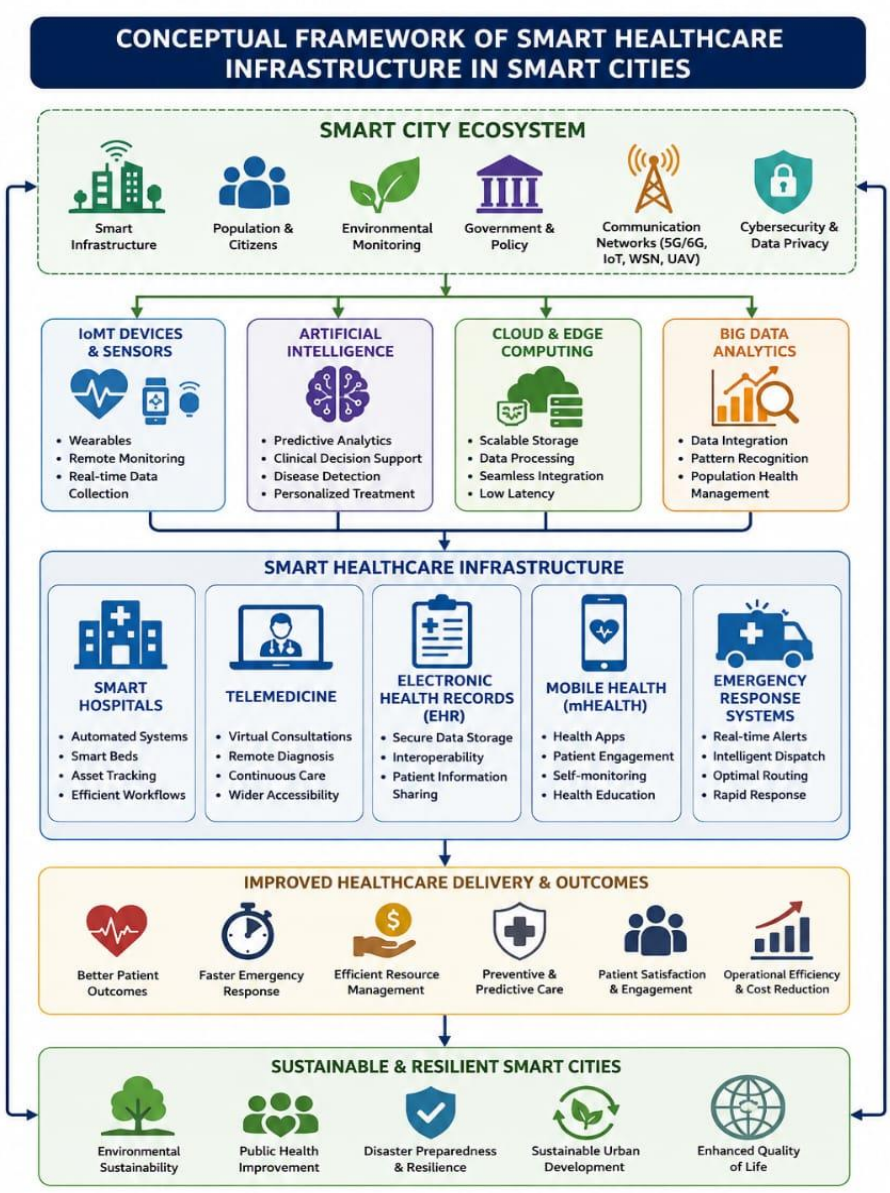
Challenges regarding interoperability, cyber security, ethical use of artificial intelligence, privacy safeguards, and long-term sustainability become serious problems during the implementation of these systems. These observations show that success does not simply rely on technological progress but also on the establishment of solid government control of the projects that can facilitate and implement healthcare systems.

4.1 SMART HOSPITALS

The application of smart healthcare in smart cities composed of smart hospitals in the context of implementation and development. Current researchers state that smart hospitals in healthcare facilities integrate technologies like AI, Internet of Medical Things (IoMT), robotics, cloud computing, big data analytics, and digital communication to improve healthcare delivery operations and patients' experiences. Compared to traditional systems, smart hospitals employ interconnected systems that allow real-time management control and automated clinical diagnostic decisions. Several studies highlight the strong advantages of implementing smart hospitals. Mohammadzadeh et al., (2023) note that these facilities enhance patient care through constant monitoring, the reduction of medical errors, and quicker clinical responses. Likewise, Tian et al., (2020) discovered that digital health technologies improve access to healthcare, increase diagnostic accuracy, and lead to more efficient use of resources.

Figure 1

illustrates the connections between the key technological elements of smart healthcare infrastructure within smart city settings, showcasing how Internet of Things (IoT) Devices, Artificial Intelligence (AI), Cloud and Edge Computing Technologies Support Smart Hospitals, Telemedicine Services, Electronic Health Records (EHR), Mobile Health Applications, and Emergency Response Systems. Collectively, these technologies contribute to improved healthcare delivery, operational efficiency, and sustainable urban healthcare development.



Source: Developed by the Author based on the reviewed literature (Abdel-Basset *et al.*, 2020; Aceto *et al.*, 2020; Tian *et al.*, 2020; Mohammadzadeh *et al.*, 2023; Alsabah *et al.*, 2025; Khatib *et al.*, 2024; El-deep *et al.*, 2025).

Figure 1. Conceptual Framework of Smart Healthcare Infrastructure within Smart City Ecosystems

Source: Developed by the Author based on the reviewed literature (Abdel-Basset et al., 2020; Aceto et al., 2020; Tian et al., 2020; Mohammadzadeh et al., 2023; Alsabah et al., 2025).

The general results of the review indicate that smart hospitals in smart healthcare delivery have the potential to improve clinical diagnostics outcomes and development efficiency. There is a different view among researchers regarding the key factors that make smart hospitals more significantly advanced through technological innovations such as Artificial Intelligence, use of automated machines, while others argue that aspects like organizational readiness, lack of staff training, leadership control, and effective change management are equally crucial for successful implementation. Relying solely on technological innovation may not lead to better results in healthcare delivery unless there are corresponding developments by the government and human resources. Some common problems include limitations in interoperability, lack of patient privacy, high implementation costs, cyber security risks, and differing perspectives on the reasons for changes within the environment. Hameed et al., (2024) observed that the growing dependence on interconnected healthcare systems puts hospitals at risk of cyber threats, which could undermine patient safety and the trust in healthcare institutions.

5.0 EMERGENCY RESPONSE SYSTEMS IN SMART CITIES

Emergency Response Systems (ERS) have become an essential component of smart healthcare ecosystems because they connect healthcare services with transportation, communication, and public safety infrastructures. Recent studies suggest that the effectiveness of emergency medical care depends not only on hospital readiness but also on the ability of cities to detect incidents rapidly, coordinate resources efficiently, and minimize delays during patient

transportation. Consequently, researchers have increasingly examined how artificial intelligence, Internet of Things (IoT) devices, intelligent transportation systems, and real-time analytics can improve emergency response performance. Costa, D. G. (2025) observed that smart city emergency management systems are evolving from traditional dispatch-based models toward integrated digital ecosystems capable of supporting real-time situational awareness. Their review found that connected sensors, surveillance systems, mobile applications, and communication platforms collectively enhance incident detection and response coordination. Echoing this sentiment, Costa, D. G. (2025). Found that emergency response systems leveraging the Internet of Things (IoT) substantially enhance the exchange of information among emergency responders, medical institutions, and municipal governments.

When planning the emergency routes and preparing for disasters using the Artificial Intelligence technology, efficiency is achieved, Integrated into the emergency response becomes a major key factor in healthcare systems. The researchers demonstrate that the data and AI algorithms are accurate based on the systems for many intensive In the event of an emergency, the data could be fed in and compromised or it may be interrupted. The current documentation also indicates how emergency response systems contribute to building urban city resilience.

Healthcare professionals' collaborations, departments of transportation, public safety organizations and the presence of smart systems is what makes them this way. Cities are able to create and harmonize protocols providing full support for disaster management and public safety.

During implementation of such systems, especially in developing countries, the lack of empirical data is a challenge. Countries where technological infrastructure and institutional capabilities may be quite different from those of developed countries. Finally, future work should concentrate on evaluation and analysis of outcomes of real world technological implementation at the end.

6.0 URBAN PLANNING ON NEW DEVELOPMENT AND FUTURE PATHS OF HEALTH CARE

A new awareness of the relationship between urban planning and public health has been introduced. The key factors of conventional urban planning are land use, transport and infrastructure, and modern urban planning methods introduce a See health as an essential component of higher order sustainable urban development.

Recent studies suggest that digital technologies enables cities to monitor environmental conditions, detect health risks, and more. Later develop precautions that can be used in urban settings to encourage health in healthcare settings. Researchers also analyzed how the smart city technologies and healthy sensors are used, and concluded that machine learning applications, there have been more and more efforts to solve urban healthcare problems using geographic information systems and web based platforms.

Their research demonstrates that smart technologies can help with the management of the environment, monitoring of disease, planning for healthcare, and more citizen involvement and engagement. The use of these technologies provides city authorities with an opportunity to develop evidence-based policies that will improve the outcomes of their populations. Emphasize the role of environmental monitoring in urban planning and new structures for pathways in the future.

The smart sensor can measure the air quality, humidity, temperature and noise pollution, and give us much information, concerning the environmental aspects of health care delivery systems.

Some studies show how data streams can be used to inform urban planning, to identify high risk areas and to plan in a way that is able to reduce environmental damages, Technologies are supposed to be centered on the functions of digital platforms and data analysis.

This approach also emphasizes the human aspect with a focus on community participation and social integration, and government policies. Technological solutions have become an integral part of smart city analysis, and their efficacy for urban health initiatives is not always a given Innovations in new urban development planning approaches.

However, even more advanced technologic systems may be inadequate to effectively address issues because of public inaction, if the public becomes inactive. Even more sophisticated technologic systems may fail to make a difference if the public remains inactive.

A major strength of block chain technologies is its ability to improve data integrity and facilitate data sharing in Electronic Health Records. Data tracking, securing and accessing patients.

The study by (Aceto et al., 2020) is recorded in the literature, indicates that block chain technology in healthcare systems can enable secure sharing of information among medical professionals, thereby lowering the likelihood of data breaches and unauthorized alterations

Khalifeh et al. (2019) was found that by pairing block chain and cloud-based healthcare solutions, the efficacy of the health IT solutions can be improved in data security and instilling trust in digital health services.

Equity and accessibility are important issues when it comes to technology for smart cities; they provide some opportunities to improve healthcare delivery access. Distances in availability of digital healthcare infrastructure may limit the capabilities with respect to healthcare inequalities. The group of people using the Internet experiences problems with using the services, low digital literacy and low level of services Limited access to health care options due to costs.

Scientists have also been advocating for inclusive planning approaches that can combine technology advancements with social equity and goals. The development of smart healthcare in smart city is facing many challenges, such as the social and technical challenges.

7.0 SOCIAL AND TECHNICAL CHALLENGES

Some of the challenges faced by the development of smart healthcare in smart city Technologies, different researchers have identified the challenges and significance of these systems.

Most of the researchers conclude that technological advancements by themselves are not enough to ensure the successful Application of health care transformation. It is essential to work with technology, organization, rules, regulatory guidelines and humans for forming the success of systems implementation.

Healthcare systems often employ a range of technologies from different manufacturers that follow conflicts and standards, concurrently, the sharing of information between hospitals, emergency services, healthcare professionals and smart city platforms continues to become difficult.

Recent analyses have always indicated that lack of interoperability basics turns into a problem in establishing Smart Healthcare Environments of a comprehensive nature. The implementation of systems is of great significance, especially in the field of cyber security and privacy. Hameed et al. (2024) observed that healthcare institutions face heightened susceptibility to cyber threats due to their reliance on interconnected digital infrastructures. A comprehensive review indicates that data leakages, ransomware incidents, and unauthorized access to patients' health records cause a substantial risk to patients' well-being and the integrity of institutional trust. Several issues have been noted in research focusing on the use of the Internet of Medical Things and cloud healthcare systems; technical problems have been identified as major organizational and environmental obstacles. Internet of Things implementation in healthcare highlights several elements important for successful deployment: adequate training, leadership backing, and prevailing organizational culture will engage all involved parties. These findings bring a solution in healthcare innovations and are seen as a socio-technical transformation of healthcare delivery.

AI is a promising and powerful technology that could be used to improve health care decision-making; a number of scholars still study algorithmic prejudice, responsibility, and equitable clarity.

Population can cause inequities among different population groups, AI models that are trained from data can be a contributor to exacerbating current health disparities.

The differences in academic champions' strong regulation and application of AI frameworks can be attributed to their differing levels of academic control and enforcement of artificial intelligence. Their reasons, for being viable and removing barriers, particularly in the developing world. While implementing advanced healthcare delivery infrastructure, significant investments are needed for the digital network infrastructure, cyber security, and smart infrastructure.

Security, cloud computing, sensor technology and resources development, There have been a number of studies that have repeatedly documented long-term benefits, but there is a less robust amount of evidence for cost, identify key areas to be explored further.

7.1 KEY FINDINGS

Literature that has been studied in this research indicates that smart healthcare infrastructure in healthcare delivery is a critical element. The adoption of technologies like telemedicine, big data analytics, artificial intelligence, cloud, etc. appear to be several findings that indicate integration of such technologies into healthcare.

For the access to patients' healthcare, patients' monitoring, the use of computing and mobile health technologies has had a significant impact. Efficiency, clinical decision making, and Technology must be put at the service of healthcare professionals to provide them with more responsive, data-driven and patient-focused services, in line with sustainable city development goals. Another review showed that smart hospitals are progressively implementing digital technologies to improve the quality of care, Maximize resources and automate clinical decision support and enhance patient experience.

Additionally, the Emergency Response systems in a Smart city can enhance real time data collection, Intelligent Transportation systems, and environmental monitoring systems and developing good network communication which enables the faster and more efficient provision of emergency medical services.

There are a number of issues that are consistently identified as challenges in implementation, such as the lack of sufficient support for effective implementation deployment of smart healthcare systems, such as privacy issues, high cost of implementation, cyber security threats, complex Organizational readiness and regulations.

Others continue to worry about issues of transparency, accountability and ethical issues of AI. Overall, the studies reviewed indicate that the successful future of smart healthcare systems will rely not just on technological advancements, but also on strong governance structures, collaboration among stakeholders, supportive policies, workforce training, and the creation of secure, interoperable healthcare ecosystems that can adapt to the changing needs of smart cities

8.0 RESEARCH GAP AND FUTURE RESEARCH DIRECTIONS

Literature review results from this study show that there are still gaps and there are directions for further research, Advancements in the use of Artificial Intelligence, cloud computing, Internet of Medical Things, telemedicine, smart devices, and so on are all vital. Care delivery systems, advanced analysis in healthcare, hospitals, there are still significant deficits in knowledge, existing research is on the technological aspects alone, not on the examination Consider them as a components of a larger Smart health system.

Several studies point out the significance of the applications of Artificial Intelligence (AI) based decision support, but the Internet of Medical Things (IoMT) is still undervalued. The internet of medical things (IoMT) is underrated while the importance of applications of Artificial Intelligence (AI) based decision support has been emphasized by several studies.

Things that enable patient monitoring, and cloud based healthcare services, little has been investigated about how well they are being effective these technologies are embedded in a holistic smart city healthcare designation.

There is little evidence of large scale system integration and cross-platform interoperability, which is a concern, Current research distribution (geographical).Technologies in more advanced regions are at the heart of several research studies, especially in Europe, North America and certain countries regions of Asia.

As on one hand there has been little focus on smart healthcare system implementation in developing countries, where factors such as digital readiness, regulatory capacities, healthcare systems and finances vary designations. Some of these differences impede the transfer of findings to socio-economic contexts and a few other literature sources highlight a lack of long-term empirical assessments.

Recent research consistently shows that interoperability is one of the challenges in healthcare, they have short- and long-term effects on operational efficiency, access to healthcare, data management and others.

Researchers conclude that there is a need for seamless communication between health care settings. A lacks of practical implementation models is generally a challenge, they also emphasize the need for smooth communication among healthcare professionals, the provision of available medical Information systems and devices. Future research directions should be towards developing a comprehensive smart healthcare system that can enhance artificial intelligence based, Algorithms, decision making, cyber security, privacy protection, transparency and the use of digital technologies in real life contexts.

More focus should be on longitudinal studies to facilitate comparisons of the analysis results between developed and developing countries. Providing good economic assessments, AI models, and healthcare cyber security strategies can be centered within government frameworks.

Finally, these issues will help to reach a better understanding of the role smart health systems can play in overcoming the challenges Contribute to the sustainability, effectiveness and inclusiveness of healthcare delivery in future smart cities.

9.0 CONTRIBUTION

This review significantly contributes to the expansion of knowledge based on Smart healthcare designation, Implementation and impact on the context of Smart cities. A good overview of the three categories of these contributions, practical, academic and policy, is provided.

9.1 ACADEMIC AND INSTITUTIONAL CONTRIBUTIONS

Academic contributions provide an overview of the current literature in this review. Relevant to healthcare technology environments to increase value adding in the implementation and development. In contrast to many earlier studies that tend to focus on specific technologies, this review consolidates information related to Artificial Intelligence (AI), the Internet of Medical Things (IoMT), Cloud Computing, Edge Computing, Telemedicine, Smart Hospitals, Emergency Response Systems, and health-oriented urban planning under a unified analytical framework. Also enhanced the current literature study by differencing between several results in various studies, bringing out the similarities and differences, highlighting various themes in a variety of research contexts. It also identified important knowledge gaps and the integration of research opportunities which can be used as guidance to future Scholars who are researching Smart healthcare systems in digital healthcare infrastructures.

9.2 PRACTICAL CONTRIBUTIONS

This review, on the practical side, offers important insights for healthcare professionals, for effective planning of smart healthcare, administrators, program developers, and environmental technologies planners are involved. They emphasize the importance of digital technologies in improving healthcare access for patients and clients, real-time Monitoring and control, emergency response coordination, diagnostic decision making and operational effectiveness.

Taking care of these challenges can assist governments and stakeholders in the formulation of new and more effective strategies for implementation and sustainability of smart healthcare developments.

9.3 POLICY CONTRIBUTIONS

This review offers evidence that can help policy makers and regulators develop new Frameworks that can enhance the effectiveness and implementation of smart healthcare technologies. The results confirm the need for standards interoperability, data governance, cyber security rules and more Regulations, ethical policies for using Artificial Intelligence (AI) and investment in healthcare delivery.

The review also emphasizes the importance of provisioning new policies that ensure fair access to digital healthcare services, In particular in developing and underdeveloped countries. To meet these policy challenges, the governments and public institutions should make these environments more conducive to supporting and securing the needs of patients in the context of smart cities' healthcare systems.

10.0 CONCLUSION

Healthcare infrastructure is one of the technological developments that has been key to the development of contemporary smart cities. The literature shows the use of artificial intelligence, cloud computing, Internet of Medical Things and edge computing in smart healthcare. The literature indicates that AI, cloud computing, IoMT, and edge computing are some of the technologies that are being used in smart healthcare, the world of computing, advanced communication technologies, and digital health platforms. The link of healthcare delivery from traditional systems may be on the new model innovations.

The review also points out that the development of smart healthcare technologies has resulted in improvements to remote patient monitoring, clinical monitoring and analysis, as well as remote diagnostics.

Decision support, emergency response, operational efficiency, healthcare access and resource management. Smart hospitals are a vital interconnected system to enhance patients' care, while challenges associated with emergency. The implementation of real-time monitoring, control and data-driven decision making are supporting urban resilience in response systems for developments, it is still a good idea to centralize and expand healthcare outside of medical services.

Interoperability is a crucial factor because of the dissemination and fragmentation of healthcare records and technology settings. Problems like privacy risks, threats, and privacy issues, lack of confidentiality, algorithmic bias and regulatory questions arise obstacles during implementation.

Limited finances and service costs, working preparedness and access to medical services emerge as issues smart healthcare initiatives, especially in rural areas. Long-term evaluation of healthcare is still an emerging challenge due to lack of economic sustainability, social impact.

These limitations will be resolved by smart healthcare systems achieving their potential for development. There is a need for healthcare stakeholders and policymakers to ensure the emphasis is placed on practical and interoperable frameworks for ethical governance of AI in healthcare.

The optimal coordination of the healthcare providers, technology developers and government is essential for good and successful changes.

The current use of modern technology applications such as artificial intelligence, digital twins, block chain technologies, telemedicine, 6G healthcare networks, etc., is expected to influence good and smart healthcare systems. Future research and investigations should focus on and concentrate on assessing this innovation in real-world settings, but ensure that technological advancements are aligned with the goals and objectives of healthcare quality, equity, and sustainability. Applying this effort can enhance and contribute meaningfully to the development of healthier, resilient, and smart cities.

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