REVIEW ARTICLE

Public health in India: Leveraging technology for a brighter future

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Background

Technology has played a pivotal role in shaping human civilisation. The healthcare industry is the primary adaptor of newer technologies in the world. Ironically it is mainly confined to the curative arena, and people in public health are a bit reluctant to utilise the newer technologies. Often the first encounter of rural folk in India with high-end technologies would be when they land in a hospital, and this could be confusing. However, the total denial of technology would do more harm to public health as resources are constrained, and technological innovations can be leveraged to ensure optimal utilisation of resources and address issues like health inequity. So, there is an evolving consensus on the judicious use of technology in a people-friendly way, which can address many of the age-old problems in public health, in a much more effective way.

Health

The history of technology in public health is long and varied, with significant developments occurring over the past several centuries [1]. Early examples of technology in public health include using clean water and sewage systems to prevent the spread of disease. The development of vaccines in the late 1800s revolutionised the future of public health. In the modern era, technology in public health has continued to evolve and expand with the development of new technologies such as electronic health records, telemedicine platforms, and mobile health apps. modern diagnostics, imaging technologies, health information systems, telemedicine and Health applications.

Primary health care and the principle of "Appropriate Technology"

Primary health care (PHC) is the foundation of a solid, effective healthcare system, and appropriate technology is critical in delivering PHC services. PHC is the first level of contact between individuals and the healthcare system and is characterised by accessibility, affordability, and community participation. Appropriate technology in PHC is essential to deliver high-quality, cost-effective services that meet the population's needs [2,3].

Appropriate technology refers to using technology suitable for a given community's specific context and needs that can be sustained over time. This includes technologies that are affordable, reliable, and easy to maintain, as well as technologies that are culturally and socially acceptable to the community. As a cardinal principle, appropriate public health technology is crucial to address the population's health needs effectively. There are several examples of appropriate public health technologies successfully implemented in India. A telling example is the Oral Rehydration Solution (ORS), a simple and effective technology for treating dehydration caused by diarrhoea. Clean water technologies such as hand pumps and water filtration systems have successfully improved access to clean water, particularly in rural and underserved areas. Another recent example of the CoWIN

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(COVID Vaccine Intelligence Network platform), a digital tool that the Government of India developed to facilitate the distribution and administration of COVID-19 vaccines [4]; the Directly Observed Treatment, Short-Course (DOTS) strategy is a technology that has been successful in the treatment of tuberculosis in India. These examples demonstrate the effectiveness of appropriate public health technology in addressing specific health challenges in India. It is essential to prioritise using appropriate, affordable, effective, and widely available technologies to maximise the impact on population health [5,6].

The Global vs Indian Scenario

The global scenario for using technology in public health varies widely, with some countries adopting new technologies more quickly than others. High-income countries tend to have more advanced healthcare systems and can invest more heavily in developing and adopting new technologies. In India, the use of technology in public health is also rapidly evolving, with the government making significant efforts to promote the adoption of digital health tools and services [7-9]. However, there are significant challenges to adopting technology in public health in India. These include issues related to data privacy and security, the inherent property of technology in exacerbating inequalities, and the need for a systematic process for the development, implementation, adoption, evaluation and sustainability of technologies in the health system.

Objectives

This paper explores the evolving role of technology in public Health in India and considers the challenges and barriers to using technology in this context. By examining the current and potential future uses of technology in public health and the challenges and obstacles to its use, this paper aims to provide insights into the future of technology in public health in India. Specifically, the review aims to:

1. Identify the various types of technology used for public health and understand its potential in the future of the public health landscape of India.
2. Discuss the challenges and limitations of implementing technology in public Health in India.
3. Discuss potential solutions for overcoming these challenges and maximising the benefits of technology in public Health in India.

Methods

We present a review of the future of technology in public health in India using the following broad steps:

1. Identification of the research question: The first step in conducting the narrative review was identifying the research question. The research question is: What is the current state of technology in public health in India, and what are the opportunities and challenges it presents?
2. Search for relevant literature: Once the research question had been identified, the next step was to search for relevant literature on the topic. This was done through a comprehensive search of three databases PubMed, Web of Science, and Google Scholar, using appropriate keywords and all relevant MeSH terms. Grey literature sources, cross-referencing, and connected papers were also explored for additional research on the relevant topic. Some relevant web pages and news articles were also studied to ensure a detailed approach to the review.
1. Selection of the relevant articles and synthesizing the information: The relevant articles identified were explored after the literature search. As per the research question, the review was built upon the themes and trends and organised the results logically and coherently.

Results and Discussion

The ever-evolving, dynamic transformation of the future of public Health in India

Our review covers the transformative future of public Health in India.

The healthcare industry is poised for significant growth and progress with the increasing adoption of personalisation, participatory approaches, and data-driven decision-making. Technology allows for creating more precise and predictive models, helping healthcare professionals make more informed decisions and deliver better outcomes. Evidence-based strategies are also becoming increasingly popular, as the ability to access and analyse large amounts of data rapidly enables healthcare providers to make more informed and reliable recommendations.

We have organised the review into the following broad areas:

1. Big Data/ Data Science

Big data refers to the large volumes of data generated by various sources, such as electronic health records, social media, and wearable devices [10]. Data science involves using advanced analytical and statistical techniques to extract meaningful insights from this data [11]. In public health, emerging fields such as data science can revolutionise how diseases are diagnosed, treated, and prevented [10-12].

One of the main applications of big data in public health is disease surveillance and prediction. By analysing large volumes of data on disease incidence and risk factors, it is possible to identify trends and patterns that can help in the early identification of outbreaks and develop targeted prevention strategies [13]. For example, data analytics has been used to identify patterns in the spread of infectious diseases, such as influenza, and to predict future outbreaks. Big data and data science can also be used to improve the accuracy and efficiency of healthcare delivery [12,14]. Data analytics can also identify patterns in healthcare utilization and opportunities for cost savings and efficiency improvements.

2. Precision Public Health

Precision public health is a concept that aims to use precision medicine approaches in public health. Precision public health applies precision medicine principles to enhance population health, tailoring prevention and treatment strategies based on individual characteristics like genetics, environment, and lifestyle. This approach aims to identify population-specific risk factors and develop targeted interventions [14}. In precision public health, this approach is applied at the population level, aiming to improve the population's health as a whole. One of the main goals of precision public health is to identify the specific risk factors and determinants of health for different populations and to develop targeted interventions to address these factors. For example, precision public health approaches could be used to identify specific genetic or environmental risk factors for certain diseases in a particular population and to develop targeted prevention strategies [15]. Precision public health also involves using advanced technologies, such as data analytics and artificial intelligence (AI), to identify patterns and trends in health data and develop targeted interventions. For example, data analytics can identify trends in disease incidence and risk factors for certain diseases in specific populations. There are several potential benefits to precision public health. Areas like targeting particular risk factors and determinants of health, precision public health approaches have the potential to be more effective and efficient in improving population health. Precision public health approaches can also help reduce health disparities and improve health [15]

3. Public health informatics:

Public health informatics is the systematic application of information, computer science,

and technology to public health practice, research, and learning [16]. This includes using electronic health records (EHRs), telemedicine, and other digital tools to manage and analyse public health data. One of the main applications of PH informatics is disease surveillance and response [17,18]. For example, electronic health records and digital surveillance systems can identify patterns in disease incidence and track the spread of infections. This can help identify and respond to outbreaks early and implement targeted prevention and control measures. PH informatics can also be used to improve the efficiency and accuracy of healthcare delivery. For example, EHRs can be used to manage patient medical information and to improve the accuracy of diagnoses and treatment plans [19]. Additionally, telemedicine can provide remote consultations and improve access to healthcare in underserved areas [20].

4. Interoperable Systems Standardisation - SNOMED CT (Systematized Nomenclature of Medicine Clinical Terms) and Fast Healthcare Interoperability Resources (FHIR)

Technology in healthcare involves using interoperable systems such as SNOMED CT (Systematized Nomenclature of Medicine Clinical Terms), a standardized medical terminology for the electronic exchange of healthcare information [21,22]. It covers all aspects of clinical care and is widely recognised as the most comprehensive and up-to-date clinical terminology. Used in EHRs, clinical decision support systems, and healthcare apps, it helps to ensure an accurate and consistent exchange of healthcare information [21]. In India, SNOMED CT is growing in adoption as the standard terminology for electronic exchange. It helps improve healthcare delivery quality, safety, and efficiency. SNOMED CT differs from ICD-10, which primarily focuses on classifying diseases and injuries but doesn't cover other aspects of clinical care. FHIR (Fast Healthcare Interoperability Resources) is another standard for exchanging electronic health information between healthcare systems and organisations [23]. It is designed to be user-friendly, fast and secure, enabling the creation of new healthcare apps and services. This leads to improved quality and efficiency of care as healthcare providers have access to more complete and up-to-date patient information. FHIR was developed and maintained by HL7, a non-profit organization for electronic healthcare information exchange standards [24]. Using SNOMED CT and FHIR supports electronic health information exchange and improves data accuracy and completeness. For example, a healthcare provider can use FHIR to send a patient's medical record to another provider and include SNOMED CT codes to describe the patient's diagnoses, procedures, and medications. This ensures that the receiving provider has a complete and accurate understanding of the patient's care.

5. Translational Genomics

Translational genomics, which refers to the application of genomic technologies and knowledge to the prevention, diagnosis, and treatment of diseases, can potentially revolutionise public Health in India. Genomic technologies can provide insights into the genetic basis of diseases and help identify new targets for developing therapies and interventions [25,26]. In India, translational genomics has the potential to address several significant public health challenges, including infectious diseases, cancer, and inherited genetic disorders [27]. For example, using genomic technologies can help identify the genetic factors that contribute to the development and progression of diseases and can help to identify new therapeutic targets for treating these diseases. The challenges to using translational genomics include a lack of infrastructure, limited access to genomic technologies, little awareness and understanding of genomic technologies, and limited capacity and resources. To fully realise the potential of translational genomics in public Health in India, it will be essential to invest in research and development, improve the regulation and standardisation of genomic technologies, and promote their integration into the

mainstream healthcare system [25]. It will also be essential to address the challenges and barriers to use of translational genomics in public health to ensure that these technologies can effectively improve population health in India.

6. Geospatial Technology

Geospatial technology uses geographic information systems (GIS) and other technologies to analyse and visualise spatial data. In the field of public health, geospatial technology can be used to understand the relationship between health and place and to identify patterns and trends in health outcomes at the population level [28]. Applications of geospatial technology in public health have grown considerably during the past two decades. Terms and disciplines such as "geomedicine," "geospatial health," and "spatial epidemiology" have become more commonplace as public health officials, researchers, and the community at large have come to rely on maps and geospatial analyses regularly. Geographic information systems (GIS) and spatial epidemiological investigations allow us to visualise and disseminate images and information about the geospatial distribution of disease outbreaks, natural disasters that impact human lives, access to healthcare facilities, "hotspots" for adverse health outcomes, and environmental health threats, to name a few [29].

One of the main applications of geospatial technology in public health is disease mapping and surveillance. Identifying patterns and trends in disease distribution and developing targeted prevention and control measures is possible. It can also be used to identify spatial correlations between health outcomes and environmental factors, such as air pollution or access to healthcare facilities. Geospatial technology can also be used to improve the efficiency and effectiveness of healthcare delivery. For example, GIS can identify areas with high healthcare needs and optimise deploying healthcare resources. Additionally, geospatial technology can be used to identify patterns in healthcare utilisation and to identify opportunities for cost savings and efficiency improvements.

7. Epidemic Management and Response

Epidemic management and response is crucial in preventing and controlling the spread of infectious diseases. In recent years, technology has played a significant role in these efforts, including disease surveillance and prediction. By analysing large amounts of data, technology helps identify outbreaks early and develop targeted prevention strategies. Technology also improves the efficiency and coordination of epidemic response efforts through digital platforms and real-time tracking of supplies and resources. To address current and future epidemics, a more integrated approach is needed, involving various disciplines, including epidemiology, social sciences, research and development, diplomacy, logistics, and crisis management, and prioritising the involvement of at-risk and affected communities and prioritising the participation of affected communities [13].

COVID-19 and technology

The COVID-19 pandemic has highlighted the crucial role that technology can play in epidemic management and response. From the early stages of the pandemic, technology had been used to track the virus's spread and develop targeted prevention and control measures [30.31]. Disease surveillance and prediction were one of the main applications of technology in the COVID-19 response. For example, data analytics was used to identify patterns in the spread of COVID-19 and to predict future outbreaks. Additionally, digital platforms coordinated multiple organisations' response efforts and disseminated information to the public [31,32]. Technology has also been used to improve the efficiency and effectiveness of the COVID-19 response. For example, telemedicine has been used to provide remote consultations and reduce the burden on healthcare facilities [33,34]. Additionally, technology has been used to enhance the logistics and supply chain management

of the COVID-19 response, with the use of real-time tracking and analytics of supplies and resources.

8. One Health

One health is a healthcare approach that considers the connection between human, animal, and environmental health [35]. In public Health, One Health can help improve overall health and in controlling infectious diseases spread from animals to humans. Digital technology, including AI and big data, can enhance One Health by providing new insights and enabling targeted preventive strategies [36]. However, One Digital Health (ODH) faces challenges with data fragmentation and access restrictions [37]. Calvin Wai Loon Ho, the author of this interesting paper [37] recommends creating a global ODH framework for fairness and equity to share data across all relevant domains. Digital technologies play a crucial role in One Health by identifying disease patterns, coordinating response efforts, and disseminating information. Implementing the One Health approach presents challenges such as interdisciplinary collaboration and integrating data sources, as well as funding, cultural, and political barriers. Despite these challenges, One Health can potentially improve population health and significantly reduce disease burden [36].

9. Internet of things

The Internet of Things (IoT) refers to the interconnected network of physical devices, such as sensors and actuators, connected to the Internet and can collect, transmit, and exchange data [38]. In the public health field, the IoT can revolutionise how diseases are diagnosed, treated, and prevented. One of the main applications of the IoT in public health is in the area of personalised health monitoring. Wearable devices like fitness trackers and smartwatches can collect individual health data and provide real-time feedback and alerts. This can help in the early detection of health issues and develop targeted prevention and treatment strategies. The IoT improves the efficiency and effectiveness of healthcare delivery [39]. For example, sensors and IoT devices can monitor patients' health remotely and alert healthcare professionals to any issues. IoT can optimise healthcare systems' logistics and supply chain management through real-time tracking and analytics of supplies and resources. However, implementing the IoT in public health also has challenges and limitations. One of the main challenges is the need for reliable and secure data transmission and storage, as the IoT involves collecting and exchanging sensitive personal health data. There are also concerns about the privacy and security of personal health data in the IoT and the potential for cyber-attacks on IoT devices [38,39]. Despite these challenges, IoT has the potential to be a powerful tool in improving population health and reducing health disparities.

10. Social media - Twitter monitoring, google trends

Social media, such as Twitter and Google Trends, have become increasingly important tools in public health, as they provide a platform for the rapid dissemination of information and the exchange of ideas [40-42]. One of the main applications of social media in public health is disease surveillance and response [43]. For example, Twitter and other social media platforms can track the spread of infectious diseases and identify patterns and trends in disease incidence. This can help in the early identification of outbreaks and the development of targeted prevention and control measures [44]. Social media can also be used to improve the efficiency and effectiveness of healthcare delivery. For example, Twitter and other social media platforms can disseminate health information and engage with the public, helping educate and empower individuals to make healthier lifestyle choices. Additionally, social media can be used to coordinate the response efforts of multiple organisations and to disseminate information to the public. However, one of the main challenges is ensuring the accuracy and reliability of the information disseminated on so-

cial media platforms. There are also issues related to the privacy and security of personal health data and the potential for spreading misinformation. Despite these challenges, social media has the potential to be a powerful tool in improving population health and reducing the burden of diseases.

11. Telehealth, Digital Health

Telehealth or digital health refers to using telecommunication and digital technologies to provide healthcare services remotely [45,46]. Telehealth will likely continue to grow in popularity, as it allows patients to access healthcare services from the comfort of their homes and reduces the need for in-person visits. This was particularly important in the COVID-19 pandemic, highlighting the need for alternative modes of healthcare delivery [32]. One of the main challenges to expanding telehealth will be the need for reliable and secure data transmission and storage, as telehealth involves collecting and exchanging sensitive personal health data. Appropriate infrastructure and training will be needed to support the implementation of telehealth services. However, with the continued development and advancement of technology, these challenges can likely be overcome, and telehealth will become an increasingly important tool in improving population health.

12. Health Technology Assessment

The future of technology in public health is closely tied to health technology assessment (HTA), which involves systematically evaluating the medical, social, economic, and ethical implications of healthcare technologies [47]. HTAs have been an essential tool in developing and implementing effective and efficient healthcare technologies, and they will continue to play a crucial role in the future of public health. One key area of focus is life cycle HTA, which involves the assessment of technologies throughout their entire life cycle, from research and development to adoption and implementation. This approach can improve the efficiency and effectiveness of healthcare technologies by identifying and addressing potential issues at an early stage, ensuring that technologies are continuously improving and meeting the needs of the healthcare system [48,49]. In addition, HTA for complex interventions, which involves the assessment of technologies that involve multiple components or stakeholders, will be increasingly important in the future. This is particularly relevant in the context of emerging technologies, such as precision medicine and digital health, which involve complex interactions and have the potential to impact population health significantly [50,51]. Technology in public health is closely tied to the field of HTA, and HTA approaches must continue to evolve and adapt to the changing needs of the healthcare system. By ensuring that technologies are rigorously evaluated and continuously improved, HTA has the potential to play a crucial role in improving population health and reducing the burden of diseases.

13. Artificial intelligence (AI)

Artificial Intelligence (AI) Artificial Intelligence (AI) is poised to play a vital role in improving public health in India, offering innovative solutions to some of the country's most pressing health problems [52,53]. One of AI's most promising uses is in predicting and preventing epidemics. By analysing large datasets on the spread of infectious diseases, machine learning algorithms can identify patterns and trends to predict the likelihood of outbreaks and develop targeted interventions to control the spread of disease [54,55]. For example, A.I.-powered epidemiological models in India helped address the COVID-19 pandemic. AI can also improve the accuracy and efficiency of disease diagnosis and treatment. For instance, machine learning algorithms can analyse medical images to identify signs of illness and enhance diagnosis accuracy [56,57]. AI can also analyse patient data to determine treatment options, which can assist healthcare professionals in making informed decisions. AI can also increase access to healthcare, especially in underserved or

rural areas, by enabling remote consultations and providing patients with information and support through telemedicine platforms or AI-powered chatbots [52,53]. With continued investment and innovation, AI has the potential to transform healthcare delivery in India and improve the lives of millions.

14. Ayushman Bharat Digital Mission and Health ID

The Ayushman Bharat Digital Mission is an initiative launched by the Indian government in 2018 to provide Universal Health Coverage (UHC) to citizens, especially those in rural areas, through technology. The mission has several components, such as the National Health Stack, a digital infrastructure for healthcare data integration, and the Health Management Information System (HMIS) to improve the quality and efficiency of services through real-time data tracking. The National Digital Health Blueprint outlines the roadmap for the digital transformation of the healthcare system in India, including creating a National Digital Health Authority [58].

The Health ID, linked to the National Health Stack, is a unique ID for all citizens and allows for creating an electronic health record (EHR) for each individual. The Health ID provides for creating a comprehensive electronic health record (EHR) for each individual, which healthcare providers at different healthcare system levels, including hospitals, clinics, and primary healthcare centres, can access. This enables healthcare providers to provide better care by accessing the individual's complete medical history, reducing the risk of errors and duplications [59,60]. This enables healthcare providers to access the individual's full medical history for better care and reduces errors. The Health ID also facilitates the tracking of health indicators and the evaluation of healthcare services. It is used to verify eligibility for the Ayushman Bharat Scheme, a health insurance program for over 500 million citizens. The Health ID is a crucial part of the Ayushman Bharat Digital Mission, improving the accessibility, affordability, and quality of healthcare services for all citizens.

Challenges, Barriers and Potentials [61-71]

The use of technology in public health in India faces several challenges, including the lack of adequate infrastructure, limited access to technology among specific population groups, limited understanding and awareness of technology, and limited capacity and resources. Cultural and behavioural factors, a lack of tailored technology for public health, and barriers to adoption may also hinder the use of technology. The use of technology in public health may also create inequalities as some population groups are more likely to benefit than others. Additionally, there are concerns about the privacy and security of personal health data, the upstream cost of technology, convincing policymakers, and the acceptance and adaptation of new technologies. The accessibility and the reliability of data collected through technology is also a concern. Furthermore, there are ethical concerns related to the use of technology for public health, and the ongoing maintenance and sustainability of technology can be challenging.

Potentials

The Role of Academic Institutions and indigenous systems of Medicines

Academic institutions can potentially play a pivotal role in shaping the Indian public health landscape. Many crucial factors, like adopting technology, conducting research, and enabling the next-generation public health professionals to use these technologies effectively, depend on academic institutions. Academic institutions can also provide training and education on the use of technology in public health, helping to ensure that healthcare professionals are equipped with the knowledge and skills needed to utilise these technologies effectively. The adoption of technology in public health must be a

grassroots effort. Considering the end-users' and local populations' needs and priorities is essential, especially in developing countries.

Considering the diverse population of India indigenous systems of medicine in India, AYUSH can contribute significantly by merging traditional and modern healthcare practices, offering more comprehensive interventions tailored to local needs. By integrating traditional and modern approaches, it is possible to develop more holistic and effective healthcare interventions that address the needs of the local population.

Building trust involves building transparent systems of governance and accountability. Trust is central to many complex processes involving local communities. Adopting participatory methods in the use of technology can help bridge existing gaps and boost their acceptance and adoption.

Table 1: Challenges and Potential Solutions for Using Technology for Public Health in India

Sl. No.	Challenges identified	Potentials
1	Lack of infrastructure	Increase investment in infrastructure, such as internet connectivity, power supply, and data storage facilities
2	Limited access to technology	Increase access to technology, such as through initiatives such as digital literacy programs or subsidies for technology purchases
3	Limited awareness and understanding of technology	Increase awareness and understanding of the potential benefits of technology through education and outreach efforts
4	Limited capacity and resources	Increase capacity and resources for healthcare providers and other stakeholders through training, funding, and other support
5	Cultural and behavioural challenges	Address cultural and behavioral challenges through education, outreach, and engagement with traditional and indigenous systems of medicine
6	Lack of tailored technology for public health	Develop technology that is specifically tailored to the needs and context of the population in India
7	Barriers to technology	Remove barriers to technology through awareness campaigns, funding and other resources, and addressing cultural and behavioral challenges
8	Technology fosters inequity	Ensure that technology is accessible and available to all groups of the population, and address any potential inequities
9	LMIC vs HIC (Indian context)	Consider the specific challenges and context of India when implementing technology for public health
10	Privacy and security concerns	Implement strong privacy and security measures to protect personal health data, such as through encryption and secure storage
11	Upstream cost	Consider the long-term benefits of technology, and invest in technology that will have a lasting impact
12	Convincing policymakers	Increase awareness and understanding of the benefits of technology among policymakers through education and outreach efforts
13	Newer technology	Keep up-to-date with newer technologies, and address any challenges to acceptance and adaptation through education and outreach efforts
14	Acceptance and adaptation	Increase awareness and understanding of newer technologies through education and outreach efforts
15	Accessibility	Increase accessibility of newer technologies through initiatives such as subsidies or other support
16	Data accuracy and reliability	Ensure the accuracy and reliability of data collected through technology through quality control measures and training
17	Ethical concerns	Address ethical concerns related to the use of technology for public health through guidelines and regulations
18	Maintenance and sustainability	Plan for the ongoing maintenance and sustainability of technology through funding and other resources
19	Integration with existing systems	Ensure that new technology is compatible with and can be integrated into existing healthcare systems and processes
20	Capacity building	Increase capacity and skills among healthcare providers and other stakeholders through training and other support
21	Resistance to change	Address resistance to change through education, outreach, and engagement with stakeholders
22	Limited access to capital	Increase access to capital for technology implementation and maintenance through funding and other support
23	Cybersecurity threats	Implement strong cybersecurity measures to protect against threats, such as through encryption and secure storage of data

A list of all the identified challenges and their potential is depicted in Table 1.

Science vs Practice in the Use of Technology for public health (72–74)

Public health science encompasses epidemiology, biostatistics, environmental health, health policy, and public health informatics. It aims to understand the complex factors influencing population health and develop and evaluate interventions to enhance it. In contrast, public health practice involves applying public health principles to real-world scenarios to improve population health. This includes creating and implementing policies, programs, and interventions to tackle public health issues and evaluating their impact.

Regarding technology use in public health, the science of public health assesses the potential benefits and risks, providing an evidence base for technology's role in public health. It aids in choosing the most appropriate and effective technologies for various contexts. On the other hand, public health practice applies these principles and methods to using technology in public health. It involves developing and implementing technology-based programs and interventions and evaluating their effect on population health. The science of public health and public health practice are tightly intertwined; the former provides the evidence base for public health practice, and the latter actualises public health principles in real-world technology use.

Conclusion

In conclusion, the role of technology in the future of public health in India is immense. However, the complex and dynamic nature of the Indian public health system poses unique challenges while offering opportunities for public health innovation. The milieu of factors affecting the future of public health is becoming more complex and requires embracing newer advancements for better public health. By prioritizing the underserved, empowering the grass-root workers, and building trust through accountable and transparent systems, India can harness the transformative power of technology in public health, ultimately leading to improved healthcare outcomes and a brighter future for its population.

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