Impact of Disruptive Technologies on Human Health and Milieu

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Abstract

This paper outlines the application of disruptive technologies and its ability to help pan-India surveillance systems, including programs related to health and environment monitoring system. The key goal is to review prior studies on disruptive technology and its existing environmental and healthcare applications and identify association strength among the selected variables through application of Vos Viewer software. This paper discusses the current usage of Artificial Intelligence, Blockchain, and Internet of Things on health and environment and also their recent developments. The findings of the study state the complexities and opportunities of the mentioned technologies on the pan-India health and environment surveillance system.

Keywords: artificial intelligence, blockchain, disruptive technologies, environment, health, internet of things

Introduction

Information management, networking technology and technical advances streamlined and improved health and environmental data collection. For instance, the growing cloud storage computing power now enables lightweight sensors to collect data continuously. Though, the details collected have not always been fully exploited. Nevertheless, affordable data storage and the increasing technical computing capacity helps to build comprehensive health and environmental datasets of untapped potential.

Many investigations and research have recommended the idea of including emerging technology in the scope of climate change and establishment of pan-Indian surveillance and monitoring practices linked to environmental protection and health system effects. These practices involve incorporation of evidence from other ecosystems of health and environmental data for academics, politicians and health authorities to use analytical tools to generate ideas from open data. The implementation of the usage of these details in the above agencies and the society, provides a consolidated location for health and environmental data storage, retrieval, and interpretation.
These practices may profit from a variety of emerging innovations, such as "Internet of Things," "cloud computing," “Artificial Intelligence," "Blockchain," "Machine Learning," “Deep Learning." These groundbreaking innovations commonly utilized in many fields concerned with Comprehensive statistics including “influenza control and air quality monitoring” and demonstrate significant potential to facilitate the introduction of the pan-Indian surveillance mechanism.

This paper arrives at a significant moment. As our climate changes quickly and affects human health and welfare, we have to adapt to as per the climate change and new health system requirements. Climate change is the largest challenge to the well-being in the 21st century, and it is a massive and creative obstacle and numerous human health security services.

Climate change could influenced by the Intergovernmental Committee on Climate Change (IPCC) repercussions:

- Increased morbidity and mortality triggered by hydroscopic temperatures, for instance, renal illness, heat stroke and acute coronary disease, and;
- Improved morbidity and mortality correlated with reduced air standards related to greenhouse gases (GHG), triggering conditions for wellbeing. For instance, lung cancer, stroke and heart attack;
- Increased incidence of vector-borne diseases triggered by cooler environments that affect mosquitoes and other species; and
- Increasing frequency, severity, and incidents such as flooding, droughts, and hurricanes severe weather. Such aspects will start a chain reaction to food protection, housing, and utilities to reduce income for the victims.

India's cost of adverse weather incidents, including extreme temperatures, flooding, and wildfires, has risen significantly. These reforms are detrimental to Indians' health. Environmental conservation is a crucial move to preserve environmental health, and innovative interventions are needed for cost-effective strategies to overcome budgetary constraints. This paper discusses emerging attempts to address some of the problems using innovative technology. The study provides a review of prior literature and its implementation in the Indian environmental and health monitoring framework and a discussion of possible issues needed to incorporate the proposed Pan-Indian Monitoring System components. The research aims to provide several descriptions of present and potential implementations of these technologies in the environment.

Methods

The present study carried out using descriptive analysis, which practices a conventional literature review. Three rounds of internal screening conducted by the researchers in the current study. The most critical articles on recent developments of disruptive technologies on health, healthcare, and environment monitoring and surveillance were selected. A brainstorming session performed during the talks to facilitate the Usage scenarios concerning “Artificial Intelligence, Blockchain, and Internet of Things.”
Cases. The researchers created a flowchart (mentioned in Figure 1) to show their procedures for selecting papers and to recommend the necessity of creative scope and creation of tracking and surveillance activities by combining the technologies and components of Artificial Intelligence, Blockchain, and Internet of Things.

**Criteria for inclusion:**
- Papers written in English language only considered,
- Full-text articles from the period January 2010 to December 2020 were considered for the study.
- Papers related to IoT, Blockchain, and Artificial Intelligence on health environment considered for the study

**Keyword search terms in PubMed and IEEE database:** Internet of Things, IoT, Blockchain, Artificial Intelligence, health, healthcare, monitoring, surveillance, environment, climate, global health, disruptive technologies

**Criteria for exclusion:**
- Papers written in other languages than English excluded from research,
- Studies earlier than Jan 2010 excluded from research.

N= 8 (In the first-time search)

N= 2 (in the search conducted on the second attempt)
Although this was not a formal analysis of scoping, present research adopted Levac. et al., (2010) guidelines. Since our goal is to be more precise. In this methodological context, six steps for the systematic review are suggested (as mentioned in table 1):

Table 1: Formulation of Research Design

<table>
<thead>
<tr>
<th>Research Methods</th>
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<tbody>
<tr>
<td><strong>Research Question</strong></td>
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<tr>
<td>In this study, we aimed at explaining &quot;How disruptive technology based on Artificial Intelligence, Blockchain, and Internet of Things will help boost environmental and health research?&quot;</td>
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<tr>
<td><strong>Articles searching</strong></td>
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<tr>
<td>Articles extracted from Scholarly databases, namely, PubMed and IEEE.</td>
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<tr>
<td><strong>Study design</strong></td>
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<tr>
<td>Information gathered from researches on randomized controlled trials, cross-sectional studies, review studies and systematic review studies, meta-analysis, sample, and case series.</td>
</tr>
<tr>
<td><strong>Sources of Data collection</strong></td>
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<tr>
<td>The data collection process carried out by studying previous research carried out at different levels concerning the usage of multiple disruptive technologies in health and the climate.</td>
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<tr>
<td><strong>Variables Assessed</strong></td>
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<tr>
<td><strong>The compilation, Results, and monitoring</strong></td>
</tr>
<tr>
<td>We address the current innovations and problems in disruptive technology to incorporate and interpret environmental and health data.</td>
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</tbody>
</table>
Result

The intensive review of many academic papers and government studies on innovations, including “Internet of Things, Blockchain, and Artificial Intelligence”, can create the tremendous potential to promote health and environmental information. The present study attempted to determine the association strength among the variables studied by the researchers of the selected articles through the Vos Viewer software version 1.6.15. First, the mapping done for the most occurred keywords used by the various researchers in different articles(Figure2) and broader view of network visualization of most occurred keywords in the selected articles also showed in figure 3. Then the formation of clustering was identified through the mapping of most occurred keywords present in the prior studies. The formation of clustering depicted the presence of 3 clusters—the description of the formed cluster through Vos viewer mentioned in table 2.

Figure 2: Mapping of Most Occurred Keywords in the Selected Articles

Figure 3: Network Visualization of Mapping of Most Occurred Keywords in the Selected Articles
Table 2: Description of Clusters Formed through Vos Viewer Software

<table>
<thead>
<tr>
<th>S.no.</th>
<th>Number of clusters</th>
<th>Description of cluster</th>
</tr>
</thead>
</table>
| 1.    | Cluster 1 (8 items) | • Artificial Intelligence  
       |                    | • Big data  
       |                    | • Blockchain  
       |                    | • Cloud computing  
       |                    | • Healthcare  
       |                    | • Internet of things  
       |                    | • IoT  
       |                    | • Machine learning |
| 2.    | Cluster 2 (6 items) | • Internet of things  
       |                    | • Delivery of healthcare  
       |                    | • Humans  
       |                    | • Internet  
       |                    | • Mobile applications  
       |                    | • Telemedicine |
| 3.    | Cluster 3 (3 items) | • Environmental monitoring  
       |                    | • Internet of things  
       |                    | • Sensors |
After forming clusters from most occurred keywords, the study further identified the presence of mapping of most influential keywords formed in Vos Viewer software (figure 4). The network visualization depicted association strength among the most influential keywords extracted from the selected articles. Keywords, namely, “artificial intelligence,” “deep learning,” “internet of things,” “blockchain,” “environmental monitoring,” and “healthcare,” and “delivery of healthcare,” showed strong association strength and indicated the relationship among the most influential keywords.

**Figure 4:** Network Visualization of Mapping of Most Influential Keywords in the Selected Articles

The study made a comprehensive analysis of each disruptive technology and assessed their application in the health and environment domain as discussed below:

1. **Internet of Things**

   The IoT is an evolving heterogeneous idea of networking that aims to influence the modern environment today significantly. IoT's central vision is to combine a vast range of intelligent artifacts towards interconnected and interconnecting networks, rendering the Internet much more all-embracing. It is a modern model in which every system communicates in a seamless world, irrespective of its scale, calculation capital, and network connectivity. It allows apps to be intelligent through detecting, utilizing data, and determining behavior, mostly without human interference. IoT-enabled devices expand exponentially, including portable equipment, kitchen equipment, connected vehicles, and health equipment. Also, IoT and other supporting technology will significantly impact information collection for applications such as environmental monitoring, wellbeing, and security in broader geographical regions. It is emphasized that the introduction of IoT habitats in every geographical region enables many artifacts. A vast number of linked machines share a massive volume of data in these networks, contributing to Big Data's development,
a connected computer. The connected device-based data is essential to the smart city paradigm because it can provide useful information to allow expert IoT systems. The IoT Architecture focused on a range of capable platforms, including WLAN, Cloud Storage, Mechanical Learning and Peer Networks.

1.1. Internet of Things in Health

The World Health Organization describes surveillance in public protection as “the ongoing compilation, systematic review and assessment of health-related data required for the preparation, execution, and assessment of public health procedure.”. Monitoring is critical when developing and enforcing public health agencies' preventive and control measures. Real technical innovation allows the gathering and reviewing data on an unimaginable scale, needing stronger tracking methodologies. Another exciting way will transform society or intelligent communities that are IoT-driven towns to increase quality of life in numerous ways, including promoting environmentally sustainable, healthy ecosystems and providing people with linked health and health care systems”.

Public health monitoring has some ongoing issues that must overcome. These challenges may be technological or non-technical in conjunction with data usage and access. The shortage of technology, competent human capital, and sufficient finance are the key obstacles for public health monitoring. Non-technical problems cover ethics, safety, and protection considerations, but it is deemed essential to gain informed consent to the implementation of healthcare research. IoT tools to promote independent living and monitor their well-being may obtain their permission. It also affects more pressing privacy and data protection challenges since they extend to health experiments and tracking including general monitoring. For smart cities, for example, ensure the protection and privacy of an individual. The problems of data relating to data utilization, access, information control, preservation, and review. Furthermore, interoperability problems between computer structures, lack of data standardization and standards to verify data reliability and confidentiality are crucial issues.

1.2. Internet of Things in Environment

Significant weather conditions, such as drastic increases in temperature, forest fires, and storms causing rivers, have a significant effect on wellbeing. For instance, the growing occurrence of heatwaves in urban zones, especially in older people, will increase the incidence of heat-related problems, including mortality. People rely on the environment, and these developments have a significant impact on their wellbeing through improved dissemination and circulation of diseases and air pollution.

IoT surveillance of the atmosphere and wellbeing will further strengthen the present perception of their relationship and contribute to possible ways to minimize harmful effects. The latest application of IoT sensors in the environment includes mapping spatio-temporal information such as transport rates and sources of pollution and utilizing sensor gathered or consumer crowd-sourced data for epidemiological tracking.

Sensors of air quality management are mainly used in outdoor or indoor tracking and personal...
monitoring. Wearable sensors may estimate personal exposures of different types. This information can determine the three-dimensional delivery in multiple microenvironments of air toxins by applying the Global Positioning System (GPS). In addition to air quality, IoT technology also tracks and generates unhealthy radiation levels, noise, real-time water pollution charts, and temperature. To control water, sensors may provide early alerts of water catastrophes such as flooding to enable citizens to escape or prepare ahead of time. Likewise, radiologic risk surveillance aims to minimize or remove the effects of radiation element release through early detection. Relative humidity and air temperature monitors may also aid to diagnose controlling the dissemination of fungoid ailments in plants required for feeding people.

IoT components also promote disaster management by crisis tracking, including earthquakes, flooding, and radiation levels; coordination of emergency response activities; assistance from outside disaster areas and information and crisis knowledge among users. Since these maps are not just IoT goods, they can create networks using sensors which monitor variables in real time that can provide early detection and nature hazard alerts. Any of the difficulties of utilizing IoT technology in the field is whether the data obtained and measured by consumer devices are correct and consistent. The consistency and consistency of users' information are also concerned, as they may theoretically contribute to the shared data and exchange "popular" yet incorrect information. The stereotypes and misinformation in raw social network data, crowd source maps may be too alarming because they are based on user data.

2. Blockchain

2.2. Blockchain in Healthcare

Healthcare is a diverse industry comprising various players, including patients, physicians, hospitals/clinics, researchers, insurance providers, and pharmaceutical firms. The sector is progressively digital, creating prospects for development in precision medicine, improved health systems, and quality treatment.

Since providers are the main data administrators and their networks are prone to data exchange and interoperability problems with other providers, patients lose their prior clinical history and therefore hinder a comprehensive health perception. The method of obtaining the whole record is complicated. In addition to issues with medical records, the new healthcare landscape still poses several obstacles. Payers, providers, patients and healthcare companies lack trust and connectedness in the context of health insurance, thus preventing care coordination and increasing costs.

2.2. Blockchain in Environment

As in the area of health, Blockchain can overcome problems of interoperability and data exchange, help
facilitate decisions and maximize capital. Technology can also boost urgent environmental issues such as resources, climate change, natural hazards, degradation of ocean quality, and air pollution. For e.g., an equivalent case of the food supply chain monitoring may be mentioned. A blockchain-enabled food monitoring solution will improve transparency in the production phase and allow consumers' eco-safe choices. Companies like IBM are also in the early stage of Blockchain's application of powered food chain technology. Finding the sources of fish or threatened animals is another plausible application.

The present research has mentioned the ability of Blockchain to permit peer-to-peer trading. The Blockchain could contribute to the implementation of peer-to-peer energy sharing schemes in environmental scenarios in which consumers will exchange energy amongst themselves. In the same sector, a carbon monitoring framework based on Blockchain may promote credibility systems and incentive mechanisms to reduce their carbon footprint and enhance auditing and regulatory enforcement with environmental strategies and partnerships.

The integration of Blockchain and IoT sensors would help to render the intensive care of air and water quality. The durability of disruptive technology of Blockchain will assist natural catastrophes. There are only a few of Blockchain's proposed implementations in the domain of environment. One must note that in both of these cases Blockchain itself is not a complete answer that only concentrates on technologies such as IoT and AI. Smart meters and other sensors, for instance, are required for automated energy markets. Usage of IoT may even boost one of Blockchain's problems. While the data log is immutable, it must be consistent and precise to access these data. Automated inputs using IoT devices reduce mistakes and boost data efficiency. However, in this case, it is necessary to be mindful of the safety need for IoT products since they could be susceptible to hacking.

In addition to maintaining correct inputs, certain technology opponents contend that “Blockchain and cryptocurrency”, typically, use a significant volume of resources to calculate and are surely not environmentally compliant. Yet Blockchain also matures, and emerging techniques and implementations can help reduce the carbon footprint of the system. Most analysts believe the Blockchain has benefits and untapped opportunities to the environmental field, particularly in conjunction with IoT, AI, and other groundbreaking technologies.

3. Artificial Intelligence

3.1. Artificial Intelligence in Health

Central and state governments both play a vital role in environmental and public health surveillance. Central and state governments, especially environmental regulators, face problems. For example, the limitations on financial and human capital, which may restrict the extent of surveillance activities. The use of technologies, namely, Big Data Analytics, Internet of Things, Artificial Intelligence, Machine Learning can assist in prompt and effective execution of vital activities, such as the management of water
contaminants to preserve water ecosystems and drinking water safety. Computers that are equipped to recognize trends automatically in results, for example, Machine Learning will automatically identify several breaches of the Indian Clean Water Act as healthy water identification methods. It can build environmental safety and justice standards into metrics when weighing the positive and negative implications by utilizing self-reporting data to direct best practices in the sector and by each organization.

Machine Learning in public health can be used for photography and diagnostic in medicine; creation of alert mechanisms utilizing broad databases such as the social network, for example, tracking of harmful drug reactions or leading consumers to suicidal thinking; predicting hospital readmission; including genomics datasets research. Through using ML and AI to construct relationship models, researchers will explain new, dynamic associations between social determinants of health and improve preventive measures. As public health surveillance includes observing and recording community-level data and actions to enhance population health, disease monitoring and outbreaks are areas that profit deeply from the ML techniques. AI and ML methods may help researchers and officials analyze and derive knowledge from their data in public health. This is due to vast quantities of data obtained from multiple outlets, like social networking, electronic health systems and patient records, including internet queries, computers linked, social networking. Researchers have little to no understanding of the global spread of diseases. Just seven (2 percent) of 355 clinically acute infectious diseases were mapped to consider their geography. This can contribute to awareness shortages and seriously hinder public health authorities' capacity to undertake successful prevention and remedial intervention in many countries around the world.

3.2. Artificial Intelligence in Environment

As climate change stems from human actions, environmental conditions that will affect our atmosphere and health care must be correctly forecasted. However, climate simulations are also somewhat different, mainly due to how data separated into distinct sections, the way processes and structures combine, and spatial and temporal scales as the broad spectrum. The IPCC studies rely on multiple climate models of varying forecasts that are then combined. By way of combining them, each climate model will be given equivalent weight. Artificial intelligence allows to determine if modelling is more credible by growing people's weight whose predictions are eventually right and less important for those who work badly. It, therefore, aims to render short- and long-term global change predictions more precise.

More specifically, AI often improves the weather prediction and the forecast of severe weather incidents. This is how they will apply new knowledge to cope with the environment's actual world complexity, taking into consideration the nature of the weather and the seas and the atmosphere in their estimates. This increases weather and environment modeling performance, rendering forecasts for decision-makers more valuable.

After doing the above assessment, the present study finds the below-mentioned review of articles to be critical to address the potential challenges and opportunities present in the study:
<table>
<thead>
<tr>
<th>Technology</th>
<th>Study Area</th>
<th>Research Objective</th>
<th>Challenges</th>
<th>Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet of Things</td>
<td>Health</td>
<td>An review of the current research, regulatory, technical and analytical landscape was the objective of this study in the field of oncology research and treatment for patients provided health data (PGHD).</td>
<td>Electronic integration of patient reporting results and biometrical evidence, review of broad and diverse biometric data sets, and future clinical process overhaul would be among the challenges.</td>
<td>In the context of big data and medical artificial intelligence, computational possibilities for patient-generated health data are envisaged.</td>
</tr>
<tr>
<td>Internet of Things</td>
<td>Health</td>
<td>Identifying and mapping the latest IoT advances in medicine and functional IoT in medicine, the active medical regions, and IoT places.</td>
<td>The healthcare sector is a vast and dynamic entity of active participation by multiple stakeholders, including patients, healthcare professionals, and insurance agencies. However, IoT currently does not engage in specific medical fields.</td>
<td>IoT apps usually built to save money and allow patients to be inspired at home. This eventually leads to wellness promotion and increased human well-being.</td>
</tr>
<tr>
<td>Internet of Things</td>
<td>Environment</td>
<td>As technology advances, it is becoming even more critical that these IoT devices become autonomous to allow long-term environmental sensing activity.</td>
<td>With the Internet of Things becoming more omnipresent and applications becoming creative, independent devices’ ability demands more creativity.</td>
<td>Energy injection methods may be used to include sensing devices that can function in several settings where natural energy supplies are not or are not large enough.</td>
</tr>
<tr>
<td>Internet of Things</td>
<td>Environment</td>
<td>This thesis primarily aims at a systemic research on indoor air pollution management technologies with the current state of the art, based on Internet of Things.</td>
<td>Creation of practical IAQ tracking functionality must be based on given the emerging pandemic scenario.</td>
<td>Real-time living climate reporting supports public security and well-being.</td>
</tr>
<tr>
<td>BlockChain</td>
<td>Health</td>
<td>To assess the blockchain adoption within the food supply chain system and thereby ensure the wellness of human beings.</td>
<td>Five future obstacles, including a lack of better understanding of blockchain, infrastructure challenges, raw data management, problems are bringing all stakeholders into it, and regulatory limitations.</td>
<td>The Internet of Things (IoT) can also be used to improve food traceability, transparency of knowledge, and recovery quality through Blockchain.</td>
</tr>
</tbody>
</table>
To discover different implementations of cyber-physical systems that use blockchain.

The introduction of blockchains into the IoT field would satisfy the need for cryptographic authentication, affecting crucial improvements through various industries.

Smart grids, health networks, and industrial manufacturing systems are among the many applications that blockchain technology can support.

Artificial intelligence’s role in the research and preparedness of COVID-19 (Coronavirus) prevention and combat is critical. Medical organizations desperately require artificial intelligence systems to treat coronaviruses and allow them to receive accurate suggestions in real-time to prevent their spread.

Artificial intelligence works conveniently for the emulation of human intelligence. It may also play an important role in understanding and developing a COVID-19 vaccine.

To investigate artificial intelligence as an advancement in digital healthcare and point out future risks and opportunities.

Technologies in artificial intelligence and different threats involved with their application. It is necessary to understand this before implementing technologies, given the path dependence usually seen in innovation diffusion patterns.

Artificial intelligence can transform healthcare by improving clinical procedures and enhancing workflows. Artificial Intelligence has three main attributes as an innovation: “it is self-referential, programmable and able to achieve marked generativity.”

In ambient experiences, people look forward into a device that gives the human feeling of contact with the environment beyond skin-like sensation.

The achievement of the strong IontronicSensing principle signal-to-noise in low-power electronics may be extremely essential for evolving wearable pathways and disposable applications.

Discussion

Many of the literature have studied echoed comments about the need for clarity before a data-sharing infrastructure is effectively implemented since uncertainty in managing private data creates a loss of faith. Several problems for the application of health monitoring technologies have appeared in previous studies by different researchers. The fundamental problems were: interoperability, data exchange and data administration, and safety, confidence, and protection.

Interoperability across technologies is essential for the efficient implementation of a framework of systems incorporating current data systems. Theoretically, systems should be interoperable, but manufacturers should maintain their data in their platform in order to protect their own applications to ensure that other
innovation cannot access their data. Unfortunately, the difficulties are in connectivity and the inability to share data between devices, data incompatibility, and data management.

As data gathered from several outlets, various parties need to be interested in developing data sharing policies. This heterogeneity renders data possession and data processing impossible to evaluate. For example, it is difficult to comprehend whether the details belong no longer to the person and his computer (for example, smartphones or smart hub), but rather to an organization, the government, or health entity that becomes medical knowledge. Data exchange is often met with challenges to availability, security, integrity, authenticity, and consistency. The dissemination of data gathered by IoT devices for healthcare applications must consider family members or caregivers’ ownership and influence, which exposes protection and privacy concerns.

In health applications, IoT devices usage impacts privacy even further since the sharing of sensitive details in these technologies is not yet precisely controlled. Problems such as equity often create concern that only mid- to high-income citizens profit from adopting a scheme using high-end IoT tools to boost regular lives. This problem is related closely with the need for improved responsibility including consistency of data ownership and administration. Indians fear their anonymity, lack of confidence and the consequences of health disclosure data. People worry that their data may be misused, resulting in unintended effects, such as insurance providers declining to provide certain benefits following penetration from external parties to their health data.

Technology has developed rapidly. As we transition to more sustainable and open activities, it is vital to develop an adequate infrastructure that supports technology integrated into the pan-Indian monitoring framework. In this way, the proposed design of reference management and monitoring may build efficient applications.

Conclusion

To scope and improve reporting and monitoring programs on environmental effects on health and health networks, the present study recommends multidisciplinary partners, including government, public researchers, different sectors, suppliers of services, or innovators. The current study indicates that data management, safety, and security regulation gaps need to resolve before effective monitoring practices enforced. The public, particularly young people more aware and easily adapt to technical and technological régime. However, there's always an issue of trust and a need for digital literacy education and growth.

Although innovations including “IoT”, “Blockchain”, and “Artificial Intelligence” have enormous potential to encourage convergence of health and environmental data, still, disadvantages and complexities remain in using these technologies in health monitoring, which should tackle at priority. This paper presented an analysis of recent instances of using these three technologies, which centered on remote surveillance and surveillance, and indicated a need for an advanced computing architecture where these technologies might in the future integrated with pilot and tracking operations. The concentrated attempts to review various academic papers and government reports and the recommendations for control and operations by the technical infrastructure provide interesting details for potential research.
References


