Health Information Technology Governance: A Scoping Review of Literature

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Purpose: The scope of this review is aimed at mapping the existing literature on Health Information Technology (HIT) Governance and pointing out the existing knowledge gap(s).

Design/methodology/approach: The investigation was conducted using a scoping review methodology. Existing literature on this area of study charts the nature and content by summarising existing evidence on HIT governance. Searches were conducted in four databases: PubMed, ScienceDirect, ACM Digital Library, and IEEE Xplore databases for literature published between 1st January 2000 and 31st December 2023.

Findings: A total of twenty-five (29) articles met the search criteria and were included in this review. The findings indicated that HIT governance is operationalised through governance mechanisms and their context-specific practices. In addition, HIT governance is mainly applied in systems that are functional at the hospital and national levels of healthcare, as well as those that facilitate health information exchange, data governance, and health information governance. Governance of HIT systems that are functional at the community healthcare level have received little research attention. Furthermore, the alignment aspect has not been addressed in the reviewed literature, yet it is an essential aspect of HIT governance.

Research limitations: A significant constraint of this review is the limited scope of literature searches conducted exclusively in four databases.

Practical implications: This study contributes to the theoretical understanding of HIT governance in HIT implementation and use.

Originality/value: This study covers the governance of HIT integrations and applications by investigating how it is achieved. This is done to shape further research agenda.

Keywords: Health Information Technology, Health Information Systems, Governance

1 Introduction

In most developing countries, the healthcare sector is organised in levels such as the national, sub-national and community levels. Kenya is one of the developing countries where the healthcare sector is divided into distinctive levels namely: national referral hospitals, county and sub-county hospitals, primary healthcare facilities and the community healthcare levels. The overall leadership and governance of health lies with the Ministry of Health (MoH). At the sub-national levels, governance of healthcare lies with the County Health Management Team (CHMT), the Sub-County Health Management Team (S-CHMT), and the Facility Health Management Team (FHMT). Community Health Committees (CHCs) act as the leadership and governance body at the community level. The responsibility of each of these bodies is to facilitate the strengthening of health systems. Information Technology (IT) integration plays a crucial role in this endeavour.

Information Technology has become a crucial enabler in every sector of the economy [1]. It facilitates efficient and effective service delivery in different industries. Among them is the healthcare sector, which has also experienced a significant increase in the adoption and use of Health Information Technology (HIT) across the globe [2] [3]. Different Health IT integrations have been rolled out in different levels of healthcare to support and facilitate health service delivery. HIT encompasses various technologies and applications such as computer and electronic communication systems that collect, analyse, manage, store, and exchange health-related information. Examples of HITs include Electronic Health Records (EHRs), Electronic Medical Records (EMRs), Health Information Exchange (HIE), Telemedicine and Telehealth, Mobile Health (mHealth), Healthcare Analytics, Health Information Systems (HIS),

Health Information Management Systems (HIMS), Healthcare Interoperability, Clinical Decision Support Systems (CDSS), Patient Portals, among others [4] [5] [6] [7] [8] [3] [9] [10].

Several opportunities and benefits are associated with the adoption and use of HIT in developing countries. These benefits include improving patient care, reducing medical errors, enhancing care coordination, increasing the efficiency of healthcare processes, better management of patient data, improving communication among care teams, improving service quality, operational efficiency, and patient satisfaction, among others [11] [12]. Whereas the different governance bodies are required to strengthen health service delivery, governance of the different HIT integrations is also necessary to facilitate HIT performance and to improve health outcomes.

1.1 Rationale of the study

Despite literature on Information Systems (IS) revealing the benefits as well as the associated opportunities in HIT integrations, especially in developing countries, there is limited performance and sub-optimal value derivation seen from HIT investments [13] [14] [15] [16] [17] [18] [19]. Existing literature reveals that over 50% of EHR systems (an example of HITs) either fail or are inadequately utilised [20]. Similarly, [21] postulated that HIT activities exhibit a failure rate of up to 70%, leading to negative and unintended consequences. According to [21], project delay, cost overrun, failure to meet the intended goal, and complete project abandonment are some of the noted failures.

To avoid these failures and get an optimum performance and value derived from HITs, several interventions, including HIT governance, need to be addressed [22] [23] [2] [24] [25] [26]. Effective HIT governance is essential for ensuring successful HIT integrations and the smooth functioning of HIT systems [27] [26]. Furthermore, HIT governance facilitates positive health outcomes [22] [23] [2] [26], and consequently, a proper functioning of the health system [28] [29] [30] [2] [26].

The primary objectives of this review are (1) to examine how Health Information Technology governance is discussed in the existing literature and (2) to identify Health Information Technology governance knowledge gap(s) that exist in the literature.

Two research questions guided the review:

RQ1. Which Health Information Technology governance mechanisms and associated practices operationalise HIT governance in the existing literature?

RQ2. What are the Health Information Technology governance knowledge gaps in the literature?

While acknowledging that HIT governance and associated practices are context-specific and what may apply to one healthcare level and organisation may not be generalised in other healthcare levels and organisations. This review presents a theoretical understanding of how HIT governance has been addressed in the existing Information Systems (IS) literature in order to benefit academia. In addition, this review seeks to benefit IS practitioners by providing clarity on HIT governance mechanisms and practices that can be designed and implemented for different HIT integrations and applications. Furthermore, the results of this review may have policy implications that can inform the development of HIT governance policy.

1.2 Health Information Technology (HIT) Governance

IT Governance has been defined differently by many authors. As laid out by the IT Governance Institute (ITGI), IT Governance is a set of governance approaches rooted in organisational structures, leadership, processes, and relational mechanisms. According to [31], IT governance is the capacity of the board, executive, and information technology management to effectively guide the development and execution of IT strategy, thus assuring the integration of business and IT. [32] defined IT governance as establishing a framework that determines decision-making authority and accountability to promote desired behaviour in the utilisation of IT.

Three fundamental principles of IT governance arise from these definitions. These principles are executive-level participation, integrating business and IT plans to achieve optimal performance, and implementing risk mitigation techniques concerning the chosen IT strategy. The fundamental concept is to enable organisations to establish IT alignment, allowing them to accomplish their strategic objectives. IT governance assesses the level of synchronization and benefits obtained from IT investments and resources. The more the organisation can effectively and efficiently utilise its IT resources, the better the level of organisational success in achieving its goals and objectives.

Like other sectors, IT in healthcare (digital health) has become pervasive and indispensable. Therefore, governance of such digital health solutions and applications is critical in determining how and when to harness digital health

solutions. This is done to improve accessibility, quality, and affordability for the health system, and generally to improve health outcomes [33] [34] [27] [2] [35] [26]. Health IT governance refers to structures, processes, relational mechanisms, and associated practices that ensure health IT supports, extends and sustains the realisation of the healthcare mission, vision, objectives and goals. On this basis, the governance of health IT cannot be overlooked.

As stated earlier, health IT governance practices are contextual and cannot be generalised, and this fact should not be overlooked when implementing HIT. The lack of generalisability of such practices is more apparent in the healthcare sector, which is multi-level characterised by many stakeholders. For instance, some HITs are functional at the national healthcare level, at the sub-national levels, hospitals, and at the dispensaries, clinics, and community levels. As such, governance practices for all these HITs cannot be generalised. For example, governance practices for HITs functioning at the hospital level differ from those at the community level. [36] [37] posited that every organisation calls for context-specific IT governance mechanisms and associated practices. While affirming this argument, [38] argued that a high-level IT governance model cannot be applied across all sectors and produce similar results.

These arguments show that mapping the body of knowledge on HIT governance is necessary. The research studies included in our scoping review examined the governance of different Health Information Technologies (HITs), such as Electronic Health Records (EHRs), community-driven health information technology, Health Information Exchange (HIE), Personal Health Records (PHRs), MEGAHIT System, Computerized Provider Order Entry (CPOE), data warehouse, virtual data warehouse, among others. Nevertheless, of interest to this study was the extent to which HIT governance was discussed in the existing literature and how it is accomplished. Examining the level of discussion on HIT governance in the current literature was essential as IT professionals, academics, and policymakers need to understand how to regulate HIT applications and solutions in the healthcare industry. Our approach provides valuable insights for these professionals and informs policy interventions.

2   Materials and Methods

2.1   Selection of the scoping review method

The investigation was conducted using a scoping review methodology. This approach is driven by the overarching objective of the study, which is to systematically document the current understanding of HIT governance. Scoping reviews, as described by [39] [40], is a method of synthesizing information aimed at methodically discovering and categorising a wide variety of data on a specific topic, field, concept, or concern. It includes utilising primary research, reviews, and non-empirical evidence without regard to their source or the particular contexts in which they are found. The aim is to identify deficiencies in the research knowledge base, elucidate fundamental concepts, record and categorise the various relevant evidence forms and provide guidance for further research agenda [41]. [39] contended that the selection of the review is kind of contingent upon the inquiries posed by the researchers and the objectives of their review. Systematic reviews are well-suited for endeavours that attempt to assess the suitability or effectiveness of a given practice.

Similarly, scoping reviews are good for investigations that intend to identify specific concepts for mapping, reporting, or discussing them [42] [39]. A scoping review approach was chosen based on the study's objectives, which sought to examine how HIT has been addressed in the literature and point out the existing knowledge gaps. Before conducting the review, the study group formulated a protocol.

2.2   Information sources

A scoping review was conducted to map the existing body of literature from January 2000 to December 2023. The review focused on peer-reviewed articles from four databases: PubMed, ScienceDirect, ACM Digital Library and IEEE Xplore. The search was designed for "specificity" using "Health information technology" and "governance" search terms. The search was also limited to peer-reviewed articles published in English. Table 1 presents the four databases searched and the search terms utilised.

2.3   Eligibility criteria

The studies included in the review met the specified criteria for inclusion. The articles focused on three main aspects: (1) HIT governance, (2) publications from January 2000 to December 2023, and (3) addressing HIT governance mechanisms which are, in particular, structures, processes and relational mechanisms. Studies were excluded if they: (1) did not exist in full-text; (2) were not written in English; (3) they had missing information and abstracts and indexes; (4) were commentaries or editorials.

2.4   Extracting and charting the results

PubMed, ScienceDirect, ACM Digital Library and IEEE Xplore databases were searched simultaneously on 31st December 2023 using the advanced search interface using the terms indicated in Table 1.

Table 1. Databases and the search terms

S.No	Database	Search terms
1	ScienceDirect	"Health information technology" and "governance"
2	PubMed	
3	ACM Digital Library	
4	IEEE *Xplore* databases	

The following limits were applied: scholarly journals (peer-reviewed); publication date (1st January 2000 to 31st December 2023); language (English); and article type (review and research articles). The search terms used are "health information technology" and "governance". A total of 1,217 articles were retrieved and screened by title and abstract. Duplicate articles were excluded in the exclusion process. The study selection method also rejected articles that did not match the inclusion requirements. The excluded articles encompassed healthcare system governance, adopting Health Information Technologies (HITs), and applying governance of technologies like Artificial Intelligence (AI) and blockchain in healthcare. We carefully reviewed a total of 46 articles, out of which 29 were selected for our scoping review. These articles are included in Figure 1, which depicts the PRISMA flow chart.

The main reason for exclusion was articles that generally focused on the governance of general health systems but did not focus on HIT governance. In addition, 17 articles were omitted from the review for the reasons that they focused on general health governance and big data governance [43] [44] [45], those focusing on AI governance [46] [47]. Other excluded a study that examined Ambidextrous governance of IT-enabled services [48], Governance of Blockchain Technology [49], E-Governance [50] and Governance's role in local health departments' information system and technology usage [51].
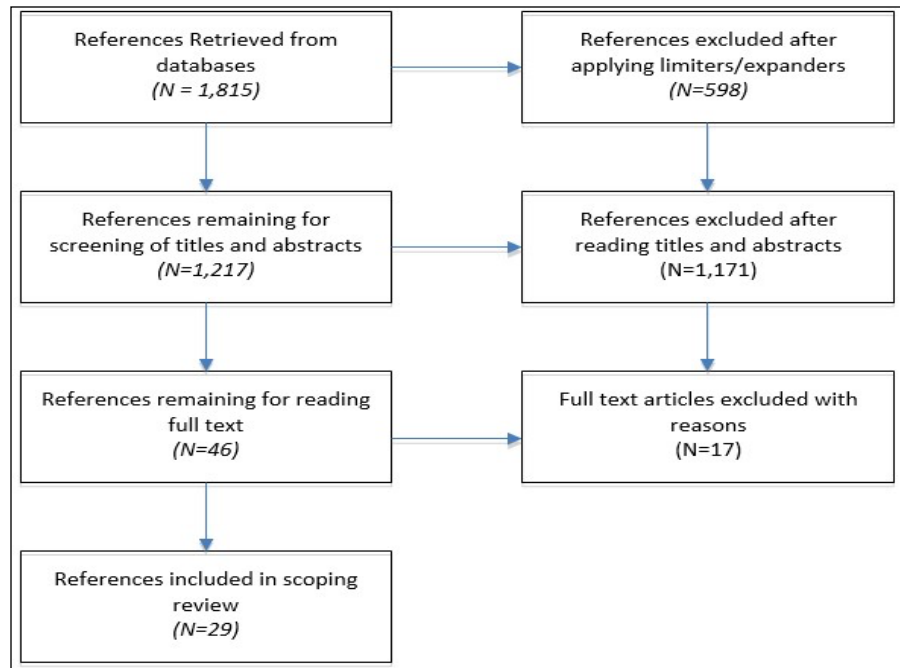
Figure 1. PRISMA flow chart of study selection as described by [52]

2.5   Data charting process and analysis

Consistent with scoping studies by [52], we gathered the data from the articles included in the research and organised it into a table before analysing and summarising the results. Table 2 summarises the article's title, author, year, aim/purpose, method, findings regarding HIT governance mechanisms and practices, and recommendations/research gaps. The data were analysed following the three manual stages of theme analysis as described by [53]. The stages are data reduction, data display and data conclusion. Data reduction involves selection, simplification and transformation of the data. Data display entails organising and compressing data with the guidance of research questions/objectives. The third stage entails concluding after having displayed data in a variety of ways.

3   Results and Findings

This scoping review yielded 29 articles. Of these, 14 were from the PubMed database, 11 were from the ScienceDirect database, and the remaining 4 were from the IEEE Xplore database. None of the articles from the ACM database met the inclusion criteria. Out of the 29 articles that met the inclusion criteria, 24 (representing 82.8%) presented primary collected and analysed data. The remaining 5 (representing 17.2%) articles were a review of literature articles. Table 2 summarises the articles, capturing the title, author, year, aim/purpose, method, findings (HIT governance mechanisms and practices), HIT governance mechanism category, and recommendations/research gaps.

Table 2. Summary Table of the articles that met the inclusion criteria

S.No	Title, Author and Year	Aim/Purpose	Method	Findings (HIT governance mechanisms and associated practices)	HIT Governance Mechanism Category	Recommendations/Research gaps
1	Data governance and data sharing agreements (DSA) for community-wide health information exchange: lessons from the beacon communities Allen *et al.* [54]	Address data governance challenges and create Data Sharing Agreements (DSAs) to promote the interchange of health information across the community.	A collaborative effort that included holding Conference calls	Organisations engaged in electronic data sharing must resolve governance matters and establish Data Sharing Agreements (DSA). DSAs are essential for addressing legal and market-related considerations.	HIT governance Processes Mechanism	Lessons learned and approaches to developing DSA include engaging stakeholders, identifying and communicating the value proposition, starting small, and expanding. It also includes Implementing a cost-effective strategy, tackling market-related issues, modifying and expanding current agreements and partnerships, and forecasting the necessary time and financial resources.
2	Long-term care and health information technology: opportunities and responsibilities for long-term and post-acute care providers (LTPAC). MacTaggart and Thorpe [55]	To examine HIT issues, the providers of LTPAC need to comprehend for successful implementation	Qualitative study	The challenges associated with transitioning to HIT encompass technical and financial aspects as well as legal and legislative considerations, technical and commercial operations, and, most importantly, governance.	HIT governance Processes Mechanism	The study stops at acknowledging the need for governance of HIT initiatives.
3	The Southeastern Minnesota Beacon Project for community-driven health information technology: origins, achievements, and legacy Chute *et al.* [56]	Documenting the origin, achievements, and legacy of the organisation and infrastructure of the Southeastern Minnesota Beacon Project	Qualitative study	The Beacon project encourages the adoption of health information technology (HIT) within a particular geographical area. A community-chartered governance structure, which all members supported, facilitated the development and management of health information technology based on the community's needs. The governance body established a governing council with representatives from each entity involved.	HIT governance Structural Mechanism	Collaboration, cooperation, and shared governance are essential for successfully implementing HITs across a population that includes many providers and non-traditional healthcare organisations.
4	Digital health transformation in Saudi Arabia: A cross-sectional analysis using Healthcare	The study evaluates the readiness for digital health transformation in	Questionnaires	For digital health transformation to succeed, it is crucial to have four fundamental components: individual-empowered healthcare, predictive analytics, effective governance and workforce, and seamless interoperability.	HIT governance Processes Mechanism	The study recommends the proper implementation of different healthcare aspects. Among these, healthcare digital transformation requires governance and workforce dimensions.

	Information and Management Systems Society's digital health indicators Al-Kahtani *et al.* [28]	numerous health facilities in the Eastern Province of Saudi Arabia.				
5	Health information exchange implementtation: lessons learned and critical success factors from a case study Feldman *et al.* [57]	To understand the technological, organisational, and governance elements necessary for implementing a health system into a statewide Health Information Exchange (HIE).	Qualitative methods	Implementing a health system across the states to facilitate Health Information Exchange (HIE) requires three crucial aspects: technological, organisational, and governance. The Inova onboarding project aims to implement a health system into a statewide Health Information Exchange. It identifies leadership and project champions with decision-making power, communication, onboarding guidelines and project resources as essential success factors.	HIT governance structural, processes and relational mechanisms	Future research should evaluate the economic and clinical elements linked to the value of HIE and expand the investigation to include social factors and public value. To comprehensively comprehend the issue, it is imperative to utilise mixed-method case studies that incorporate surveys and encompass extensive geographical locations.
6	Smart Health Community: The Hidden Value of Health Information Exchange Ciriello and Kulatilaka [42]	Examine how to create more value than efficiencies from HIT investments through the innovative health community.	Qualitative study	Comprehensive governance of the Health Information Exchange (HIE) is necessary to achieve the coevolution of healthcare markets and business models and generate additional value beyond efficiencies from investments in Health Information Technology (HIT). Nevertheless, the process of coevolution is characterised by a slow pace, primarily due to the lack of motivating factors for existing delivery systems and limitations imposed by the dominant patient-healthcare paradigm.	HIT governance structural, processes and relational mechanisms	The study suggests that developing healthcare markets and business models simultaneously requires implementing novel governance processes, structures, and partnerships.
7	A Mid-South Chronic Disease Registry and Practice-Based Research Network to Address Disparities Surbhi *et al.* [25]	To elucidate a cutting-edge health information technology (HIT) framework to facilitate community-wide health enhancement.	Case study	HIT data structure and governance practices include the DWPC registry data governance board, DWPC steering committee, and DWPC registry data management committee. The study indicates that the Health Information Technology (HIT) Governance framework facilitates the enhancement of overall community health.	HIT governance structural mechanism	The study suggests that implementing regional HIT initiatives, such as registries and practice-based research networks (PBRNs), can contribute to a more efficient healthcare delivery system.
8	Data warehouse governance programs in healthcare settings: A literature review and a call to action Elliott *et al.* [58]	The review examines what is known about data warehouse governance to	A literature review	A data warehouse governance (DWG) primarily concerns strategic decision-making and oversight, carried out by DWG's committees The secondary objectives are to prioritise the distribution of resources, the assessment of investment worth, the	HIT governance structural and processes mechanisms	Further investigation is required to tackle the issue of data warehouse governance policies. The limited research on this topic shows a significant lack of explicit governance policies for data warehouses in healthcare settings.

#	Title	Aim	Methodology	Findings	Mechanism	Recommendations
		assess its current status.		establishment of policies and processes related to privacy and security, compliance, and the reduction of risks. Additional governance processes encompass accountability, authority, roles, rules of engagement, management of multifunctional conflicts, decision-making and entitlements, leadership, change management, issue resolution, legislation creation and implementation, cost and complexity management, value creation, user training and support, and technical operations.		
9	Building and Strengthening Infrastructure for Data Exchange: Lessons from the Beacon Communities Torres *et al.* [59]	Investigates the strategies and encounters of the Beacon Communities in constructing and enhancing Health Information Technology infrastructure.	Qualitative research that utilised interviews, observations and document analysis	The study indicates that technical progress, stakeholder engagement and governance are three crosscutting priority areas for strengthening HIT infrastructure. According to the study, governance is critical to fostering trust and stakeholder confidence through neutral conveners and transparent governance structures, especially in competitive markets.	HIT governance structural and relational mechanisms	The study recommends measures which include promoting technological advancements and innovations, engaging essential stakeholders, and setting up accountable leadership and governance of the infrastructure with unbiased facilitators to improve data-sharing infrastructures.
10	Driving digital health transformation in hospitals: a formative qualitative evaluation of the English Global Digital Exemplar (GDE) programme Krasuska *et al.* [27]	The study aims to analyse how the GDE program facilitates digital transformation in the provider organisations involved.	Qualitative study	Providing dedicated funds, adherence to governance criteria, and acquiring a positive reputation as a centre of digital excellence expedites the digital transformation in organisations participating in the GDE project. Some of the practices associated with governance include the GDE programme board and the chief clinical information officer (CCIO).	HIT governance structural and processes mechanisms	The study recommends implementing measures that include protected funding and governance mechanisms and exploiting reputational benefits, which are crucial for driving local progress necessary for large-scale digital transformation programs in healthcare.
11	Lessons learned from the implementation of computerised provider order entry in 5 community hospitals: a qualitative study Simon *et al.* [24]	The study describes the experiences of hospitals that have effectively used Computerized Provider Order Entry (CPOE) systems.	Qualitative approach (observations and semi-structured interviews)	Implementing CPOE involves five domains: governance, planning, assistance, opinions, and implications. Governance matters focus on implementing a well-defined organisational decision-making process and involving clinicians. Governance issues include preparation, planning, support, managing perceptions, and assessing the effects.	HIT governance structural and processes mechanisms	The study suggests that for CPOE adoption to be effective in community hospitals, it is essential to consider concepts such as governance, preparation, support, perceptions, and repercussions during the project design phase.
12	The HMO research network (HMORN) virtual data warehouse (VDW): a public data	The study addresses the HMORN VDW data model,	Qualitative study	HMORN established a governance framework consisting of the VDW operations committee, the VDW implementation group (VIG), the asset stewardship committee, and the HMORN governing board.	HIT governance structural and processes mechanisms	The study proposes that healthcare and health insurance systems not affiliated with the HMORN can adopt the VDW data framework to create a decentralised and

	model to support collaboration Ross *et al.* [60]	governance principles, data content, and quality assurance techniques.		The report emphasises the structured procedures for modifying VDW specifications, introducing new VDW tables, and establishing new workgroups.		compatible healthcare data system or collaborate with the HMORN through partnerships.
13	Identifying Organisational Capacities and incentives for clinical data-sharing: the case of a regional perinatal information system Korst *et al.* [61]	To investigate the progress of regional data exchange among healthcare institutions	A case study using standard qualitative methods	The study demonstrates that effective data sharing among healthcare organisations necessitates the following: 1) An evaluation of preparedness, 2) a recognised authority, 3) a formal governance structure, and 4) an external IT provider.	HIT governance structural mechanism	The study suggests that it is advisable to establish a governance structure before developing a data-sharing system.
14	Developing a Model for National Health Information Governance (IG) Program in Iran Rouzbahani *et al.* [62]	The study aims to create a framework for Iran's national health information governance initiative.	Applied, cross-sectional descriptive study	The national IG program comprises 11 components, 12 principles, and natural and judicial authorities. These authorities are responsible for implementing the health IG program and have specific job descriptions.	HIT governance structural mechanism	The report suggests the creation of a health Information Governance (IG) council and a steering group for health IG inside the Ministry of Health and Medical Education. Additionally, it suggests the creation of a board of directors tasked with supporting the national health IG program.
15	Health Information Technology and Value Middleton and Cheung [18]	Examine the obstacles and factors that contribute to the successful utilisation of Health Information Technology (HIT) and explore specific value of HIT.	Literature review	The primary impediments to HIT implementation include the intricate nature of healthcare, subpar system usability, user dissatisfaction, and challenges relating to the organisation, such as leadership issues.	HIT governance structural mechanism	The study recommends various strategies to enhance the value of Health Information Technologies (HITs). These aspects encompass engaging experts, offering incentives, prioritising activities, improving usability and workflow assistance, promoting interoperability and adhering to standards.
16	Governance for Personal Health Records (PHR) Reti *et al.* [63]	The study aims to explore effective organisational-level personal health records (PHR) governance structures.	Used semi-structured interviews within specifically chosen organisations in the United States.	Governance structures vary in all healthcare organisations/settings. They include the Steering Committee, Senior Management, eHealth Product Team, Connecting Portfolio Oversight Group, Advisory Group, and Advisory Board. The current governance of the Personal Health Record (PHR) system involves indirectly representing patients through doctors or Consultative assistance networks. The study argues that such indirect representation is insufficient and patients must "be at the table."	HIT governance structural mechanism	Personal health records serve as communication tools for professionals and patients. Therefore, the study suggests that the governance of Personal Health Records (PHR) should include the participation of patients to enhance patient-centered treatment and the development of policies.

17	Governance structures impact on eHealth Kierkegaard [64]	Investigated Denmark's success in moving into an eHealth-focused healthcare system	A case study approach and literature search	The efforts to implement national eHealth initiatives must move beyond technological considerations and examine enablers and barriers such as governance structures and policies.	HIT governance structural and processes mechanisms	Successful national eHealth implementation requires consideration of the dynamic nature of governance. Also, it is essential to balance centralisation and decentralisation models of governance.
18	Collaboration in electronic medical evidence development: A case study of the Social Security Administration's MEGAHIT System Feldman and Horan [29]	To investigate the individual contributions of technological, organisational, and governance aspects to the effectiveness of collaborative endeavours in generating value from the MEGAHIT system.	A case study that involved conducting interviews with 43 participants	The MEGAHIT application facilitates the authorised exchange of patient health information by sending requests for and receipts. The success of information sharing through MEGAHIT requires the establishment and strengthening of end-to-end governance structures, addressing privacy, security, data use and reciprocal support agreements (DURSA), certificate authority (CA), and Service Level Agreements.	HIT governance structural and processes mechanisms	The study suggests enhancing collaboration to effectively exchange information via a safe and accessible system.
19	Social Franchising: Scale and Spread of Innovation in Canada Maciejewski et al. [30]	Examined how Canada leverages social franchising (governance model) in healthcare contexts and innovations.	A literature review	Catalysing HIT innovations and use requires a governance model and approach incorporating different teams and committees to oversee the rollout and use of health IT. According to the study, the National BASE™ Governance model comprises networks, a national BASE™ committee, a corporate subcommittee, an Information Technology subcommittee, and action teams.	HIT governance structural mechanism	The study suggests implementing a National BASE™ model that utilises social franchising to expand and disseminate effective HIT initiatives.
20	Building resilient hospital information technology services through organisational learning: Lessons in CIO leadership during an international systemic crisis in the United States and Abu Dhabi, United Arab Emirates. Cousins et al. [33]	To document the most effective strategies employed by Chief Information Officers (CIOs) to recover from challenges	A qualitative study	Four essential practices required to establish robust hospital information technology services include ambidextrous leadership, governance (including committee structures, strategic planning processes, project approvals, strategic partnerships, regulatory flexibility, financial support Health Information Technology (HIT) activities, investment in IT infrastructure, and enhancement of innovation and learning capacities are required.	HIT governance structural and processes mechanisms	The article proposes a conceptual framework to direct the creation of healthcare IT resilience and emphasises the significance of organisational learning as a fundamental aspect of HIT resiliency.
21	Breaking the Healthcare Interoperability Barrier by Empowering and	The study examined essential elements required to break the	An evaluation of related work	The study introduces a framework characterising the essential elements of interoperable healthcare systems.	HIT governance structural and processes mechanisms	The study suggests that three essential components are necessary for the successful integration of healthcare: an

	Engaging Actors in the Healthcare System Azarm *et al.* [65]	healthcare interoperability barrier in Canada.		The management and legal enforcement of the framework should be entrusted to the governing body overseeing the healthcare system.		adequate dataset, interoperable technology solutions, and a governing authority.
22	Transforming healthcare with information technology in Japan: A review of policy, people, and progress Abraham *et al.* [66]	Investigated the adoption of Health Information Technology (HIT) in the medical community of the Kyoto Yamashina area. Impact of historical and current Japanese governmental policies that promote the use of HIT.	A case study utilising interviews as well as document analysis	An IT leadership with strong IT knowledge is necessary for transformation in healthcare IT. Equally significant are the Chief Information Officer (CIO), governmental factions, and consortiums that guide the IT Policy Office. It is crucial to train healthcare organisational staff on the fundamental aspects of IT management and the responsibilities of a Chief Information Officer (CIO) to foster strong leadership within organisations that will implement Health Information Technology (HIT). Furthermore, it is crucial to comply with policies and standards and prioritise security, privacy, and confidentiality considerations. Functionality related to meeting security and data encryption.	HIT governance structural and processes mechanisms	The study suggests that it is necessary to establish a comprehensive governance framework to achieve widespread implementation of Health Information Technology (HIT).
23	Successfully implementing a National Electronic Health Record (EHR): a rapid umbrella review. Fennelly *et al.* [34]	It analyses crucial elements that influence the effectiveness of an Electronic Health Record (EHR) deployment in various healthcare settings.	A rapid umbrella review	Critical determinants of Electronic Health Record (EHR) success encompass essential elements such as effective governance, strong leadership and organisational culture, active participation of end-users, comprehensive training programs, robust support systems, adequate allocation of resources, and optimised workflows. Additional considerations encompass usability, interoperability, adaptability, infrastructure, regulations, standards, and testing.	HIT governance structural and processes mechanisms	The study recommends contextual healthcare considerations for issues affecting EHR initiatives.
24	Computerised Provider Order Entry (CPOE): Important Non-technical Issues and Considerations Harrington *et al.* [67]	The study sought to explore critical non-technical issues required in CPOE implementation and use	Qualitative study	CPOE implementation requires technological and non-technical considerations. Some of the governance structures for CPOE success include a safety committee, a governance group, a committee or a council. Processes include workflows and personnel training and engagement.	HIT governance structural and processes mechanisms	The study emphasises the importance of careful planning to minimise disturbance. It also highlights the need for active involvement and guidance from all clinicians using CPOE in the clinical setting.
25	A literature review for large-scale Health Information System project planning, implementation and Evaluation Sligo *et al.* [35]	Important factors necessary for HIS implementation	A literature review	The efficient execution of Health Information Systems necessitates meticulous administration, governance, and task-orientated structures. Equally important is the need for low staff turnover, strong staff capabilities, practical timetables, well-organised logistical procedures about the innovation, and recognition that the implementation process is continuous. HIS implementation involves legal, administrative, communication, human factors and support.	HIT governance structural, processes and relational mechanisms	The study recommends a more rigorous evaluation of the implemented HISs in healthcare settings. The current body of literature is insufficient and hindered by oversimplified and varied methodologies, making it challenging to draw general conclusions from the findings.

26	Health Data Governance Issues in Healthcare Facilities: Perspective of Hospital Management Oktaviana *et al.* [68]	Analyse the issues in healthcare facilities related to health data governance	A qualitative study	Identified five major health data governance issues in healthcare facilities. These are IT resources and responsibility, data quality, data security, data standards, and policies	HIT governance processes mechanism	There is a need to explore both internal and external challenges facing health data governance to improve the benefits of the technology
27	e-Health should be governed as other assets in healthcare organizations Juiz *et al.* [69]	Sought to develop a common IT governance framework model for healthcare institutions based on the ISO/IEC 38500 standard.	A qualitative study in four different hospitals	The Standardization of IT governance in healthcare institutions is in the following categories: Structures - IT governance steering committee and the IT governance advisory/technical committee Alignment processes: IT services adjustment, the IT project portfolio selection and the IT investment prioritization. Communication: Exchange of documents and reports and the publication of the results of IT activities	HIT governance structural, processes and relational mechanisms	The proposed model provides how to deploy particular IT governance frameworks including the usual governance components: structures, alignment processes and communications. Need to examine the effectiveness of the proposed governance framework.
28	Establishing ICT Governance for Regional Information Infrastructures in Healthcare Ulriksen *et al.* [70]	Sought to develop an ICT governance organization	qualitative interpretive methods - meetings	Governing Information Infrastructure requires structures, processes and relational mechanisms but more importantly, a focus on the process for handling diverging political interests and managing tensions and complex interdependences. Governing the Information Infrastructure requires local, regional and technical perspectives to be able to serve all the needs of all the stakeholders.	HIT governance structural, processes and relational mechanisms	Need to develop an ICT governance organization to govern Information infrastructure to facilitate information sharing, standardization and interoperability of healthcare IT integrations.
29	IT Governance Design for Hospital Management Information System Case Study: X Hospital Shalannanda *et al.* [71]	Sought to develop an effective IT Governance mechanism for X Hospital.	A Single Case Study	IT Governance design process follows the structure, processes and relational mechanisms The findings indicate the need to tailor-make IT Governance practices for X Hospital.	HIT governance structural, processes and relational mechanisms	Recommends the integration of COBIT 5 and ITIL v3

4   Discussion of research findings

The section below presents findings as per the review objectives.

4.1   Objective 1: How Health Information Technology (HIT) governance is discussed in the literature

This study showed that Health Information Technology (HIT) Governance is essential and cannot be overlooked. It supports studies [28] [29] [30] who argue that HIT Governance enables the well-functioning of digital health solutions and also acts as a prerequisite for health system functioning. This argument is a departure from the usual ideology where HITs have majorly focused on the technological components and less on the broader social issues. In support of this proposition, [33] [67] [64] [27] argued that the implementation of HITs needs to consider both the technical as well as social issues, such as leadership and governance, which also include structures and policies. According to [55] [72] [34] [60], non-technical issues of HITs include funding, legal and policy concerns, business operations, HIT governance, among others.

However, the mere mention of the need for HIT governance is not enough, it needs to be operationalised and contextualised. Studies [56] [42] [58] [57] [69] [63] [60] [71] [25] [70] provided a more detailed examination of the HIT governance and suggested its three categories commonly referred to as governance mechanisms. These are the HIT governance structures, processes and relational mechanisms.

4.1.1 HIT Governance Structural Mechanism

The HIT governance structure pertains to the power distribution that decides across the health information technology ecosystem. As defined by the IT Governance Institute, an IT governance structural mechanism is a formal device and mechanism that promotes horizontal communication and collaboration between business and IT management roles in decision-making. Examples include the HIT steering committee, HIT council, and project management office, among others. Such bodies/teams are responsible for making HIT decisions. Of the 26 articles reviewed, 17 (65.4%) explicitly mentioned the need to design and implement appropriate HIT governance structures. Studies [42] [58] [29] [34] [64] postulated the existence of a HIT governance structural mechanism operationalised through various governance practices.

According to [30], specific eHealth governance teams and committees have been established to supervise the implementation and utilisation of HIT innovations. These include the Networks Committee, National BASE™ Committee, Corporate Subcommittee, Information Technology Subcommittee, Action Teams, and the Secretariat. [27] investigated the success of the GDE program. The authors observed the establishment of project management structures and the rise of various leaders in clinical health informatics, including the Chief Clinical Information Officer, Chief Nursing Information Officer, Chief Medical Information Officer, and Deputy Chief Clinical Information Officer, who possess a blend of clinical and digital transformation knowledge. The success of health information exchange functionality and networking infrastructures at Kyoto Yamashina in Japan relied on different enablers, including the creation and inclusion of the office of the CIO [66]. [67] also noted that the success of the Computerized Provider Order Entry (CPOE) system relied on establishing governance practices such as committees or councils instead of workgroups and the safety committee. [35] echoed the need for sustainable structures as opposed to temporary workgroups, transparent management and governance structures, and task-orientated structures as opposed to output-oriented structures, which play a crucial role in HIS project planning, implementation and evaluation. [62] reiterated that the information governance (IG) council and the steering committee form essential governance practices.

[56] reiterated for the need of HIT governance structures. They argued for the establishment of HIT governance teams, including a governing council. In addition, a project champion with decision-making power is also essential [57]. [25] pointed out other governance structures, including the Diabetes Wellness and Prevention Coalition (DWPC) Registry Data Governance Board, the DWPC Steering Committee, and the DWPC Registry Data Management Committee. A study by [60] on virtual data warehouses pointed out that some of the HMO Research Network (HMORN) Virtual Data Warehouse governance structures included Virtual Data Warehouse (VDW) Operations Committee (VOC), VDW Implementation Group

(VIG), Asset Stewardship Committee (ASC) as well as the HMORN Governing Board. Furthermore, [63] pointed out some Personal Health Records (PHR) governance structure practices including a steering committee, senior management, eHealth product team, connecting portfolio, oversight group, advisory group, and advisory board with patient representatives.

4.1.2 HIT Governance Processes Mechanism

HIT governance processes form the second category of HIT governance. It refers to the different actions or activities implemented to achieve health outcomes. These processes include workflows, allocation of resources, standard operating practices, policies and procedures. Studies [66] [29] [34] [67] argued for the need to implement HIT governance processes.

The reviewed literature pointed out various practices associated with HIT governance processes. For example, conducting training, end-user involvement, resourcing, system implementation support, developing HIT standards, providing incentives, clear legislation regarding accountability, change management, as well as addressing security, privacy and confidentiality are some of the governance practices aimed at transforming healthcare with information technology [66] [34] [68]. In addition, establishing Data Use and Reciprocal Support Agreements (DURSA), Certificate Authority (CA), and Service Level Agreements (SLA), policies, procedures, privacy, security, risk assessment and compliance, and risk mitigation as well as data sharing agreements (DSAs), are also essential practices [54] [58] [29] [68] [25].

[67] [60] reiterated the importance of governance processes issues, such as establishing workflows and engaging personnel. They also advocated for organisations to address emerging CPOE implementation issues such as content changes, the functionality of the CPOE system for updates and enhancement, review and evaluation, adherence to the regulatory standards and provisions, as well as approved content changes, including appropriate policies and procedures. In their reviewed literature on large-scale health information system (HIS) projects, [35] emphasized on the significance of governance practices including but not limited to low staff turnover, competent staff with adequate capabilities, appropriate staffing levels, realistic timelines, well-organised logistical procedures for innovation, and recognition that implementation is an ongoing process. Other studies [57] opined that on boarding guides and project resources are some of the HIT project governance issues that should also be addressed.

4.1.3 HIT Governance Relational Mechanism

The third category is the relational mechanism of HIT governance. It refers to the communication and relationships between stakeholders in HIT governance. It is as essential as HIT governance decisions and processes [42] [58] [35] [25]. HIT governance relational mechanism involves active engagement and cooperative interactions among healthcare stakeholders. It comprises stakeholders' identification and the communication approaches adopted to disseminate HIT decisions and actions. According to [57], the relational mechanisms of HIT governance are essential and of utmost importance for achieving and maintaining alignment, even when the necessary structures and processes are established. Examples of relational mechanisms in healthcare include executive-level enterprise-wide communication and the establishment or inclusion of the CIO's office, among others. [57] observed that communication through sending and receiving timely and accurate emails and promptly communicating plays a vital role in HIE and health systems implementation. [58] [25] reiterated on the role of communication practice and posited that the processes, decisions and activities that ensure data warehouse user engagement, organisational leadership and executive support, and value to the data warehouse greatly rely on effective and efficient communication.

In light of these propositions, this study concluded that there exist three broad categorisations of HIT governance mechanisms (HIT governance structures, HIT governance processes and the HIT governance relational mechanism). Furthermore, the findings from the study revealed that context-specific governance practices further operationalise each mechanism. This proposition is in tandem with other studies in healthcare contexts [11] [2] **Error! Reference source not found.** that postulated the three categorisations of HIT governance. Similarly, studies [38] [32] posit that every organisational asset requires mechanisms and associated practices necessary for alignment.

4.2 Objective 2: To identify the Health Information Technology governance knowledge gap(s) that exists in the literature

The 29 articles reviewed focused on the governance of HITs, such as those facilitating health data sharing, health information exchange, systems functional at the hospital level organisations, and national HITs. Other studies [54] [56] [42] [59] also examined community-level HITs which were the community-wide health information exchange, Smart Health Community and community-driven health information technology. The governance practices associated with the identified community-level HITs included the use of neutral conveners as a transparent governance structure [59], the use of a governing council [56], and the use of Data Sharing Agreements (DSA) [54].

Despite these attempts, none of the reviewed studies comprehensively examined the practices associated with Community-level HIT governance, yet HIT governance is contextual and should not be generalised. The governance of hospital-level HITs and their practices cannot be the same as that of community-level HITs. Such a proposition is even more apparent in healthcare organisations characterised by multiple functional systems at different levels of healthcare. In support of this argument, [12] postulated that the governance of health IT has been majorly for systems functional at hospital levels and higher levels of healthcare with little emphasis on governance of community-based health IT. [36] [37] posited that every organisation calls for context-specific IT governance mechanisms and associated practices. This argument reflects that of [38], who argued that a high-level IT governance model cannot be applied across all sectors and produce similar results.

Further, although the search strings did not contain the term alignment, none of the 29 articles reviewed mentions or even related alignment (healthcare – HIT alignment) to HIT governance, yet alignment is an essential aspect in information systems governance, particularly in HIT governance. This presented another knowledge gap. [1] conceptualised the linkage between IT governance and strategic alignment. They concluded that a mix of mature IT governance practices leads to higher IT alignment and value derivation.

5 Limitations

Our scoping review had some limitations. A major constraint of this scoping review was its reliance on only four databases, ScienceDirect, PubMed, ACM Digital Library and IEEE Xplore, to conduct literature searches. In addition, evidence from the four databases was used. A broader scoping exercise may have resulted in a more comprehensive dataset. Furthermore, this scoping review was an enormous undertaking, and the results only captured literature up to the 31st of December 2023. Finally, some studies that did not explicitly use HIT were not included due to the choice of the search strategy used in the study.

6 Conclusion

To begin with, governance for HIT integrations and systems functional at the hospital levels, national healthcare organisations, and information and data governance, including those supporting health information exchange (HIE), were addressed. Little knowledge was available in terms of community-level HIT governance, and although healthcare-HIT alignment is an essential component of HIT governance, none of the reviewed literature addressed it.

Therefore, this review unravelled the need to comprehensively examine the governance of community-level HITs, including Community-Based Health Information Systems (CBHIS). Furthermore, studies should examine healthcare-HIT alignment as an essential aspect of HIT governance. Finally, there is a need to explore the three constructs (HIT governance, alignment and health outcomes) more holistically by incorporating a mix of research methodologies (qualitative and quantitative methods). Such a holistic view will establish the downstream effect of HIT governance on health outcomes. The findings of this review form the basis for subsequent research that focuses on CBHIS governance.

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Statement of conflict of interest

The authors declare the nonexistence of any conflict of interest.

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