

Review

Conceptualising the Factors Influencing Community Health Workers' Preparedness for ICT Implementation: A Systematised Scoping Review

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Abstract: Background: Globally, community health workers (CHW) are increasingly viewed as an integral part of the health system as opposed to simply being an extension of it. Given this view, most low- or middle-income countries (LMICs) have refocused their efforts on reorganising CHW initiatives to maximise their impact. The ongoing endeavours to augment the practice of community health workers using technological solutions are characterised by as many challenges as opportunities. In low- and middle-income countries, including South Africa, information and communication technology (ICT) has become a promising development in the enhancement of the equitable coverage of health services by community health workers. However, there has not been a wide-scale implementation and adoption of ICT; most technology initiatives fail to scale up during the implementation stage, which is attributable to human and context-related factors. Although there has been an effort to develop solutions to address ICT infrastructure and technical barriers, conceptualising an evidence-based understanding of the contextual and user-related factors that influence the efficacy of technology adoption by CHWs within their multidimensional system remains critical. **Objective:** The purpose of the study is to conceptualise the social factors to consider when implementing a bespoke ICT solution suited to the specific demands of CHWs in primary healthcare in developing contexts, with a particular focus on the South African context. **Methodology:** The methodology involves synthesizing, extracting, and consolidating the findings of a systematised scoping review into concepts and factors. The review adapts Arksey and O'Malley's scoping review approach to the study and incorporates 59 relevant articles. **Results:** Although the knowledge base on CHWs is extensive, there is a considerable gap in addressing structural challenges within the community system, which contributes significantly to the overall performance of CHW programs. Factors promoting policy adaptations, common practice within the health system, CHW competencies, a community's development in terms of knowledge and economic advancement, safety and security, the environment, and the socio-cultural context all play a significant role in facilitating or impeding the success of health interventions from the individual to the national level. **Conclusions:** Within several practical limitations, the study shows that despite the efforts of various developing countries to promote technology adoption, the barriers to ICT adoption outweigh the benefits gained in developing countries. The paper argues that addressing these challenges before and during implementation is critical. The authors conclude with some essential concerns about assisting CHWs towards realising the desired health outcomes through ICT.

Keywords: community health workers; health information systems; resource-constrained environments



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1. Introduction

Globally, CHWs are increasingly viewed as an integral part of the health system as opposed to simply being an extension of it [1]. Given this view, most LMICs have refocused their efforts on reorganising CHW initiatives to maximise their impact. In 2011, the South African Department of Health formally integrated community health workers (CHWs) into the national health system to strengthen primary healthcare delivery following the Universal Health Coverage (UHC) principles and the South African National Development Plan 2030 [2]. Several studies have found that most CHWs are comfortable providing clinical treatment but are unsure how to translate epidemiological and socio-demographic data into relevant information for service delivery [3]. Information and communication technology (ICT) provides a viable mechanism for assisting CHWs with information appropriation.

To enable the healthcare system's service footprint to be expanded and strengthened, a structural response is required to determine the influence of the social determinants of health. According to Jinabhai et al. [3], a shared understanding of how to deal with the complexities of the multidimensional settings and CHW-related difficulties that drive decision making and implementation efforts is required. However, the extension of CHW programmes into national mandates has raised significant concerns, such as poor management, poor implementation, unrealistic expectations, and under-resourcing, which ultimately undermine the credibility of the CHW concept and the aspirations embodied in the National Development Plan 2030 [2,4]. The nature of CHW programmes intensifies the ripple effect of these concerns, as the effectiveness of CHW interventions primarily depends on social mobilisation rather than political transformation. Ideally, these programmes should coexist within the confines of the community environment and the organisational parameters of the official health system.

In reality, Munshi et al. [2] found that most South African communities do not benefit as much from CHW initiatives as they would have if the programmes were transplanted from the health system and integrated into communities with elements of ownership alongside other social reforms. Moreover, most CHW programmes do not live beyond the lifespan of the initial mobilisation attempt; on most occasions, the programme eventually collapses as the impetus of the mobilisation fades. One may thus argue that there is a need for an integrated approach that sustains social participation while also ensuring governmental involvement, particularly in contexts with heightened social complexities, such as South Africa, where community mobilisation has unpredictable rhythms and dynamics [2]. The need to better understand the measures promoting widespread ICT use necessitates considering the community environment, CHW needs, and the health system setting. This approach could help make a coherent, targeted, and unified implementation framework that can meet local and national health mandates, as required by the UHC principles [4].

Multiple reviews exist on CHWs in LMICs. The goal of this study is to consolidate their findings through a scoping review by meaningfully assessing and identifying the components influencing CHWs' readiness to adopt and use technological solutions from a social standpoint [5–9]. The purpose of this study is to document the CHW implementation landscape across contextual environments to identify the potential barriers and facilitators of current policies, practices, and conditions. A systematic scoping review operationalises this to better understand the existing human and environmental needs. In essence, the research goal is to investigate and analyse the evidence on CHWs in communities and health systems in developing countries, as well as how this prepares people to accept ICT solutions. The paper is organised and presented as follows: First, a brief explanation of the research methodology used to conduct the literature review is provided, followed by the search results for the included studies. Following is a section that details the narrative synthesis of the findings and a discussion of ideas for future implementation. The paper concludes with a summary of what was learned, what the research added, and some final thoughts.

2. Research Method

The authors adapted the principles of Arksey and O'Malley's scoping review methodology [10] to explore the literature in both the academic and popular press. A systematic scoping review seeks to "map the key concepts underpinning a research area as well as the major sources and types of evidence available" [11]. A scoping literature review, as opposed to a systematic literature review, allows for exploring diverse research evidence through broad search terms with less emphasis on critical appraisals. The following section outlines the steps taken to identify and analyse eligible studies through document analysis.

2.1. Search Strategy

The authors first completed a preliminary search of an online database for peer-reviewed papers, Scopus. Search phrases were purposefully developed to ensure that relevant studies could be identified. Following that, the keywords were combined to form a master search string, which was then used as a full search string across multiple databases, including Scopus, PubMed, Web of Science, and Science Direct. Additionally, the authors used a snowball search strategy to identify supplementary studies by evaluating the references provided in the eligible research. Grey literature was also found using Google, Google Scholar, and the CHW Central website. Following the database search, and operationalising transparency in the inclusion criteria, the study identified eligible studies using the population, concept, and context (PCC) guidelines recommended by the Joana Briggs Institute of Reviewers' Manual [12].

2.2. Study Selection

Table 1 shows the keyword search phrases, the databases used, and the inclusion and exclusion criteria. The inclusion criteria ensure studies are included if they present research evidence related to socio-technical factors influencing CHWs. Studies focusing on CHWs, discussing contextual factors influencing the uptake of health interventions, and incorporating ICT were thus considered. In addition, the review included research papers that attempted to shed light on the relationship between CHWs and their environments and the impact of social factors on CHWs' readiness for ICT adoption. Finally, bibliometric data of the identified articles were uploaded to Mendeley and duplicates were identified and removed.

Table 1. Summary of search criteria.

Item	Description
Keywords	Community health workers, social determinants, social issues, social factors, LMICs, developing countries, resource-constrained environment, developing context, sub-Saharan Africa, South Africa
Database	Scopus, PubMed, Web of Science, Science Direct, and Google Scholar
Inclusion criteria	Participant CHWs of any age and gender
	Pragmatism of studies Sociotechnical factors affecting CHWs within the community system and the health system
	Publication year Articles published between 2015 and 2022. The limitation in years is linked to the proliferation of ICT technology and, by extension, mobile ICT interventions in South Africa [13] Therefore, the study aimed to include more recent studies in the review.
Screening	Inclusion conditions Research articles focused on ICT implementation interventions for CHWs in developing countries.
Exclusion criteria	<ul style="list-style-type: none"> • Studies focused on in-depth reporting of the development of digital health solutions for healthcare professionals other than CHWs. • Studies on CHWs focused on developed contexts. • Editorial reviews, opinion papers, conference abstracts and studies with non-retrievable full text.

2.3. Data Extraction

The full texts of the studies were imported into Atlas.ti for full-text analysis after the exclusion criteria were applied. The authors reviewed the text and used Atlas.ti to perform thematic coding. The extracted data included the characteristics of the studies as well as factors influencing CHWs, their surroundings, and ICT uptake; the data concluded with a summary of the key findings. First, data on the characteristics of the studies were extracted including the descriptive characteristics of the eligible studies. Second, data on the influencing factors were extracted and coded from the eligible studies' results and discussion sections. Finally, the data from the discussion sections provided the author with information for further elaboration and interpretation of the findings.

2.4. Synthesis

The review used a thematic approach to synthesise the data; statistical synthesis of the results was not explored. The thematic approach included familiarisation with the data, generating codes, and producing a summary of the findings. The authors extracted the data from the selected studies' results and discussion sections into codes from which the author analysed patterns; the information was further themed using categories identified in the literature and emerging from the analysis. The following concepts were identified from the selected literature: health systems' practices, education and training, health systems' policies and competency-based tasks/role assignments, economic contexts, environmental contexts, safety and security, community-based learning and development, and socio-cultural contexts. The identified factors under each concept were further classified into subconcepts. The synthesis results were presented in tables and a conceptual map depicting the relationships between the *factors*, *subconcepts*, and *concepts*.

3. Results

3.1. Included Studies

Figure 1 shows how the PRISMA method was used to guide the addition and removal of studies from the list of initially identified literature. A total of 780 records were initially found. After removing duplicates, 686 records were considered eligible. These records' titles and abstracts were screened and 123 records met the inclusion criteria. Of these, 41 articles were considered relevant. Additional records were found by "snowballing" and were subjected to the same selection process as the initially identified records. An extra 18 studies were considered relevant. This process is illustrated in Figure 1.

3.2. Description of the Eligible Studies

The 59 articles identified for full-text analysis included qualitative, quantitative, and mixed-method studies. Of these, 37 used qualitative methods, 2 used quantitative methods, and the remaining 16 used a combination of the two. A significant portion of the research focused on CHW prospects in developing countries; additionally, the majority of the studies emphasised specific social concepts in isolation rather than as an integrated concept. Furthermore, the majority of the studies focused on CHWs as the primary demographic, with only a few studies focusing on the health system's human resource pool as a whole. In terms of geographic distribution, 23 studies focused on work on the African continent, with 10 of them primarily focused on South Africa and the remaining 13 spread across the sub-Saharan African region. Also, 18 of the eligible studies focused on LMICs, with most of them not specifying the exact geographical locations. Nine studies focused on Asian countries, two studies focused on resource-constrained environments in developed North American countries, and one study focused on South America. Lastly, six studies did not contain relevant geographical information. In terms of publication dates, only studies published between 2015 and 2022 were considered, with the majority appearing in 2017 and 2018.

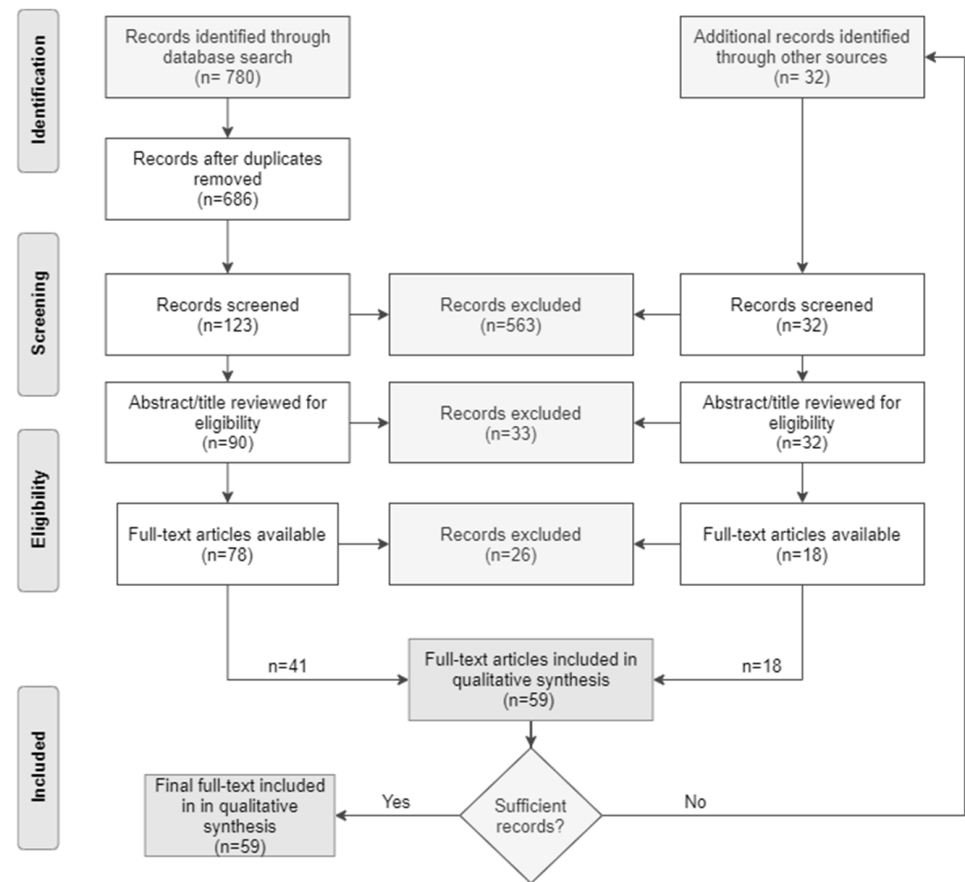


Figure 1. Flow chart of distinct phases of the systematic review.

3.3. A Narrative Synthesis of Findings

The following concepts were used to categorise the identified influencing factors: health systems' practices, education and training, health systems' policies and competency-based tasks/role assignments, economic contexts, environmental contexts, safety and security, community-based learning and development, and sociocultural contexts, as depicted in Figure 2. From the results of the studies, factors were identified, extracted, and categorised according to these concepts. To further consolidate the results, the factors were then grouped into subconcepts based on their degree of interaction and influence on CHWs' social contexts and readiness for health interventions. Each subconcept and its factors can act as a barrier or facilitate an aspect of influence. The final output is illustrated in Table 2. These concepts are discussed in detail in the sections that follow; this categorisation contributes to understanding the barriers to appraising the transferability and applicability of interventions, particularly technological interventions.

Consequently, the literature review seeks to understand how the contextual environment affects CHWs and their ability to adopt feasible technologies. Under each concept, the review's content is discussed concerning CHWs and the three contextual environments (health systems' contexts, community health systems' contexts, and community systems' contexts) that the study considers fundamental spaces for CHWs and their functions. The following illustrates the results obtained from the eligible studies.

Table 2. The categorised social factors of influence under the respective concepts and subconcepts.

Concepts	Subconcept	Factors of Influence	Support from Literature
Health system contexts	CHW workforce considerations	■Availability, integration, and professionalisation of the CHW workforce.	[5,14,15]
	Appropriate allocation of responsibilities and roles	■Task-shifting: standard operating procedures and institutional and programmatic guidelines including the national recognition of CHWs' scope of practice ■Nature of their roles and the adequacy of training compared to their tasks	[9,16–20]
	Leadership and governance	■Formalisation of the governance and leadership system and political mobilisation ■Power dynamics, decision making ■Supervision and cultural brokerages between government and leadership of CHW initiatives ■Accountability through a proper management system ■Formal authority for decision making	[14,18,21–26]
Health systems' practices	Health workforce relationships	■The lack of internal cohesion, collaboration, and communication within the health workforce ■Support capacity building ■Interpersonal support ■Workplace support	[8,20,27–30]
	Health system models	■Appropriateness of health system models in a local setting ■Implementation of a single health system model and the replication of developed countries' health models in developing contexts	[5,30–33]
	Programme design	■Quality and standards of equipment and services ■Regulation of structured clinical guidelines ■Compliance of work practises with clinical guidelines ■Development of feedback mechanisms ■Standard tools for adequate moderation of performance	[8,12,31,34,35]
	Development of appropriate systems	■Resources for informal and formal processes ■Informal and hidden support networks ■Availability of health infrastructure ■Structure of health systems ■Proportionate information accessibility ■Implementation of a functional referral system	[5,36,37]
Health systems' policy-related factors	CHW and human resources policy considerations	■Participation by communities and CHWs ■Policy development related to CHW availability, incentives, and career prospects ■Concrete definitions of CHW roles in policy ■Inclusion of CHWs in implementing policies and health system initiatives ■Development of culturally inclusive policies for practical training ■Policies linking training and scope of practise with CHWs' accreditation ■Clear policy outline to professionalise CHWs ■Properly-defined practises at the policy level ■Eligibility criteria and categories of services in existing policies	[21,23,38]
	Policy formation	■Integration of new knowledge into relevant, existing health policies ■Health system capacity to implement policies ■Policies with adequate documentation ■Funding accessibility for policy development and research ■Lack of detailed policymaking by authorities ■Training of researchers and policymakers ■Conceptualisation of supportive supervision function in policies ■The imposition of developed countries' policies on developing countries ■Instability of policies in the health system ■Knowledge of the local context setting	[39–41]
	Political commitment and climate	■Competing political priorities ■The exertion of power by various major players on health systems' decisions ■Translation/ deviation of actual policy commitments into actual practice ■Influence of different degrees of power (political and social)	[9,31,32,42]

Table 2. Cont.

Concepts	Subconcept	Factors of Influence	Support from Literature
Education and training-related factors	Training redesign for appropriateness	<ul style="list-style-type: none"> ■Socially oriented capacities: Confidentiality awareness, communication, and coordination skills ■Cultural congruence consideration in training approaches ■Availability of appropriate technical tools and financial resources for training ■Alignment of training with technical and social aspects of the local settings ■CHW skills in using health education strategies and community dialogue interventions ■Transparent processes, assessment, and outcomes of qualification-based curriculum 	[19,29,39,43–46]
	Organisational input	<ul style="list-style-type: none"> ■Capacity building: Induction, skills development, mentoring, and coaching ■Competency-based training ■Frequency of training ■Training modules aligned with roles ■Formalisation and structure post-in-service training 	[27,28,32,47,48]
	Changes to education, training, and certification	<ul style="list-style-type: none"> ■CHW technical-retained competency ■The formality of CHWs' qualifications ■Comprehension of theoretical health and mHealth concepts ■Correlation of pre-existing capacities and roles with training amount and type 	[9,44–46,49–51]
	Workplace design and organisation structure	<ul style="list-style-type: none"> ■Continuous supervision ■Physical learning environment ■Discrepancies between practice and training theory ■Internet and virtual social networks ■Comprehension of training content 	[6,33,52–54]
	Training strategies	<ul style="list-style-type: none"> ■Continuous training and education ■Knowledge- and skills-based training approaches ■Learning practices ■Clinical and technical skills ■Formally accredited health literacy ■Content level and accuracy 	[9,14,46,53,55]
Competency-based task/role assignment-related factors	Predisposed influences	<ul style="list-style-type: none"> ■Primary school education: minimal entry-level requirement ■Historical experiences ■Individual readiness for learning ■Personal health beliefs ■Health status of CHWs ■Motivational factors at the interpersonal level ■Financial incentives 	[6,7,20,37,48,56]
	Portfolio of tasks	<ul style="list-style-type: none"> ■Nature and type of tasks ■Properly defined core tasks ■Discrete remits (limited responsibilities) ■Characterisation of diverse roles ■Type of intervention/role (education, navigation, and recruitment, support, research, and data collection, clinical, preventive) 	[15,54,57,58]
	Hiring-model considerations	<ul style="list-style-type: none"> ■Creation of entry-level positions ■Hiring and selection criteria ■Supervisory and management support: role assigners ■Knowledge of the host community ■Time and continuity of work ■Flexibility (time to perform roles) ■Education and training factors (competency-based training curriculum) ■Regularity and duration of relationships ■A standardised set of core competencies ■Enabling environment to develop a strong workforce ■Multilingual and multicultural competence ■Context and characteristics of CHW's considerations in the scope of practise definition ■A formal description of the scope of practise 	[25,50,59–63]
Community health system contexts			
Economic contexts	Microeconomic factors	<ul style="list-style-type: none"> ■Professionalised employment ■Financial security ■Household-level socioeconomic factors (wealth and caste) ■Cost of ownership and utilisation of technology 	[32,34,64–67]
	Macroeconomic factors	<ul style="list-style-type: none"> ■Perceived adequacy of financial compensation ■Transport and tracing of microfunding availability ■Economic stability ■Availability and suitability of apparatus (including technological tools) 	[21,22,25,55,64,65,68]

Table 2. Cont.

Concepts	Subconcept	Factors of Influence	Support from Literature
Environmental context-related factors	<i>Social and physical environment: Community conditions</i>	■Topographical challenges ■Movability/ transportability/walkability ■Mobilisation and involvement of community leaders ■Community readiness: perception and attitude of the community ■Community support ■Community embeddedness and accountability ■Interaction between community and CHWs	[5,16,31,37,60,64,69]
	<i>Social and physical environment: CHW—capabilities</i>	■Integration of CHW demographic factors, the community, and the work context ■Population coverage ■CHW autonomy ■Accessibility and acceptability of CHWs' services ■CHWs' technology utilisation	[8,16,36,37]
	<i>Work environment: Strategies for successful leadership and governance</i>	■The gap between training content/curriculum and the work environment ■Robust quality assurance mechanisms (such as standardised training and supportive supervision) ■Management and supervisory system effectiveness ■Accessibility of leadership within the work system ■Health systems' practises	[21,34,60,70,71]
	<i>Work environment: Organisational culture and structure</i>	■Involve the workers in decisions about whether to add new services ■Group norms and attitude ■Interdependence and mutual support ■Cultural affluence ■Communication channels and collaboration efforts within a workspace ■Interaction between CHW—health profession ■Workload compatibility with standard roles	[7,32,37,56,64,72]
Community system contexts	<i>Work environment: Resources</i>	■Conventions of transactional tasks and substitutional practices ■CHW time spent in work system: ■Work flexibility ■Material and human resources availability ■Availability and proximity to social and health infrastructures and resources	[30,31,46,71,73,74]
Safety and security-related factors	Access control and availability	■Accessibility of security and emergency services ■Adequate access to health- and safety-related technology features ■Security and confidentiality of the data contained	[31,43,75]
	Individual safety factors	■Security: the probability of career change and risks ■Perceived personal safety in the field	[14,36,44,63]
	Management support	■Protection guidelines for CHW working conditions and occupational safety ■Level of safety of institutions and manageability of workloads	[27,36,73,76]
Community-based learning and development-related factors	Location span of control	■Community safety: Crime and violence ■Privacy and safety of service locations ■Navigability of community vicinities	[23,36,73]
	Enabling conditions	■Accessibility of health services ■Community practises and health beliefs	[9,14,16,42,51,60,72]
	Community participation and engagement	■Social participation and engagement culture	[31,32,70,77]
Sociocultural context-related factors	Knowledge building	■Advocacy and community leadership integration ■Community health literacy level ■Community leadership empowerment and development	[5,48–50,78,79]
	Employability factors	■Recruitment, selection, and training of CHWs ■Education-related factors ■Caste-related factors	[3,5,59,78]
	Contextual influences	■Micropolitical climate ■Subcultures ■Socio-environmental factors ■Safety and security factors ■Gender roles ■Family orientation and structure ■Cultural beliefs and stigma about illnesses ■Social norms and attitudes ■Community engagement: social interactions ■Traditions and values of communities ■Systemic and structural inequities: social class ■Socio-economic position	[7,17,44,49,69]
	Community structure and social organisation		[8,14,17,24,68,69,73]

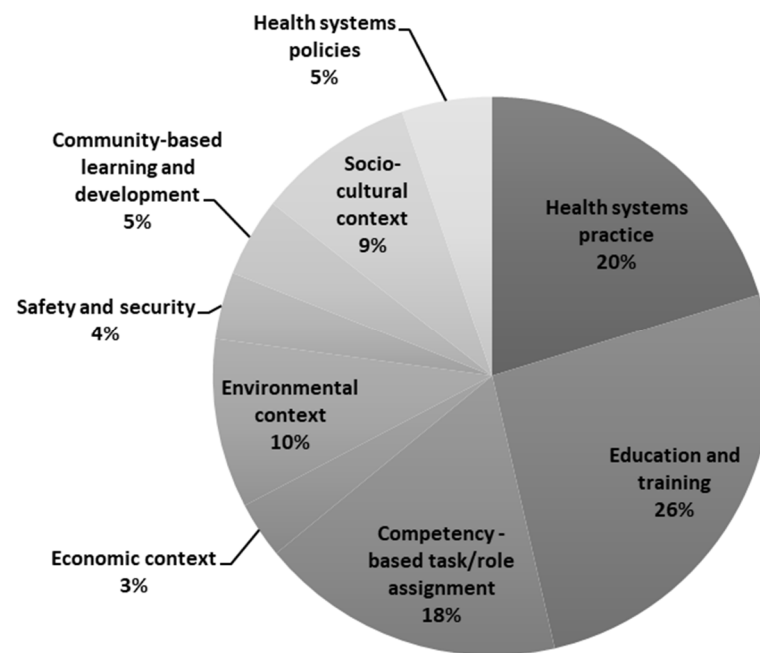


Figure 2. Frequency of occurrence of the concepts that were used to code evidence from the literature.

3.4. Health Systems' Practices

Several studies have alluded that a functional health system relies on appropriately assigning roles and establishing good working relationships between CHWs and other healthcare professionals. Furthermore, these are regarded as essential components that can influence the receptibility of interventions in the view of CHWs [39,43,52,73,80]. According to Assegaai and Schneider [27], the quality of the relationships between CHWs and the official health system has a significant impact on their work ethic and practices. Although most CHW programmes have formal health supervisors who advise and direct them, in practice, their leadership is not always effective. Schneider and Nxumalo [21] found that CHWs in the Western Cape and North West provinces were seldom recognised as autonomous health agents. According to [55], professional support and good relationships between CHWs and other healthcare professionals were found to be important in enhancing CHWs' competencies; however, a lack thereof led to CHWs solidifying their mistrust of the major players in the health system, resulting in CHWs receiving minimal recognition within their communities and enhancing the indifference of CHWs toward their role clarification and motivation to perform effectively. In addition, inadequate organisational support and the perception of CHWs as extensions to be exploited by the broader health system contribute to the immobilisation of the health system. In [73], the issue of CHWs' lack of professional certification and insufficient incentives for CHWs relative to other employment opportunities are discussed; furthermore, this issue is attributed to being a barrier to the scale-up and sustainability of implementation interventions [34,49,81].

Most CHWs are overburdened by assuming team-leading roles and overseeing ward-based outreach teams' work [27]. The evidence shows that power dynamics in health systems and community expectations sometimes play a role in persuading CHWs to execute practices that may be beyond their area of expertise or job description [16,64]. Among the many factors shown in Table 2, the following are recognised as important subcomponents to consider in health systems' practises to guarantee the effectiveness of the implementation of ICT interventions: [31,34]; support-capacity building [28]; interpersonal support [28,82]; workplace support [5,28]; accountability through proper management systems [14,21,22]; formal authority for decision making [9,32]; and standard tools for the adequate moderation of performance [27,52]. The lack of systematic approaches to integrating CHWs into the healthcare resource pool [9]; corruption [6,29]; ill-treatment

and belittlement [29,38]; managerial carelessness and indiscretion in the administration of CHWs [14,21]; and contradicting role assignments lead to their dissatisfaction [16]. The facilitating or hindering factors are categorised under the following subconcepts: appropriate allocation of responsibilities and roles; workforce determination; leadership and governance; health workforce relationships; programme design; and development of appropriate systems.

3.5. Health Systems' Policies

This concept includes factors categorised under three subconcepts: the first subconcept is human resources policies, which is concerned with aspects of working conditions, incentives, training, and career perspectives. The second subconcept is policy formation, which includes factors influencing policy creation and development. The last category is political commitment and climate, which is concerned with aspects of political and social commitments. The study found that, in most developing contexts, the rights of CHWs were not officially covered owing to a lack of policy development, which resulted in insufficient support for CHWs and limited their capacity to function within the health system and in their communities. Furthermore, due to the lack of various regulations, employment prospects for CHWs are fragmented, and there are no defined processes for authorising CHW roles and tasks. According to [32,73,80], policy implementation entails integrating CHWs into the health system as well as into human resource strategic planning to claim that the functionality of the health system, particularly the state-owned sector, is impacted by CHW performance.

Ndima et al. [80] added that the fragmented health system and inadequate policy coordination are essential factors to the rigidity within the verticalised information flow and governance. As a result, Cometto et al. [44] provide valuable suggestions for using a whole-systems approach, which entails harmonising and aggregating the aims, context, and design of the local health system through policies to match with the national health system. Kok et al. [73] discovered that, although most nations have national health policies that encompass CHWs, there is no comprehensive policy specific to CHWs. A lack of policy leads to insufficient support and the inability to work and receive help in their communities, which, in turn, leads to little acknowledgement from healthcare and community-based system stakeholders [17,34,75]. Policies regarding vulnerable populations and the steps for effectively addressing their needs through CHWs while considering their language, culture, literacy, and community development are more specific [14,27,36,53]. Furthermore, according to several scholars [9,29,83], interest groups tend to compel developing countries to adopt developed countries' health policies to further international agendas and interpersonal interests. Such practice occasionally does not comply with statutory provisions or complement developing countries' contextual environments.

Other studies [5,33] even go as far as suggesting penalties for such organisations as an appropriate punishment to defend the government's capacity to sustain the enactment of national regulations and the execution of health programs. It is widely acknowledged that sophisticated systems and tactics may be prohibitively expensive for impoverished countries due to public health underfunding and a reliance on donors [5]. However, there is evidence to show that the failure of ICT health interventions is caused by the lack of policy directives that address issues such as the misappropriation of funds and lack of accountability and that parastatal programmes through which national health expenditures are administered are corrupt [21]. These impede the ability of the health system to implement ICT-related policies for CHWs [42]. Because of this, the reviews [16,23,42] suggest taking into account the preconditions of the community, the political commitment, and the social conditions of the CHW human resource pool to strengthen the development of appropriate CHW-related policies and the implementation of ICT interventions. These suggestions can help to figure out how social factors can be used to influence and inform policy development.

3.6. Education and Training

Training and redesigning training programmes for appropriateness enable CHWs to be equipped with the appropriate skills and attitudes to increase the success of ICT uptake. Therefore, this concept accounts for factors related to organisational input towards enabling CHWs with ICT; educating, training, and certifying their training; restructuring their organisation and workplace design; developing training strategies to allow for continuous improvements and the adoption of context-specific training skills; and accounting for the influence of predisposing factors such as the social and cultural norms that influence how CHWs may perceive learning. However, there remains a knowledge vacuum on how to promote large-scale intervention implementation and sustain the expanding roles of CHWs effectively. According to Ndima et al. [80], CHWs should receive proper training and support using the same human resource management approaches as other health professionals. In the same way, their training should include ongoing skills and knowledge development [39], refresher training [39,64], continuous real-time feedback [34], and frequent performance evaluations [18,31,80] to improve their skills.

Oliver et al. [32] argue that to qualify CHWs properly, they should undergo refresher training regularly. According to Tseng et al. [14], training for CHWs should focus on aspects that are important in their jobs, such as health promotion, prevention, and screening. As a result, their training must change simultaneously to meet the health demands that necessitate a regularly updated training curriculum and administrative techniques to link the greater range of their community's health needs [23,24,53,74]. Geldsetzer et al. [35] advise that the desired training comprises three key features: first, they should be instructed to expand their knowledge and abilities in areas that were not addressed in earlier training; second, they must develop creative training approaches that are appropriate to their changing contexts; and third, they should include training to adequately handle patients who may not fall within the specified tasks of the individual CHWs. The majority of training programmes do not cover technological literacy; thus, it is essential that the training includes technological enablement [82] as well as change management skills to enable CHWs to adjust quickly to change, anticipate possible channels, and diagnose and treat underlying problems that fall within their scope [39,50,59]. Adequate training and technical knowledge were discovered to be optimal performance characteristics, particularly for CHWs who are likely to conduct activities that necessitate the use of ICT solutions, which necessitate technical expertise and superior managerial support [45].

3.7. Competency-Based Task/Role Assignment

This concept is concerned with the portfolio of CHW tasks concerning understanding, defining, and characterising their roles for specific tasks to achieve measurable outcomes; in addition, hiring model considerations is another subconcept with factors concerning the process of recruiting and professionalising CHWs based on their core competencies, training, and scope of practice. Most review studies that assess CHWs' roles and capacities reveal that the load, complexity, and range of functions that CHWs perform vary substantially according to context-specific needs and opportunities. Similarly, the studies generated lists of activities identified as the core tasks, including health focus areas for CHWs. Some of the significant health focus areas include neonatal, antenatal, child and maternal care, and infectious and non-communicable diseases [14,29,32,37,52,76]. As a result, CHWs engage in a comprehensive range of activities that are categorised under similar focal health issues such as health promotion and prevention.

Remarkably, a review by Topp et al. [42] notes that the expansion in CHWs' roles harms their performance; considerably, CHWs are likely to succeed when their roles are clearly defined with a limited scope of work practices. Mohajer and Singh [16] state that the hierarchical bureaucracy within the health system does not account for the social capital and reciprocal relationships between CHWs and their communities. As a result, their social position and lack of authority weaken their effectiveness and ability to advocate for strengthened governance [53]. In addition, it is pivotal to note that the responsibilities of

CHWs are not binary eccentricities but operate relatively along a continuous spectrum where some CHWs assume broader responsibilities, whereas others have limited responsibilities. The type of role dictates the responsibilities/scope of practice and the required competency. In most cases, the role assignment was based on the experience of CHWs and perceptions by supervisors and facility managers, as there are no nationally recognised standards for role assignment [84]. The range of health system functions includes clinical care services, utilisation of health services, education, research in collecting and reporting data, mediation between social and health systems, and psychosocial support [15,30].

3.8. Economic Context

The economic context is concerned with macroeconomic and microeconomic factors that are categorised depending on their impact on CHWs as people and the financial sustainability of the ICT implementation efforts. According to research conducted by Kok et al. [17], incentives significantly impact the performance of CHWs. Although there is an expanding body of literature that documents the impact of the economic context, the evidence is primarily based on understanding the relationship between incentives and motivation with the intent of improving CHW performance. CHWs in most developing countries are expected to start as volunteers without job security or assured future employment pathways. Inadvertently, some of them ultimately move through a programme that allows them to receive incentives such as fixed salaries, regular allowances or stipends, performance-based compensation, material incentives, training, supplies, and preferential treatment from superiors [21,83]. Consequently, the mechanisms that can be used to holistically contextualise CHWs' preferences to ensure their satisfaction and economic security are often not realised. As a result, the widespread consensus is that, notwithstanding the socioeconomic gaps, the value of CHWs in the primary healthcare sector can be potentially profitable provided they are suitably incentivised and equipped with the appropriate skills [15,25,55].

In addition, Ngugi et al. [64] suggest that in most resource-constrained environments, the lack of basic monetary incentives to supplement CHWs' income negatively influences their attrition and retention rates as well as their willingness to learn and adopt new skills; this significantly affects their health and welfare. Ultimately, improving their service quality because of their intrinsic desire to serve their community does not preclude their desire for employment, family, and social support. Income and community safety play a critical role in the health services delivered by CHWs, particularly within the South African community, where it is documented that CHWs who do not receive external rewards show exceptional attrition [23,73]. Additional studies [5,52,56] assert that the possibility of promotion, the provision of welfare facilities; incentive mechanisms; equality between health professions; and the range and scope of CHWs' assigned activities have the potential to improve the work environment for CHWs [25,65].

3.9. Environmental Context

Within the environmental concept, factors related to the social and physical environment as well as the work environment of CHWs are of primary concern. CHWs find themselves straddling two cultural zones in which on the one hand, they fulfil clinical tasks within communities and on the other hand, they are answerable to the health system that wants to recognise them as part of its workforce [42,53]. Therefore, understanding the factors influencing their working environment is critical. Factors related to successful governance strategies, organisational culture, and structure, as well as available resources within the environment, must be considered to create a conducive environment for ICT implementation and use. As a result, the physical circumstances of the community, the health systems' structures, and the CHW organisational programmes' characteristics must be considered from a macrosociological standpoint. Another body of research [73,85] considered CHWs in healthcare from a micro-sociological standpoint, focusing on the interactions between CHWs, their neighbourhoods, and their social and health behaviours

and outcomes. However, there are very few details about how the dynamic relationships and interactions among CHWs are shaped by the environment in which they and their work structure are embedded. Grant et al. [7] recognise the complexity and distinctiveness of the context in which CHWs work, adding that their interpersonal ties put their secrecy to the test because they are both members of the community and service providers. Other research takes a more elaborative approach, defining the environment as a geographical region within which members interact.

Geldsetzer et al. [83] state that the proximity of households to CHWs' health facilities and climatic changes play major roles in the utilisation of CHWs by their communities, postulating that households within one to three kilometres are less likely to utilise CHWs' services compared to households within one kilometre of a CHW facility [17,83]. Even when proximity is accounted for, the key determining factor is the comfort, trust, and perceived confidentiality of the patient to work with the recommended CHW since the consent of both parties is obtained before they are linked [14,35,72]. Given their lack of equipment and training, their incapacity to perform their duties jeopardises their potential to strengthen ties between their community and healthcare institutions [18,23,55]. Due to their limited training, they inevitably fail to distinguish between the professional environment they are expected to work in and how to manoeuvre it in a developing setting such as South Africa, which becomes an even more formidable obstacle [64]. The work environment has a significant impact on CHWs' satisfaction, which can be attributed to a system-wide misunderstanding of their roles, particularly regarding cultural congruence and the overlapping responsibilities of multiple community health systems [9,36,47,55,56]. The factors relevant to this concept are categorised under the following subconcepts: community conditions, CHW capabilities, strategies for successful leadership and governance, resources, organisational culture, and structure [60].

3.10. Safety and Security

Ensuring access and control to data security and emergency services is emphasised in studies, whereas factors related to the assurance of individual safety are deemed of high relevance as most CHWs find themselves vulnerable to issues related to job security and personal safety in their communities [73]. Moreover, creating management support systems to ensure that CHWs have protective guidelines for managing their workloads and achieving occupational safety is important. Most resource-constrained environments have concerns about crime and violence; therefore, having ICT solutions that integrate with the span of the location and ensure measures for the navigability of the vicinity is essential. Kok et al. [17] elaborated on the concept of personal safety and security for CHWs in LMICs and concluded that a lack of security interferes with CHW service provision and contributes to CHW attrition. Furthermore, compensation, job security, and working conditions are potential constraints that may influence CHWs' propensity to carry out their jobs effectively.

Reduced productivity and service quality are attributed to a lack of safety and security and ultimately affect the efficiency of community-based programs. Kambarami et al. [64] propose profiling CHWs using structural and social aspects and ensuring control over their work location. Increased access to provider networks and emergency services plays a significant role in influencing CHWs' determination to perform and could potentially motivate them to adopt and use ICT effectively when there are considerable benefits. However, in multi-tiered contexts where crime and violence are pervasive, the perception of a lack of personal safety interferes with their capacity to offer their services. Furthermore, their safety as citizens of communities and constituents of the healthcare workforce, with their work systems integrated into the community, could place them in the path of violence [36]. As a result, the dynamics of their community's conditions provide significant barriers to their individuality and a risk to their employment.

3.11. Community-Based Learning and Development

The early involvement of communities in implementation projects has been deemed a key to the success of ICT implementation. However, it is not always easy to communicate the correct information, especially in environments where the social structures do not permit the easy adoption and acceptance of new systems. Therefore, several aspects can help to determine the types of information and strategies to employ for maximum cooperation. These include understanding the enabling conditions, how the community's participation, engagement, level of knowledge, and education will inform the implementation process, and the typical strategies to employ when approaching a community based on their level of understanding. This understanding would minimise the difficulties in engaging with community stakeholders and understanding the community's social structures and prevailing perceptions. The objective of the community development effort is to improve the livelihoods of marginalised societies in a way that is compatible with the historical context of social work from a macrolevel perspective [86].

Community development and community-based approaches should focus on enabling access to health care, considering the community's belief systems towards health issues, and effectively availing information about health behaviour to empower societies [14,77,78]. The perspective is supported by the notion that enhancing a community's ability to identify problems and needs, organising and supporting social change strategies, and accepting social change propositions lie at the heart of community empowerment [49]. In this way, the acceptance of health services delivered through ICT solutions by CHWs is influenced by the community's level of knowledge and their interest in social engagement [7,31,32]. As a result, to enhance community-based learning and development, there is a need to include the following factors from the literature that contribute to community responsiveness: community involvement; community utilisation of CHWs; community knowledge of CHW roles; the negation of community intervention; understanding of CHW intervention; intensification of incommunicable or non-communicable disease patients; augmented adherence to medication per catchment area; knowledge of preventive procedures; and conservational community management [5,37,52,53].

3.12. Socio-Cultural Contexts

Most ICT implementation interventions in healthcare have adopted a purely technical method, which presumes that social interactions and perceptions will not evoke any latent resistance. However, reality deems it essential to focus on understanding how CHWs view their employment from a socio-cultural perspective, and how they view their contextual environment and community structure including their cultural beliefs, patriarchal structures, and gender roles. Another essential point to consider is that of gender roles [35,37]. Most LMICs allow specific antenatal and maternal care tasks to be performed only by female CHWs because of cultural beliefs and values systems. As a result, social- and gender-based values produce shadowing processes that impact the processes and responses of CHWs, necessitating consideration in implementing ICT health interventions [60,69]. Most male CHWs' mobility is limited, particularly in Middle Eastern, Asian, and African nations, where cultural and religious conventions influence and shape interactions between males and females [16].

A major proportion of CHWs are required to volunteer while serving and living in disadvantaged communities where they are vulnerable to structural poverty and inequities [87]. This raises another overarching concern for CHWs: the impact of employment stability on their social status. From an individual standpoint, offering their labour without financial incentives and security can have a negative effect on their participation and engagement in their communities. CHWs are required to provide healthcare services in communities where they frequently resemble the people they serve. Such resemblances may exist in terms of social and cultural characteristics such as political ideologies, traditional and religious beliefs, language or demographic factors, conditions or needs, shared lived experiences, common understandings, and usually from living in the same loca-

tion [16,26,42,82]. The extent to which CHWs’ demographic attributes differ from their communities is relevant [73,82]. Furthermore, although most CHWs are sociable with cultural and community awareness, the vast majority have little or no prior experience navigating local health systems. Table 2 shows the factors conceptualised under each concept and subconcept within the underlying context.

4. Discussion

This literature review provides an overview of the social contextual factors (grouped under concepts and subconcepts) that influence CHWs and their technological preparedness (see Figure 3). As illustrated in Figure 3, the nodes indicate the potential pathway of effect and interaction, with each colour denoting a concept or subconcept exerting significant influence on the other). The objective of this review was to frame the problem through sociological lenses on the CHWs’ settings. The inference drawn from the literature review is that numerous social contextual factors influence the success and failure of technology dissemination for CHWs within the healthcare system. The goal of describing the social system influences was accomplished extensively by expanding on the contextual circumstances contributing to the success or failure of interventions at the community–health interface.

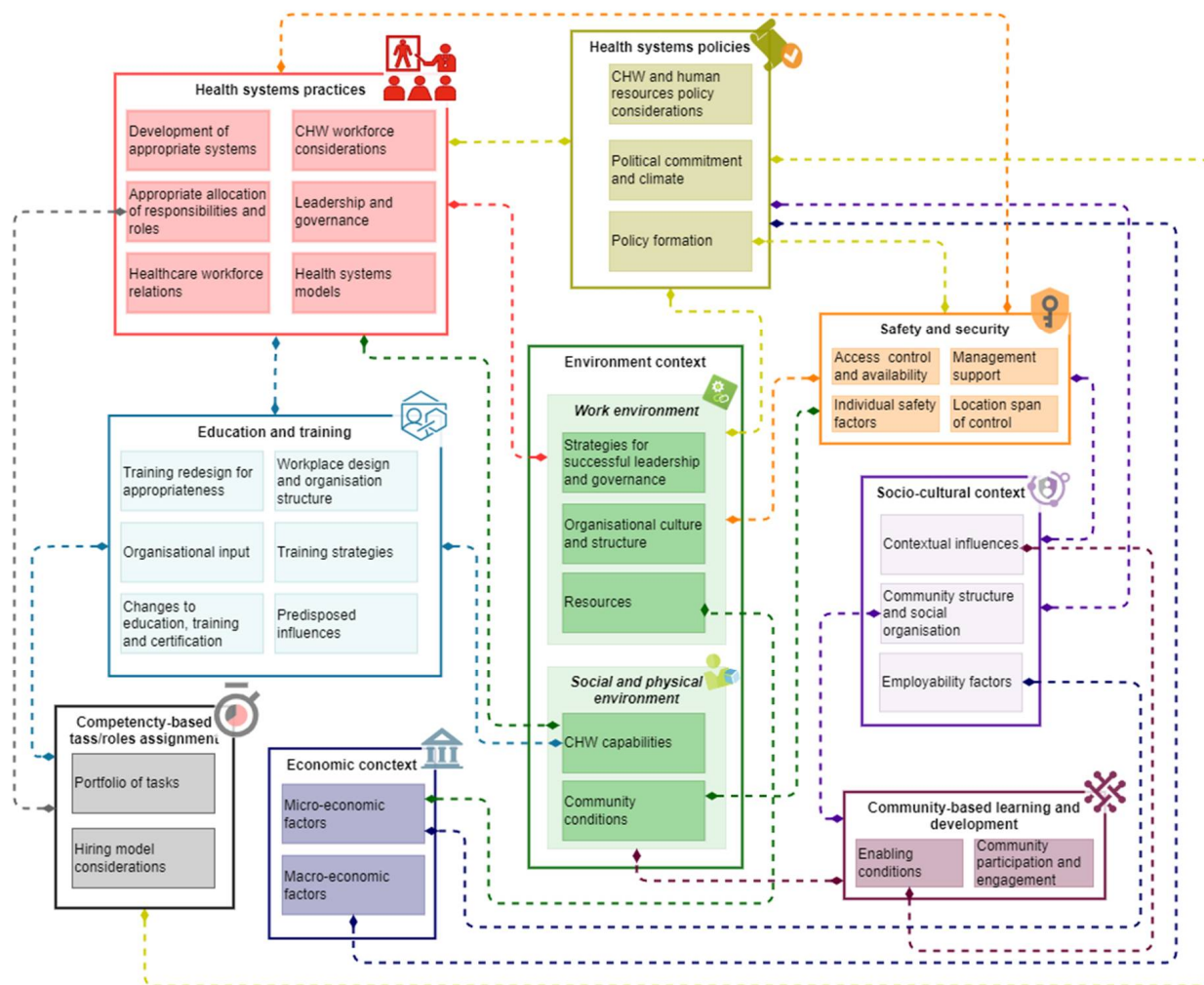


Figure 3. An illustration of the social influences to consider in determining CHWs’ preparedness for ICT intervention uptake.

The research results focused on identifying social aspects that are preconditions in the implementation processes of ICT interventions and designs. This study found that integrating CHWs into health systems necessitates recognising their relationships with the community and health systems since these influence how CHWs respond to the community health systems' expectations. Furthermore, Kok et al. [73] support the importance of expanding the health system contexts concerning CHWs from a comprehensive sociological viewpoint. The health system is a component of CHWs' broader societal, economic, and political worlds; thus, their influences are projected from various contexts, influencing their capabilities to attain optimal performance. Researchers agree that CHWs who are successfully incorporated and integrated into the health system have the potential to enhance their local health systems' processes and alleviate the burden on their countries' national health systems. Recognizing these influential factors could assist policy makers and technology developers to comprehend the functionality required of effective and contextually appropriate ICT solutions. Remarkably, some studies suggested that some problems could be resolved by identifying what the CHWs' functions should entail at all levels of the health system; consequently, this could significantly enhance the understanding of their practises and beliefs, ultimately assisting policy makers with shaping implementation projects.

Developing appropriate implementation models that accurately reflect CHWs' roles and responsibilities, for example, entails the consideration of the structure of the interactions between other health professionals and CHWs; provision of support and leadership to CHWs; and provision of facilitation expertise to initiate an assessment of practises that may prevent CHWs from accepting ICT solutions. This will also enable programme developers to properly design socially perceived valuable programmes from the perspective of CHWs. Furthermore, the study uncovered that the health system's hierarchical structure indicates that communication channels are more rigid for CHWs. As a result, CHWs find it increasingly difficult to approach district and provincial-level major players for assistance. As a result, their interactions are limited to being amongst themselves. For instance, the effort of reporting issues but having most of them go unaddressed by their health system contributes to the culture of malpractice and their lack of motivation to accurately capture and report problems that could potentially provide valuable data to the health system. According to the findings, the inefficient communication networks between the different actors engaging with CHWs in practices result from a lack of communication skills and misunderstandings in supervisory lines. In most cases, the design of practices does not clearly define the boundaries between supervisory and managerial lines, nor does it designate who is allowed to perform which functions. The study also acknowledged the challenges that the health system faces, such as the hierarchical structure in governance and leadership, a lack of motivation and job satisfaction in its human resource pool, rigidity and top-down information flow, and the engagement and influence of non-governmental organisations in the misconceptions that confront CHWs [30,42,45].

The study deemed the availability of policies focused on CHWs critical, as was the need for effective intervention programmes within the health system. However, evidence from the literature reveals that policy frameworks are not always followed because they are not consistently tailored to the unique requirements of CHWs and the people with whom they engage. Typically, policy design differs from practice design since the range of expertise, knowledge, and resources needed to operationalise effective ICT implementation strategies is relatively scarce within a single organisation, and most institutions are ill-equipped to tackle such a task effectively on their own. In contrast, most governmental institutions lack the capacity for large-scale implementation interventions. Moreover, on an individual level, CHWs are usually not familiar with health standards and recommended practices because they have not been effectively conveyed or distributed from the national level to their organisational level [8,69,88]. Therefore, facilitating interactions between policy makers and decision makers may enable the incorporation of research-based policy practices into health system practices, resulting in research and practice outcomes that accurately reflect real-time policy priorities, areas for improvement in health practices, community needs,

and CHWs' performance. Most stakeholders associated with implementing ICT health policies do not consider investment in systematic adherence to policy implementation as a priority. As a result, there is a widespread conviction that their autonomy permits them to enact their beliefs over adopting policy recommendations into their practices. Consequently, the opportunity to provide significant evidence of how to change policy and practice is underutilised.

Moreover, this literature review elaborated on the actual practises of CHWs and the tension between the outcomes of CHWs' actual experiences and the objectives of health policies, especially global health policies that seek to provide approaches to integrating universal health objectives into developing countries' ailing health systems without considering the differences in values and local conditions. Although the intent of such global initiatives is appreciated, most global policies are only aligned in writing with universal healthcare coverage and sustainable development goals and barely address local issues that are at the core of most developing nations' health crises. The study concludes that this is due to most global policies focusing only on the effects of adjusting health programmes and neglecting the interrelated factors within the social contexts of developing, resource-constrained settings such as those of sub-Saharan African countries. Consequently, this prevents developing countries from focusing on improving their health systems' functionalities. As noted by Asweto et al. [5], this consequence, as for most developing countries, ultimately affects the national health plan to formally integrate CHWs into the health system and the national human resource strategic plan, as well as the overall sustainability of CHWs programmes. Another concern is the influence of political systems on CHW-related policies, as most political structures are potential facilitators and gatekeepers of community-based health initiatives. Therefore, there is a need to review whether a political climate creates an optimal condition for ICT implementation concerning both infrastructure and regulatory frameworks. First, political actions need to establish frameworks that enable engagement with stakeholders who are external and internal to the health system. Second, it is essential to ensure that there is a political commitment to facilitate the scale-up and sustainability of health technologies in resource-constrained environments by accumulating and encouraging financial investment in ICT and appropriate technological solutions that align with the local needs of CHWs and the communities they serve [73,89].

The findings emphasised the significance of incorporating elements from the health and community systems into CHW interventions and programmes. Another suggestion is to consider the implications for health system policies and practices, such as the availability of CHWs, resource policies, and governance structures. However, countries such as South Africa have a national CHW policy framework, which has unanimity challenges between governmental and non-governmental organisations that are employing their processes in their recruitment, training, and hiring of CHWs. In addition, every province has specific strategic plans for CHWs, which are usually unaligned with national policies. This results in uncontrolled decentralisation and a lack of reintegration between the local and national spheres. Most countries have insufficient CHW-centric policies but also lack general human resource policies and labour laws that accommodate and adequately articulate the overlapping contexts within which CHWs work [55]. There are a lack of payment and incentive policies, working conditions, training, and clear professional development paths [32,73]. Based on its policies, South Africa has proactively charted several reformative actions towards catering to the role of CHWs, particularly within the PHC re-engineering strategy [4]. Thus far, the strategy does not account for the changing forms of organisations, capabilities, networks, and orientations. In addition, the existing literature provides evidence that researchers' findings, based on small-scale ICT implementation research, do not align or reflect a national view; this is not surprising, given the different provincial governance structures. It is an apparent challenge in South Africa that the decentralisation of the health system to the provincial level makes it difficult to measure the impact of CHWs at the national level. The multiple perspectives of the major players in community health systems

lack an integrated understanding of how ICT could support the achievement of national objectives through CHWs.

Furthermore, the literature indicates that there is still a significant gap in health research when it comes to recognising the complexity of CHWs' work systems and approaches to career development; this is attributed to a lack of standard definitions and the improper adjudication of governance from the micro- to the macrosphere [20,21,58,83,90]. Therefore, the recommendation is to develop appropriate professionalisation standards as a mechanism through which a broader systematic perspective of CHWs and the care economy can be supported. The lack of specialised and diverse training for CHWs and the need for basic education, continued training, and professional development opportunities influenced CHWs' willingness to adopt new skills, including technology utilisation, was reported as a principal challenge. Thus, the higher the education level and experience of CHWs, the greater their preparedness for ICT. One of the technological infrastructure barriers is a lack of knowledge about how to maximise the potential of the current tools and processes used by CHWs; this is due to a lack of organisational inputs such as capacity building and minimal or no primary education and basic training. The review also found that studies show evidence of global efforts to professionalise CHWs through minimal education requirements. The consideration of formally integrating CHWs into the health system requires linking their initiatives with appropriate educational levels; labour regulations; community development; guidelines on certification; career ladders; an appropriate typology of CHWs; and clear categories of their roles and responsibilities related to their level of national education and experience.

Moreover, the review elaborated on the need for practical training and educational tools to empower CHWs [91]. Shipton et al. [18] state that training strengthens the performance of CHWs, and one of the main specifications is the need to maintain technical skills once they are acquired and the need to account for the provision of decision-making tools as an essential mechanism for their integration within the health system. In light of this, the evidence in this review proposes that the clarity of the roles and responsibilities from policy interventions to implementations has not been clear enough to distinguish the multilevel roles and complexities within which CHWs are embedded from a health system's perspective [84].

A study by Schneider and Lehman [79] suggests that researchers should take a social and institutional approach to CHW roles at the community–health systems interface, which indicates that it is vital to account for the economic contexts, social–cultural contexts, and environmental contexts of CHWs. The importance of understanding contexts before and during any implementation fosters the potential for developing tools subject to a rigorous evaluation of their ability to assess the specific context. Contextual environments remain vital areas that should be considered for integrating technology. It is highly recommended that they are considered for insight regarding key strategies in designing, developing, integrating, and implementing ICT solutions for CHWs' duties. The success of CHW programmes and ICT interventions depends on an enabling environment [16,60]. Likewise, health systems and the political and economic environments stimulate the social interactions of CHWs, which directly impacts and informs the changes occurring within the environment. However, the current understanding of CHWs' status and their patterns of relationships within the community and health settings represents a complex environment. From an economic perspective, the study found that financial and non-financial incentives were essential for providing insight into the structural determinants underlying CHWs' willingness to be retained and to render services to their communities [69]. The standard view in the literature in most developing contexts where there are high levels of unemployment is that potential CHWs volunteer to gain health experience to strategically position themselves in the long term for professional healthcare opportunities. Recognizing this dynamic could help to devise incentive structures that can ensure the retention of CHWs and ultimately motivate them to accept ICT solutions when introduced. Economic adversity and financial instability in developing contexts also imply that most initiatives

are halted due to a lack of investment. The financial implications of the commitment to incentivise CHWs and to fund the necessary changes in their programmes have the potential to constrain the sustainability of the programmes and, ultimately, limit the performance of technology-enabled CHWs compared to the care provided without ICT adoption. As a result, the review postulates that combining socio-economic and health components as pre-conditions for informing the design and development of interventions can result in improved CHW preparedness.

The review also found that low levels of education in communities exacerbate poor adherence to health promotion and prevention strategies within most developing countries. As a result, shared beliefs and community practices can prevent communities from receiving CHW health services and encourage resistance to technologies [60,73]. Thus, the review postulates that community dialogue and involvement are paramount to enhancing the acceptance of CHWs' health services; the latter has an altruistic influence on CHWs to want to perform better even if it is through digitised solutions. Community-based learning and development strategies should be encouraged through community participation and knowledge-building initiatives that foster cultural desirability between the community and CHWs by ensuring they are recognised as professionals in their capacity as caregivers of their communities. Further, the review found that incorporating community development could enable CHWs to disseminate health information appropriately and better engage with households to provide holistic care.

Regarding the environment, the review found that social and working environments influence, facilitate, or inhibit the effectiveness of interventions that aim to equip CHWs, including technological interventions. CHWs work in a complex social environment that involves geographically manoeuvring the physical conditions of impoverished communities, some of which have dilapidated structures, and dealing with communities that are stalled in complex social problems due to inequalities and socio-economic conditions. There was also considerable evidence to show that ICT integrability and CHWs' technical competence and capabilities are influenced by their social contexts; this implies that the likelihood is very high that CHWs share values and link interpersonal relationships and common physical infrastructure with their communities [36,69,72]. The review noted that upgrading their physical environment by considering factors such as safety and mobility could enhance the developers' abilities to have a comprehensive view of how best to predict technology use and foster CHWs' productivity and stability. Similarly, an enabling working environment with high-performing health systems and sound governance is crucial to the productivity of CHWs and their preparation for adopting good information systems and appropriate technologies to re-enforce their competencies. The lack of proper management and leadership creates unsupportive practices that result in poor working environments. As a result, creating a positive working environment necessitates an organisational culture that promotes cohesion and participation, provides sound leadership and governance, and adequately mobilises local resources [46,65].

Further, sociocultural factors such as the structure of neighbourhoods, housing, the concentration of poverty, crime, unemployment, and community beliefs and norms can limit CHWs' independent functioning while also having the potential to impede their efforts to adopt and use ICT [17] effectively. In addition, the review identified how sociocultural influences play a role in influencing CHWs' social hierarchies and acceptance of newly introduced innovative solutions. Kok et al. [17] and Sabo et al. [49] emphasised the importance of sociocultural dynamics and how social interactions within CHWs and their community play a role in technology utilisation and overall performance [92,93]. In addition to sociocultural factors, issues around personal safety, data and financial security, location accessibility, and occupational health regulations were essential to CHWs' preparedness to accept and use ICT; these require further exploration for the long-term sustainability of ICT implementations. Although the study found that health system factors were influential in developing contexts, the consideration of community system factors positively enhanced CHWs' willingness and preparedness for the implementation of innovative

health initiatives, including ICT solutions [9,20,59]. The adoption and implementation of ICT by CHWs require the following: an increased translation of research evidence into actionable policies and practices; provision of training to improve unique skill sets and incentives; long-term coalition building; and formal partnerships between community stakeholders, CHWs, ICT developers, and crucial research and policy stakeholders. Additional research on resource-constrained environments with adequate descriptions of ICT implementation strategies and technical contexts is required to provide further evidence to inform ICT implementation processes.

5. Limitations of the Study and Future Work

This scoping review attempted to be as inclusive as possible. However, it is acknowledged that the search phrases used in the search strategy may have filtered out eligible studies. It is also possible that the review's reliance on the literature and only a limited number of papers have limited the generalisability of the findings. An additional search was conducted to identify grey literature; however, it is possible that eligible studies could have been missed and as such, a search is not focused on a specific database. One of the significant challenges of the review was the reliance on identifying the influencing factors that can affect the effectiveness of CHW interventions; these were often stated but not elaborated in detail and were ultimately deemed to have several shortcomings. In addition, most of the studies did not explicitly capture the contexts in which CHW interventions occur, which limits the interpretations of these studies.

Despite its limitations, this review can provide policy makers with a framework for assessing the various factors that affect the development and adjustment of CHW programmes. As far as future research is concerned, it is essential to note that there is a need for robust, practical evidence of how social influences affect CHWs' readiness for technology. In this vein, avoiding a narrow outlook on interventions specific to CHWs' effectiveness is necessary. Therefore, additional research should investigate the validity of the influences from a realistic evaluation perspective. Further research could be done on how these influences can be operationalised through implementation mechanisms.

6. Conclusions

This review included both quantitative and qualitative studies. Furthermore, it allowed the researcher to explore the various dimensions of CHWs' contexts and work systems and identify the contributing factors. The literature review concluded that the characteristics of the social context contribute to the success or failure of the diffusion of technology for CHWs within the healthcare system. The aim of describing the factors of influence from a social perspective was achieved by elaborating on the different contextual environments that contribute to the success or failure of CHW-related interventions within the community health system. A view emerged from the literature that emphasises the critical examination of CHWs' profession as both a social power and a strategic response to underserved communities. Understanding the contexts, implementations, and evaluations of complex interventions, such as technological solutions interventions, contributes to filling the gap between the research knowledge and the practical application of the knowledge. As a result, policy makers are able to make informed decisions with regard to evaluating and assessing interventions comprising multiple interdependent components. In addition, the boundaries of the ecosystem between the interventions, implementations, and contexts are defined to help conceptualise an appropriate means to assess the impact of the intervention. For instance, implementing technological solutions for CHWs comprises multiple interacting contextual factors such as regulations that need to be passed and enforced as well as lawful aspects, infrastructure, and educational aspects. Notably, no intervention within a healthcare ecosystem can take place in isolation and interventions stand to be compromised or enhanced by other factors and interventions at both the micro- and macrolevel. As a result, the context needs to be appropriately assessed to understand the influences and contextual factors that enable the impactful conceptualisation of an

intervention within the ecosystem. The scoping review suggests that the introduction of technology-enabled CHWs does not necessarily imply that there will be equitable coverage for their communities. Hence, there is a need to consider a wide range of intervention and design factors that may be applied or moderated to ensure that interventions result in improved service delivery through increased technology utilisation. A more thorough mapping and investigation into how these factors can inform the implementation process is needed.

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Abbreviations

ICT	Information and Communication Technology
CHWs	Community Health Workers
UHC	Universal Health Coverage
PCC	Population, Concept, and Context

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