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Analytical Study of Management Information Systems in Public Health Centers (PUSKESMAS) in Indonesia: A Comprehensive Systematic Review

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ABSTRACT

Background: One of the most important parts of the healthcare system has been recognized as primary health care (PHC). enhancing PHC's ability to offer rehabilitation, basic prevention, treatment, and health promotion services. The shift from institution-centric to patient-centric health care is encouraged by current developments in health informatics. IT is used by everyone who wishes to stay healthy and is active in illness prevention and health promotion, not just patients in medical settings. The tracking, administration, and sharing of personal health information is made easier with the help of consumer-focused systems called personal health records, or PHRs. **The aim:** The aim of this study to show about management information systems in public health centers (PUSKESMAS) in Indonesia. **Methods:** This study satisfied all the requirements set forth by the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020. Using a combination of online reference sources, including Pubmed, SagePub, and Sciencedirect, the search strategy was limited to publications released between 2014 and 2024. No review articles, previously published works, or partially completed works were included. **Result:** Eight publications were found to be directly related to our ongoing systematic examination after a rigorous three-level screening approach. Subsequently, a comprehensive analysis of the complete text was conducted, and additional scrutiny was given to these articles. **Conclusion:** To promote the fulfillment of public health workers, the government must examine the primary health care primary health worker recruitment policy. The administration of health information systems is crucial to supplying precise and reliable data to support policymakers. The PHC Health Information System is the primary place where community data is entered by the health authority due to the urgency of the data needs.

Keyword: Management, information systems, public health, (PUSKESMAS).

INTRODUCTION

Indonesia applies non-discrimination as the foundation for sustainable growth in the health sector. In order to achieve sustainable development, the system—in this example, the health information system—must be strengthened. Decisions involving the health information system can only be made with reliable, transparent, and interoperable data—what was referred to as "one data" in 2018. The Indonesian health information system has a number of issues. Firstly, it is still operating in the industrial era 4.0, whereas the rest of the world has moved on to the industrial era 6.0. Secondly, there is a lack of integration or interoperability in the routine information systems and JKN implementation. Lastly, there is a lack of focus on open standards development, technology advancement, and security and privacy management in health information systems.[1,2]

In this instance, the Ministry of Health resembles a health institution that provides services through clinics, hospitals, and health centers. From the highest level of central administration to the tiniest sub-district, the Ministry of Health is also in charge of administrative management. In order to support a healthy society, health service initiatives with these administrations seek to increase community access to healthcare services. The healthcare organization needs to identify essential success aspects, including costs, technology, and planning, in order to fulfill its goals. Health services generally and health information systems specifically are impacted by changes in the world in numerous sectors, as well as by initiatives to improve the quality, accessibility, and sustainability of health services as well as the availability and quality of health data or information.[1,3]

In order to revitalize primary healthcare (PHC) initiatives, the Astana Declaration of 2018 placed a strong emphasis on community-based services that are in line with crucial public health and health equity roles. Achieving the Sustainable Development Goals is associated with shifting healthcare toward primary care; Thailand and India are two countries that have demonstrated effective shifts to community-level care. Building complete PHC systems is not without its difficulties, though. These include insufficient recruitment, retention, and competency of the health workforce; inadequate attention to community needs; conflicts and disease outbreaks, as demonstrated by the current pandemic; and a lack of continuous political commitment and financial methods. Weak governance in PHC may also result from a lack of political commitment.[4,5]

The primary objective of Sustainable Development Goal (SDG) 3, which is to guarantee healthy lives and promote well-being for all people at all ages, is universal health coverage (UHC). The goal of UHC is to ensure that everyone has access to high-quality healthcare services based on their needs and that doing so won't put them in financial hardship. While there is agreement on what and why UHC is necessary, there is disagreement on how to get there. Primary health care has been demonstrated over the past forty years to improve service coverage and quality in the most effective and equitable manner, expand access to services, and help protect people's finances. Primary healthcare is seen by many in the global health community, notably the World Health Organization, as the first step toward attaining universal health coverage (UHC).[6–8]

Through the organization, collection, processing, and electronic sharing of information inside an organization, an integrated health information system (IHIS) can enhance the delivery of health care services. A properly implemented IHIS can be more effective by decreasing the amount of time required to obtain crucial data and make it available to medical professionals, lowering clinical error rates, offering assistance to medical professionals, enhancing information management, and enhancing patient access to care, all of which have a positive impact on society and the economy. When not used properly, IHIS can have a detrimental effect on the delivery of healthcare services. This is typically due to system flaws (errors, crashes, software, or other limitations that affect user tasks) or inadequate staff training and support, which can result in the absence of information or the use of incorrect information when making decisions, which can have an impact on the overall health of the patient. Today, providing safe, high-quality, and affordable healthcare to all patients is a challenge for all healthcare providers and institutions. To satisfy these objectives, it is therefore essential to continuously assess and improve the IHIS that is currently in place in addition to implementing it.[9–11]

METHODS

Protocol

By following the rules provided by Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020, the author of this study made certain that it was up to par with the requirements. This is done to ensure that the conclusions drawn from the inquiry are accurate.

Criteria for Eligibility

In order to conduct this literature study, we will contrast and compare the management information systems found in Indonesian public health facilities, or PUSKESMAS. Researching the management information systems in Indonesian public health centers (PUSKESMAS) can help achieve this. The main objective of this composition is to illustrate the significance of the challenges that have been recognized throughout the entire text.

To be eligible to participate in the study, researchers had to meet the following requirements: 1) The report must be written in English and must include information regarding the management information systems (PUSKESMAS) of public health centers in Indonesia. The manuscript must fulfill both of these conditions in order to be considered for publication. 2) A few of the examined studies were released after 2014, but prior to the time frame considered relevant by this systematic review. Editorials, submissions without a DOI, already published review articles, and entries that are nearly exact replicas of journal papers that have already been published are a few examples of research that are prohibited.

Search Strategy

We used "management information systems in public health centers (PUSKESMAS) in Indonesia." as keywords. The search for studies to be included in the systematic review was carried out using the PubMed, SagePub, and Sciencedirect databases.

Table 1. Search Strategy

Database	**Search Strategy**	***Hits***
Pubmed	*((*"PUSKESMAS*"[MeSH Subheading] OR* "Indonesia*"[All Fields] OR* "Public health*" [All Fields]) AND (*"information system*"[All Fields] OR* " management*" [All Fields]))*	2739
Science Direct	*((*"PUSKESMAS*"[MeSH Subheading] OR* "Indonesia*"[All Fields] OR* "Public health*" [All Fields]) AND (*"information system*"[All Fields] OR* " management*" [All Fields]))*	22
Sagepub	*((*"PUSKESMAS*"[MeSH Subheading] OR* "Indonesia*"[All Fields] OR* "Public health*" [All Fields]) AND (*"information system*"[All Fields] OR* " management*" [All Fields]))*	49

Data retrieval

The writers conducted an analysis to ascertain whether each study met the inclusion criteria after reading the study's title and abstract. Subsequently, the authors determined

which prior studies to include as references in their paper and picked those ones. This conclusion was reached after reviewing other studies that appeared to support the same pattern. All submissions must be made in English and must not have been published elsewhere.

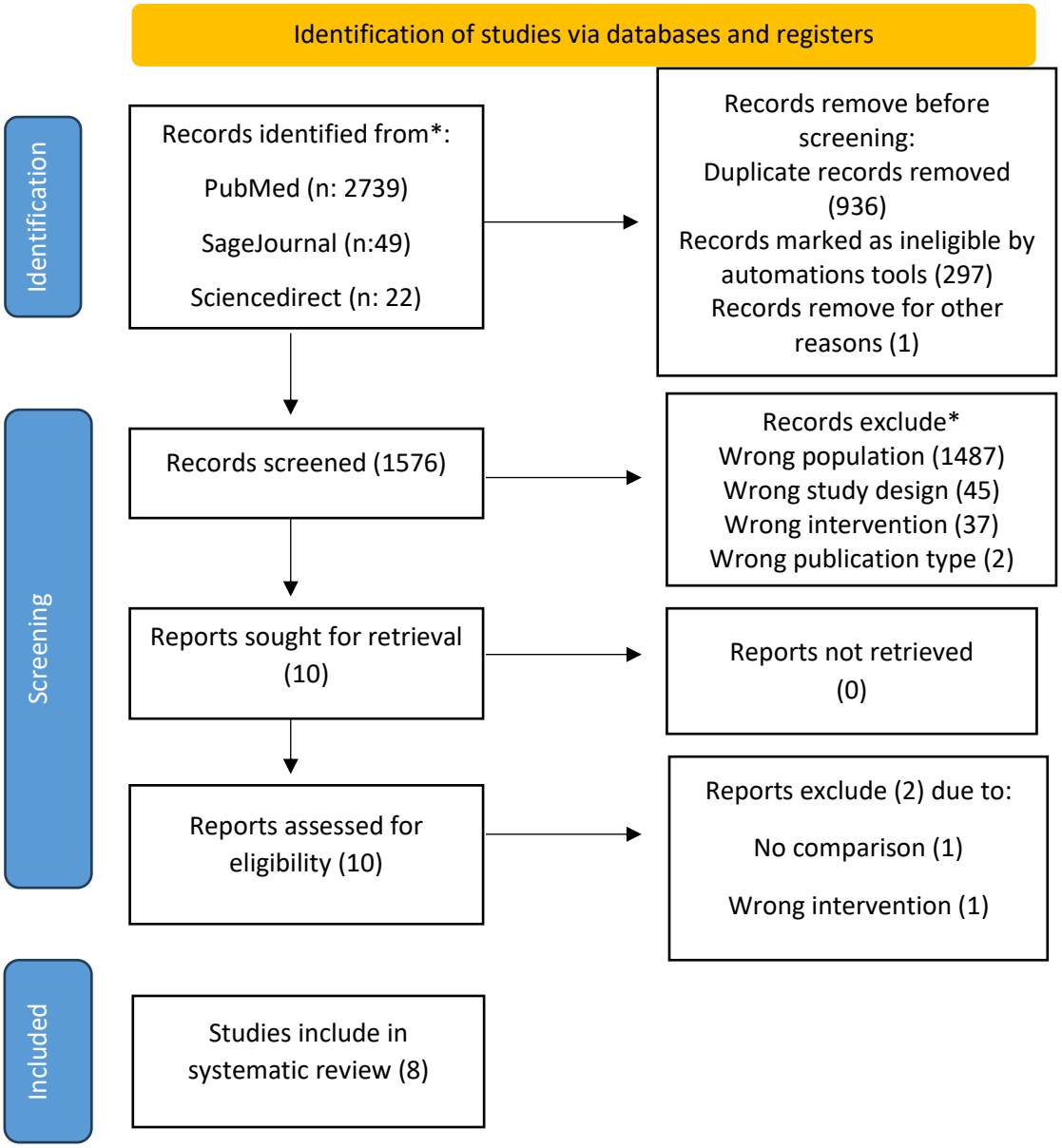

Figure 1. Article search flowchart

For the purposes of the systematic review, only papers that met all inclusion requirements were considered. By doing this, the quantity of results is whittled down to just those that are relevant to the query. The findings of any study that does not meet our standards are not taken into account. Subsequently, an extensive analysis of the research findings will be conducted. Names, authors, publication dates, locations, study activities, and parameters were among the details that came to light during the investigation conducted for this study.

Quality Assessment and Data Synthesis

Before deciding which publications to look into further, each author conducted independent research on the studies that were mentioned in the publication's title and abstract. The evaluation of every article that meets the review's inclusion criteria will be the following stage after it has been determined that it is appropriate for inclusion. After that, based on the information we've found, we'll decide which articles to include in the review. This criterion is applied when choosing papers for additional evaluation. in an effort to make the process of choosing which papers to review as straightforward as possible. We are going to talk about which previous studies were conducted and what aspects of those studies warranted their inclusion in the review.

Table 2. Critical appraisal of Study

Parameters	(Arsyad, DS et al., 2022)	(Harahap, NC et al., 2023)	(Mawarni, D & Sabran, S., 2022)	(Kusumawati, NI & Sulistyawati., 2018)	(Limanto, S & Andre., 2018)	(Idaiani, S et al., 2023)	(Kurniawan, A et al., 2017)	(Wigunto, C et al., 2023)
1. Bias related to temporal precedence								
Is it clear in the study what is the “cause” and what is the “effect” (ie, there is no confusion about which variable comes first)?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2. Bias related to selection and allocation								

Was there a control group?	No	No	No	No	No	No	No	No
3. Bias related to confounding factors								
Were participants included in any comparisons similar?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4. Bias related to administration of intervention/exposure								
Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	No	No	No	No	No	No	No	No
5. Bias related to assessment, detection, and measurement of the outcome								
Were there multiple measurements of the outcome, both pre and post the intervention/exposure?	No	No	No	No	No	No	No	No
Were the outcomes of participants included in any comparisons measured in the same way?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Were outcomes measured in a reliable way?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
6. Bias related to participant retention								
Was follow-up complete and, if not, were differences between groups in terms of their follow-up adequately described and analyzed?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
7. Statistical conclusion validity								
Was appropriate statistical analysis used?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

RESULT

Our research team first collected 2810 publications using reliable sources such as Science Direct, PubMed, and SagePub. After a comprehensive three-level screening process, only eight papers were found to be directly relevant to our ongoing systematic review. After that, these pieces were chosen for additional analysis and a comprehensive reading of the complete text. To make it easier to view, Table 3 gathers the literature that was analyzed for this analysis.

Table 3. The litelature include in this study

Author	Origin	Method	Sample	Result
Arsyad, DS et al., 2022[12]	Indonesia	The study questionnaire was adapted from the World Health Organization (WHO) Service Availability and Readiness Assessment (SARA), modified based on the package of essentials for non-communicable disease (PEN) and the Indonesian Ministry of health regulation. Data were collected from all Puskesmas facilities	47	Puskesmas provides early diagnosis, disease prevention, and health promotion for cardiovascular disorders such as diabetes, hypertension, stroke, and coronary heart disease (CHD). In the meantime, most Puskesmas were receiving basic medical care. Only a small percentage of Puskesmas received long-term treatment for patients with diabetes and hypertension, as well as rehabilitation for CHD and stroke victims. Puskesmas' preparedness score to provide CVD healthcare ranged from 60 to 86. Moreover, 11 Puskesmas (23.4%) had a score of less than 75, indicating a less-than-ideal level of preparedness to provide CVD health care. The two biggest issues preventing subpar preparation for high-quality CVD health

		($N = 47$) located in Makassar city.		services were a lack of necessary medications and a limited ability for diagnostic tests.
Harahap, NC et al., 2023[13]	Indonesia	This study followed the design science research guidelines. The requirements were identified through interviews with 37 respondents from health organizations and a questionnaire with 1012 patients.	37	The architectural vision, business architecture, application architecture, data architecture, and technology architecture are the five components of the architecture design, which is based on The Open Group architectural Framework version 9.2. A high-fidelity prototype was created for both doctors and patients. Improvements were made in the evaluation to include stakeholders, add the functionality that was needed for the PHR, and provide the information that was needed for the functions that were created for the prototype.
Mawarni, D & Sabran, S., 2022[14]	Indonesia	We use secondary data from health facility research in 2019.	9831	Public health workers meet criteria in 68.79% of primary health care in rural regions and 71.33% of primary health care in remote areas overall, but only in 46.82% of urban areas. The public health professional who focuses on behavior modification and health promotion is more fulfilled than the others. The availability of public health professionals in primary healthcare settings, both urban and rural, is influenced by their accreditation status. In particular, service

				capability and accreditation status have an impact on remote primary health care. To promote the fulfillment of public health workers, the government must examine the primary health care primary health worker recruitment policy.
Kusumawati, NI & Sulistyawati., 2018[15]	Indonesia	A cross-sectional approach was conducted through a survey on the 37 of PHC's user.	37	According to the hypothesis testing, perceived usefulness predicted by terminology, perceived ease of use is significantly predicted by screen design and terminology, perceived usefulness significantly predicts the intention of use and perceived ease of use, while system use which predicted considerably by the intention of use and facilitating condition.
Limanto, S & Andre., 2018[16]	Indonesia	Methods used to collect data are interview, observing ongoing system, and scrutinize related document. The interview was held with internal user (Doctor, assistant, and administrator officer) and	-	In certain instances, medical records may be lost because they are primarily manually kept (on paper) in Indonesia. As a result, the doctor's care is not at its best since the doctor is unable to review the patient's medical history or previous treatments. This study offers a novel idea to assist rural residents in receiving better medical care. Using a smartphone, people could sign up and keep an eye on the doctor service line. To enhance patient service quality,

		several patient as external user.		the system was upgraded to include medical record management capabilities.
Idaiani, S et al., 2023[17]	Indonesia	This cross-sectional research used data from 9831 CHCs from the Health Facilities Research 2019 (RIFASKES). Significance was assessed using a chi-square test and analysis of variance (ANOVA).	34	With STATA version 14, the spmap command was utilized to generate a map displaying the quantity of applications. The results indicated that the best regions were 2, which included Java and Bali, 1, which included Sumatra Island and its surrounds, and 3, which included Nusa Tenggara. Three provinces in area 1—Jambi, Lampung, and Bangka Belitung—had the highest mean, which was found to be equivalent to that of Java. Furthermore, less than 60% of all data-storage programs were found in Papua and West Papua. As a result, the health information system in Indonesia varies depending on the province and area. The analysis's findings suggest that the information systems of the CHCs be improved going forward.
Kurniawan, A et al., 2017[18]	Indonesia	This was a qualitative study. The study was conducted in Sukoharjo, Kartasura, Bendosari, Mojolaban community	3	Three health information systems (SIMPUS, P care, and bridging system) have been implemented in Sukoharjo District. However, their performance is yet to be improved. Loading time was lengthy and error

		health centers, in Sukoharjo District, Central Java, from October to December, 2017.		often occured. Patients often complained of the lengthy service. Some items in the information system form were left blank. Data entry occasionally was inconsistent with examination outcome. Security system of the health information existed, but sometimes unauthorized individuals can access and use that information. There was a lack of human resources and hardware. The health information system had not met the information need.
Wiguno, C et al., 2023[19]	Indonesia	In this study, researchers used five indicators adapted from Sutrisno (2007:125-126) to measure the extent to which the implementation of SIMPUS affects the effectiveness of health services and its benefits for local communities.	-	Research findings show that program understanding, achievement of goals, and real changes in patient data management have reflected the positive impact of SIMPUS at the South Tangerang Community Health Center. However, technical obstacles, especially related to network and electricity disruptions, pose challenges in using the system. Therefore, suggestions are made to improve infrastructure, officer training, implementation of backup systems, routine maintenance, external cooperation, continuous evaluation, preparation of emergency policies, and

				development of additional features as necessary improvement and development steps to ensure sustainability and effectiveness. SIMPUS in the future.

DISCUSSION

With the fourth biggest population and one of the fastest-growing economies in the world, Indonesia, which was recently categorized as an upper-middle-income nation, has made significant strides toward enhancing health outcomes. Nonetheless, issues still exist in isolated areas and have been resolved by tactics like deploying medical personnel and expanding the scope of national health insurance. In Indonesia, public community health centers, also known as Pusat Kesehatan Masyarakat or Puskesmas, are largely in charge of overseeing the PHC network. Puskesmas are essential for delivering all-encompassing care, especially in isolated locations. Primary care transformation, the empowerment of community health workers (CHWs) to enhance public health services, primary and secondary preventive healthcare, and high-quality primary health services are some of the recent changes to the Indonesian health system. The community-based integrated health post, also known as Posyandu or Pos Pelayanan Terpadu, is the hub of the Puskesmas network and provides community-based health services. It is impossible to overestimate the importance of Posyandu in Indonesia, since it provides an essential first line of healthcare to a nation where a large portion of the populace lives in isolated places outside the reach of traditional PHCs.[4,20,21]

Globally, primary health care (PHC) is recognized as a key factor in the advancement of both the 2030 Agenda for Sustainable Development and universal health coverage (UHC). Investing in PHC encourages sustainability and offers great rewards. Nevertheless, primary care and public health interventions, or PHC services, now receive just half of the health budget in low- and middle-income countries (LMICs). Providing high-quality PHC services shouldn't be seen as a low-cost tactic; instead, substantial

financial resources must be allocated to easily accessible health systems that offer a full range of interventions to all individuals in need. These expenditures can have a substantial positive impact. In the Astana Declaration, nations and other stakeholders promised, among other things, to provide sufficient funding for basic health care. This commitment was made at the Global Conference on basic Health Care in October 2018.[22–24]

A health information system, or HIS, is a system that gathers and evaluates data from the public health field as well as other pertinent fields, guaranteeing the data's general accuracy, applicability, and timeliness. The evaluated data are then transformed into information that is helpful for making decisions pertaining to health. In actuality, this data may be utilized at several stages of the healthcare system, including population, individual, hospital, and public health surveillance. Such an information system is typically necessary for the planning and execution of health care activities in order to enhance health systems and promote better health. Evaluating population health needs and the efficacy and reach of health interventions are also beneficial.[1,25]

Decades ago, as health management and public health policy became more complex, especially in developing nations, the demand for an integrated HIS itself emerged. The HIS becomes a vital tool in these nations, which includes Indonesia. It offers a framework for coordinating efforts to address a range of health issues, including infectious illnesses. Still, there are issues with implementing HISs in poor nations. Several significant barriers have been found in studies including underdeveloped nations. First, it is recognized that problems with HIS implementation frequently emerge from the social, political, economic, and public health environment in which the system is intended to function rather than from the technological aspects of the system itself. Second, the program's performance also depends on how well human resources (medical staff) can integrate a new health management information system. Thirdly, it should be highlighted that no matter how excellent the health information system is, the program will not be able to produce adequate outcomes if the individuals in charge of it lack commitment and leadership.[9,25]

CONCLUSION

In conclusion, To promote the fulfillment of public health workers, the government must examine the primary health care primary health worker recruitment policy. The administration of health information systems is crucial to supplying precise and reliable data to support policymakers. The PHC Health Information System is the primary place where community data is entered by the health authority due to the urgency of the data needs.

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