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Implementation of Health Statistics to Improve the Quality of Epidemiological Reporting in Health Service Facilities

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ABSTRACT

Objective: *Health statistics play an important role in transforming routine data of health service facilities into meaningful epidemiological information. Complete, timely, accurate, and analyzable reporting is needed to support disease surveillance, early detection of extraordinary events, program evaluation, and public health decision-making. This article aims to examine the implementation of health statistics in improving the quality of epidemiological reporting in health service facilities.* ***Method:*** *The review was conducted through searches of PubMed, Scopus, ScienceDirect, Google Scholar, Garuda, and national journal databases. The keywords used included health statistics, epidemiological reporting, disease surveillance, routine health information system, data quality, completeness, timeliness, health facility reporting, and Indonesia. Article selection followed the PRISMA process through identification, deduplication, title-abstract screening, and full-text review until 27 articles met the inclusion criteria. Data were extracted based on country, design, facility context, data quality indicators, reporting system, and key findings.* ***Results:*** *The review results show that the implementation of health statistics in healthcare facilities is widely used to strengthen surveillance reporting, routine health information systems, hospital reporting, EWARS, DHIS2, and priority disease reporting. The most frequently used indicators are completeness, timeliness, accuracy, consistency, validity, and data utilization. The main challenges include limited human resource capacity, reporting workload, system duplication, weak data validation, reporting delays, and low utilization of analysis results.* ***Novelty:*** *Strengthening basic statistics training, indicator standardization, information system integration, data quality audits, and routine feedback are needed to improve the quality of epidemiological reporting.*

INTRODUCTION

Health data is never merely a series of numbers stored in forms, applications, or monthly reports of health service facilities. Every patient visit, examination results, diagnosis, actions, deaths, and disease events are pieces of information that can describe public health conditions if processed properly. The epidemiological value of this data is only formed when the processes of recording, grouping, examination, analysis, interpretation, and presentation are carried out using health statistical principles. Incomplete, late, or inconsistent reporting can obscure changes in disease patterns and hinder the recognition of early signs of case increases. Experience from various countries shows that the quality of routine data is still influenced by weak validation, limited staff capabilities, mismatch of indicators, and suboptimal use of analysis results for decision-making [1], [2], [3].

The phenomenon of health information system implementation in Indonesia shows that the increase in the number of applications has not always been accompanied by an improvement in information quality. Community health centers can use many reporting systems simultaneously to meet the needs of programs, local governments, and the central government, so officers must input similar data into several applications. This

fragmentation increases administrative burden, increases the risk of numerical discrepancies, and reduces staff time to analyze the collected data. Gaps in facilities, internet networks, user competencies, and technical support also cause health service facilities' ability to produce quality reports to be uneven. The obligation to maintain electronic medical records should be the foundation for building more integrated health data, but its implementation still requires standardization of data elements and alignment of reporting flows to avoid new duplications [4], [5], [6], [7].

The concept of health statistics includes a systematic process to collect, examine, process, analyze, interpret, and present data related to health status, health services, and influencing factors. This process places routine data as the basic material to produce epidemiological indicators that can be used in disease surveillance, program evaluation, service planning, and intervention prioritization. Data quality in this context is not only assessed by the presence of the report but also by its suitability to user needs. Completeness indicates how much data that should be reported is available, while timeliness describes the system's ability to deliver information within the specified time limit. The quality perspective also includes accuracy, consistency, validity, comparability, relevance, and ease of use of data to support accountable health decisions [1], [8], [9].

Previous research shows that reporting quality issues are not only related to technology but are also influenced by human factors and organizational governance. Studies on routine health information systems have found that the availability of forms, staff capabilities, training, supervision, data quality checks, and feedback from management levels are related to the completeness and accuracy of reports [9], [10], [11]. DHIS2 data review in Nepal shows that reports can have a good level of completeness, but still show inconsistencies between indicators, periods, and recording sources [12]. Findings at Ethiopian health facilities also indicate that the use of guidelines, the presence of trained personnel, evaluation implementation, and management support are important factors in producing reliable data [13]. The similarity of results from various locations confirms that the quality of epidemiological reporting is the result of an interaction between staff competence, work procedures, information technology, supervision, and data usage culture.

The urgency of strengthening health statistics increases when healthcare facilities face diseases that have the potential to cause extraordinary events. Surveillance systems require fast and accurate reports because changes in case numbers in a short time can be an early signal that requires verification and field response. The decline in the quality of Early Warning Alert and Response System reporting during the COVID-19 pandemic indicates that service pressures, limited human resources, and shifts in priorities can affect the continuity of reporting of other diseases [2]. The Regulation of the Minister of Health of the Republic of Indonesia Number 1 of 2026 has provided the latest foundation regarding the implementation of vigilance, handling extraordinary events, outbreaks, and health crises [14]. Delays in reporting under these conditions can cause delayed investigations, wider disease spread, improper use of resources, and increased risks to

the community. The need for quality data is also related to the preparation of facility and regional plans, because decisions not supported by data can result in programs that are less relevant to local health issues [15].

Solutions to improve reporting quality need to place health statistics implementation as part of routine work, not as an additional task after the report is submitted. Health service facilities need to build a data management cycle starting from determining operational definitions of indicators, recording data sources, validation, processing, analysis, interpretation, presentation, to providing feedback. Standardization of variables and indicators can reduce differences in understanding among staff, while system integration can reduce the repetition of the same data entry [1], [3], [7]. Continuous technology integration needs to be accompanied by regular data quality audits to identify missing values, figure irregularities, duplication, and discrepancies between reports and source documents. Strengthening basic statistical skills, using guidelines, supportive supervision, and regular feedback has been proven to be related to increased information utilization by health workers [16], [17]. The implementation of this strategy can transform reporting activities from administrative obligations into a learning process that helps facilities recognize problems and evaluate service outcomes.

Studies on health data quality have been widely conducted, but most studies still focus on a single disease, one application, one type of facility, or a specific region. Some studies assess completeness and timeliness, while others discuss accuracy, consistency, system readiness, or data utilization separately [4], [6], [18]. These limitations leave a need for studies linking the application of health statistics with various dimensions of epidemiological reporting quality at the health service facility level. This article aims to examine the implementation of health statistics in improving the quality of epidemiological reporting through a synthesis of research on disease surveillance, routine health information systems, hospital reporting, EWARS, DHIS2, and priority disease reporting. The results of the study are expected to provide an overview of the quality indicators used, the most frequently encountered obstacles, as well as strengthening strategies that can be applied so that health service facility data becomes more accurate, timely, meaningful, and beneficial information for public health protection.

RESEARCH METHOD

This study uses a literature review method with article searches through the PubMed, Scopus, ScienceDirect, Google Scholar, and Garuda databases conducted on publications from 2021 to 2026. The keywords used include "health statistics," "epidemiological reporting," "disease surveillance," "routine health information system," "health management information system," "data quality," "completeness," "timeliness," "accuracy," "health facility reporting," "DHIS2," "EWARS," as well as a combination of Indonesian keywords such as "health statistics," "epidemiological reporting," "disease surveillance," "data quality," and "health service facilities" with the help of Boolean AND and OR operators. Inclusion criteria include scientific articles in Indonesian or English,

available in full text form, published in scientific journals, discussing the application of health statistics or routine health information systems in healthcare facilities, and containing reporting quality indicators such as completeness, timeliness, accuracy, consistency, validity, or data utilization. Exclusion criteria include duplicate articles, editorial articles, letters to the editor, proceedings that do not provide complete manuscripts, research that only discusses technology development without data quality evaluation, research outside healthcare facilities, and articles not directly related to epidemiological reporting. The article selection process follows the Preferred Reporting Items for Systematic Reviews and Meta Analyses or PRISMA flow, which began with the identification of 684 articles, consisting of 126 articles from PubMed, 148 articles from Scopus, 117 articles from ScienceDirect, 203 articles from Google Scholar, and 90 articles from Garuda. A total of 176 duplicate articles were removed, leaving 508 articles to be selected based on titles and abstracts. The results of title and abstract screening revealed 392 articles that did not match the topic, resulting in 116 articles to be reviewed in full-text form. The full-text selection produced 89 articles because they did not discuss epidemiological reporting, did not present data quality indicators, were not conducted in healthcare facilities, were outside the publication year range, or were not available in full-text form. The final stage produced 27 articles that met all criteria and were used in the data extraction and synthesis process.

RESULTS AND DISCUSSION

Results

A total of 27 articles were analyzed in this review. The selected articles came from Indonesia, the Netherlands, Tanzania, Ethiopia, Benin, Chad, Nepal, Uganda, South Sudan, Ivory Coast, Mozambique, and Nigeria. Research from Indonesia is the largest group because it fits with the main context of epidemiological reporting in health service facilities. The research designs used are quite diverse, but most employ cross-sectional approaches, system evaluation, data quality evaluation, routine data analysis, and mixed methods. The systems studied include Early Warning Alert and Response System, Early Warning and Response System, Health Management Information System, Routine Health Information System, District Health Information Software 2, One Health Data Application, Online Hospital, malaria surveillance information system, and a specific disease reporting system.

Table 1. Article Characteristics

Code	Author and year	Country or region	Research design	Systems or contexts under study	Research focus
Article (1)	Hardhantyo et al., 2022	Indonesia	Mixing method	EWARS or national SKDR	Quality of surveillance reporting before and during the COVID-19

					pandemic
Article (2)	Faridah et al., 2020	Bandung, Indonesia	System evaluation and case studies	Dengue fever surveillance information system	Flow of information, coordination, and implementation of dengue fever surveillance
Article (3)	Barsasella et al., 2022	Indonesia	Reporting system analysis	COVID-19 reporting at the national and provincial levels	Information flow and COVID-19 data gaps
Article (4)	Manurung et al., 2020	West Papua, Indonesia	Program evaluation	EWARS or SKDR	Performance of early warning systems in geographically limited areas
Article (5)	Herawati et al., 2023	Indonesia	Descriptive study	Malaria Surveillance Information System	Availability and readiness of malaria surveillance systems at community health centers
Articles (6)	Idaiani et al., 2023	Indonesia	Cross-sectional analysis	Health program information system	Gaps in the implementation of information systems between regions and facilities
Article (7)	Aisyah et al., 2025	Indonesia	Cross-sectional national analysis	Health information system for community health centers	The level of utilization of health information systems
Articles (8)	Sanjaya et al., 2024	Indonesia	Data quality evaluation	One Health Data Application	The use of the WHO Data Quality Tool to improve routine data
Article (9)	Elfrida et al., 2024	Sumatra Island, Indonesia	Quantitative cross-sectional	Online Hospital Application	Quality of hospital reporting data
Articles (10)	Tumiat et al., 2024	Kebumen, Indonesia	Performance evaluation	EWARS or SKDR	Completeness and timeliness of reporting
Articles (11)	Ward et al., 2005	Netherlands	Comparative before and after	Electronic reporting of infectious	The influence of digitalization

				diseases	on completeness and timeliness
Articles (12)	Rumisha et al., 2020	Tanzania	Cross-sectional and data quality assessment	Facility and district level HMIS	Completeness, accuracy, and consistency of routine data
Articles (13)	Shama et al., 2021	Harari, Ethiopia	Cross-section, document review, interviews, and observation	RHIS public health facility	Data quality and influencing factors
Articles (14)	Chekol et al., 2023	West Gojjam, Ethiopia	Cross-section	RHIS community health center	Data quality and organizational and technical factors
Articles (15)	Getachew et al., 2022	Shashogo, Ethiopia	Cross-section	HMIS community health center	Data quality and related factors
Articles (16)	Solomon et al., 2021	Ethiopia Selatan	Cross-section	HMIS community health center	Assessment of completeness, timeliness, and accuracy
Articles (17)	Glèlè Ahanhanzo et al., 2014	Benin	Observational cross-sectional	RHIS	Factors related to routine data quality
Articles (18)	Moukénet et al., 2021	Chad	Cross-section and data verification	HMIS malaria program	Data accuracy between source documents and reports
Articles (19)	Sanjel et al., 2024	Lumbini, Nepal	Review of secondary data	DHIS2	Data quality of maternal and child health indicators
Articles (20)	Nansikombi et al., 2023	Uganda	National surveillance data analysis	Weekly reporting of potentially epidemic diseases	Completeness and timeliness of reporting
Articles (21)	Morris et al., 2024	Maridi, Sudan Selatan	Cross-sectional and mixed methods	RHIS	Technical, organizational, and behavioral factors
Articles (22)	Gobena et al., 2022	Jigjiga, Ethiopia	Cross-cutting and implementation research	RHIS public health facility	Data quality and supporting implementation factors
Articles (23)	Mekonnen et al., 2021	North Gondar, Ethiopia	Cross-section	Routine health information	Data utilization by healthcare workers
Articles	Mekuria et	Dire	Cross-section	RHIS public	Utilization of

(24)	al., 2023	Dawa, Ethiopia		health facility	information for decision-making
Articles (25)	Kabakama et al., 2016	Tanzania	Case series analysis	HMIS pediatric diseases	Use of child disease data for decision-making
Articles (26)	Nyamtema, 2010	Tanzania	System and policy analysis	HMIS	Information system gaps in changes in the health sector
Articles (27)	Bosch Capblanch et al., 2021	Ivory Coast, Mozambique, and Nigeria	Randomized group testing protocol	PHISICC paper-based health information system	Development of interventions to improve data quality and usage

Most research was conducted at primary health service facilities and district-level health units. Indonesian research mostly examined disease surveillance systems, information system readiness, reporting gaps, and the use of national applications. Research from African countries mostly assessed the quality of RHIS and HMIS based on the alignment between source documents and reports, availability of trained personnel, supervision, feedback, and the use of information by health workers.

Table 2. Synthesis of Reviewed Article Results

Code	Aspects or indicators studied	Main results	Meaning of epidemiological reporting
Article (1)	Completeness, timeliness, workload, and continuity of reporting	The COVID-19 pandemic increased the burden on surveillance officers and affected the quality of EWARS reporting. The system is not yet fully integrated with service and laboratory data sources	The resilience of the reporting system needs to be strengthened to continue functioning during health emergencies
Article (2)	Coordination, data flow, reporting accuracy, and inter-agency relations	Dengue fever reporting involves many levels of organization, but coordination, data exchange, and uniformity of procedures have not been optimally implemented	The quality of surveillance is determined not only by the application but also by inter-agency coordination
Article (3)	Information flow, completeness of variables, duplication, and data gaps	The use of multiple COVID-19 reporting channels has caused data disparities between facility levels, provinces, and national levels	Data standards and interoperability are necessary to produce a single consistent source of information
Article (4)	Report completeness, detection speed,	EWARS helps coordinate disease control, but implementation in remote	System adjustments based on geographic conditions are necessary

	response, communication network, and staff capacity	areas is affected by networks, mobility, training, and technical support	to keep reporting running
Article (5)	Readiness of facilities, human resources, devices, connectivity, and system support	The readiness of the malaria surveillance system is still uneven among community health centers due to differences in facilities, staff competencies, and operational support	Application availability must be accompanied by readiness of facilities and user staff
Articles (6)	Availability, distribution, and utilization of program information systems	There is a gap in health information systems based on region, facility characteristics, facilities, and human resource capacity	Information system policies need to consider the capability gaps in facilities
Article (7)	System usage intensity, user capabilities, facilities, and organizational support	The utilization of health information systems is influenced by infrastructure availability, health worker capabilities, and management support	The success of the system needs to be assessed based on the use of information, not just the number of applications
Articles (8)	Completeness, internal consistency, indicator suitability, and data verification	The WHO Data Quality Tool can identify data irregularities, missing values, and inconsistencies between periods	Data quality audits need to become a routine activity before data is used for decision-making
Article (9)	Completeness, accuracy, consistency, and timeliness of hospital reporting	The quality of Online Hospital reports differs between hospitals, and incompleteness and discrepancies in filling out are still found	Automatic validation, supervision, and feedback need to be strengthened in hospital reporting
Articles (10)	Completeness and timeliness of weekly reports	EWARS reporting performance is not yet uniform across all reporting units and is still influenced by discipline, monitoring, and follow-up by officers	Regular monitoring is necessary to maintain the continuity of weekly reporting
Articles (11)	Timeliness and completeness of infectious disease notifications	Electronic reporting speeds up report acceptance and improves completeness compared to conventional procedures	Digitalization can increase efficiency if the system is easy to use and workflows are clear
Articles (12)	Completeness, accuracy, consistency, and suitability of source documents	Differences were found between the service register, facility recapitulation, and district-level reports	Tiered verification is necessary to ensure that the data sent matches the source of the records
Articles (13)	Completeness, timeliness, accuracy, training, supervision, and availability of tools	Data quality relates to officer training, the use of standard formats, supervision, and data verification activities	Quality improvement requires a combination of technical support and governance strengthening

Articles (14)	Completeness, timeliness, accuracy, feedback, and information culture	Data quality varies between facilities and is influenced by training, supervision, feedback, and data usage habits	The culture of data usage encourages officers to be more meticulous in recording
Articles (15)	Completeness, timeliness, accuracy, competence, and workload	Data quality has not yet reached standards across all facilities and is influenced by skills, workload, and resource availability	Responsibility division and competency improvement need to be done simultaneously
Articles (16)	Completeness, accuracy, timeliness, audit, and management support	Recording errors and report discrepancies are still found in facilities that have not conducted regular audits and feedback	Data audits and follow-up audit results are important elements of quality control
Articles (17)	Motivation, supervision, workload, form availability, and data quality	Data quality is influenced by the interaction between individual, technical, and organizational factors	Interventions focused solely on technology are not enough to improve data quality
Articles (18)	Accuracy of malaria reports and conformity with registers	Verification found possible overreporting or underreporting between source documents and aggregate reports.	Data reconciliation is required before malaria indicators are calculated and reported
Articles (19)	Completeness, consistency, extreme values, and suitability of indicators	DHIS2 data may be well complete, but still show inconsistencies and unreasonable values on certain indicators	The completeness of the report does not always indicate that the data is accurate and consistent
Articles (20)	Completeness and timeliness of reports of potentially epidemic diseases	Weekly reporting performance varies between regions and periods, which can affect the speed of disease detection	Monitoring of reporting indicators needs to be carried out down to the district and facility levels
Articles (21)	Technical, organizational, behavioral, competency, and feedback factors	Data quality is influenced by the officers' ability, availability of equipment, leadership, motivation, supervision, and information culture	Improvement approaches need to include humans, organizations, and technology in an integrated manner
Articles (22)	Completeness, accuracy, timeliness, standard tools, and implementation support	Facilities with trained personnel, available recording tools, and active supervision tend to have better data quality	Implementation support needs to be provided continuously and not stop after training
Articles (23)	Analysis, interpretation, presentation, and use of data	The use of routine information by healthcare workers is still limited and related to analytical skills, device access, and supervision	Quality data does not provide benefits if not used in decisions
Articles (24)	Information usage, workforce capability, data availability, and organizational support	Healthcare workers are better able to use information when receiving training, data access, leadership support, and feedback	Strengthening data literacy is necessary to connect reporting with planning

Articles (25)	Completeness and consistency of child disease data and their use for decision-making	Incompleteness and discrepancies in figures limit the use of child disease data in program planning	Local analysis needs to be accompanied by quality checks of data sources
Articles (26)	System fragmentation, number of indicators, reporting load, and feedback	HMIS faces too many data needs, separate systems, and weak relationships between information collection and usage	Simplification of indicators and harmonization of systems are necessary to reduce facility burdens
Articles (27)	Form design, logging flow, training, support, and data usage	The study designed a simpler paper-based information system intervention to be tested on data quality and usage	Improvements do not always depend on digitalization and need to be adjusted to the readiness of the facilities

The synthesis results show that the most commonly used indicators are completeness, timeliness, accuracy, consistency, validity, and information usage. The factors most frequently influencing these indicators include staff competence, workload, availability of forms and devices, clarity of indicator definitions, supervision, data audit, feedback, leadership support, connectivity, and integration between systems. These results indicate that the quality of epidemiological reporting is not only a matter of record-keeping but also reflects the organization's ability to manage data from the moment services are provided until information is used in decision-making.

Discussion

The review results show that the implementation of health statistics has become an important part of epidemiological reporting, although the forms of application differ between countries and facilities. The research group in Indonesia mostly discussed disease surveillance, EWARS, hospital reporting, health program systems, and the use of national applications in Articles (1) through (10). Research groups from Tanzania, Ethiopia, Benin, Chad, Uganda, and South Sudan mostly assessed the quality of RHIS and HMIS through comparisons between source documents, facility reports, and district-level data in Articles (12) through (18), Articles (20) to (26). Article (11) shows the early development of electronic reporting, while Article (19) describes the use of DHIS2 for maternal and child health indicators. Article (27) provides a different approach through the development of a simpler paper-based information system. These variations show that health statistics can be applied to both digital and manual systems as long as the collection, validation, analysis, and utilization processes are systematically arranged.

The strongest similarity was found in the use of completeness and timeliness as the main indicators of reporting quality. Articles (1), (4), (10), and (20) show that both indicators are very important in early warning systems because late or incomplete reports can hinder the detection of disease pattern changes. Article (11) shows that electronic reporting can accelerate infectious disease notifications, but the findings of Article (1) confirm that technology does not guarantee continuity of reporting when officers face

high workloads. Article (4) also shows that national systems can face different obstacles when implemented in remote areas. The correlation of these results shows that reporting quality requires functioning technology, available personnel, clear procedures, and monitoring systems capable of recognizing facilities that have not reported. Findings about reporting burden, coordination challenges, and integration limitations in Indonesia's system are also reflected in EWARS research and priority disease reporting.

Differences began to appear when the study used accuracy and consistency indicators. Articles (12), (13), (14), (15), (16), (17), (18), and (22) assessed data quality through the conformity between service registers and aggregate reports. The research group found that reports submitted on time did not necessarily match the source data. Article (18) highlighted the importance of verification of malaria data because aggregation errors can result in reports exceeding or falling short of the actual number of incidents. Article (19) also shows that a good level of DHIS2 completeness can be accompanied by extreme values, inconsistencies between indicators, or changes in numbers that are difficult to explain. These equations clarify that quality assessment should not stop at the existence of reports. Examination of the reasonableness of the numbers, consistency between periods, relationships between indicator components, and conformity with source documents need to be conducted before the data are used to assess the epidemiological situation.

The human factor is a consistent theme in almost all articles. Articles (5), (7), (13), (14), (15), (16), (17), (21), (22), (23), and (24) indicate that competence, experience, motivation, understanding of indicators, and analytical skills are related to data quality and usage. Staff who do not understand the operational definition of indicators may make mistakes from the recording stage, while those who do not receive analysis training tend to only submit reports without interpreting the results. Workload also appears as a problem in Articles (1), (15), (17), (21), and (26). This condition makes reporting treated as an administrative obligation that must be completed after the main service. The conclusion of this relationship shows that improving basic statistical skills needs to be accompanied by proportional division of tasks, mentoring, and recognition of data management functions as an important part of health services.

Organizational and governance factors have an influence as important as individual competence. Articles (2) and (3) show that data problems in Indonesia occur when many agencies and applications use different flows, formats, or definitions. The COVID-19 reporting system shows data gaps at the facility, province, and national levels when information exchange mechanisms are not yet fully integrated. Articles (6), (8), (9), and (26) also show that system fragmentation, differences in facility capabilities, numerous indicators, and weak feedback increase the risk of duplication and inconsistency. Articles (13), (14), (16), (21), and (22) found that supervision and feedback are related to better data quality. Facilities that receive data verification results can identify errors and make corrections, while facilities that are only asked to submit reports do not gain lessons from the reporting process. Good data governance needs to build a two-way relationship between facilities as data producers and program managers as information users.

Digitalization provides benefits but cannot be positioned as the only solution. Article (11) shows the advantages of electronic reporting in speeding up notifications and improving completeness. Articles (1), (3), (8), (9), and (19) show that digital applications can also contain incomplete, inconsistent, or different data from other sources if validation and integration have not yet been implemented. Article (27) instead develops simplified paper-based interventions for facilities with technological limitations. These findings show that system design needs to adjust to facility readiness. Simple systems understood by officers can produce better data than complex applications but are not integrated with workflows. The advantages of technology lie in delivery speed, automatic checks, storage, and ease of analysis. Disadvantages arise when connectivity is limited, applications are too many, interfaces are difficult to use, technical support is unavailable, or the same data must be entered repeatedly.

Information utilization remains a weak stage in the overall health statistics cycle. Articles (7), (8), (19), (23), (24), (25), and (26) indicate that the data collected have not always been analyzed to determine priorities, evaluate programs, or improve services. Articles (23) and (24) show that the use of information is related to analytical ability, access to data, leadership support, and organizational culture. Article (25) shows that incomplete child disease data limits its use in planning. Article (26) adds that the abundance of indicators can make officers focus more on meeting report demands rather than understanding health situations. The conclusion from this relationship shows that data quality and data use form a reciprocal relationship. Data considered inaccurate are rarely used, while data that is never used tends to receive attention for improvement.

The advantages of this collection of articles lie in the breadth of system context, regions, types of facilities, and the indicators analyzed. The mixed methods approach in Article (1), system evaluation in Articles (2) through (5), national analysis in Articles (6), (7), and (20), as well as document verification in Articles (12), (13), (18), and (19), provide complementary overviews. Quantitative research is able to show patterns of completeness, timeliness, and accuracy, while the qualitative component explains the reasons behind the low data quality. The lack of evidence lies in the dominance of cross-sectional designs that have not yet been able to confirm cause-and-effect relationships. Differences in definitions and quality limits in each article also make direct comparisons between countries difficult. Articles (11), (17), (25), and 26 come from longer periods, so their technological contexts differ from current conditions. Article (27) is still a research protocol and therefore has not produced evidence of intervention effectiveness. Some studies also rely on staff assessments that can be influenced by perceptions and tendencies in giving answers considered good.

Subsequent research needs to use longitudinal, experimental, or quasi-experimental designs to assess changes in data quality before and after interventions. Interventions may include basic statistical training, indicator simplification, application integration, automatic validation, data quality audits, supportive supervision, or providing regular feedback. Research also needs to measure the relationship between improved reporting quality and the speed of detecting extraordinary events, accuracy of prioritization,

resource efficiency, and patient service outcomes. Studies in Indonesia need to compare facilities based on urban, rural, archipelagic, border, and network limitations so that the developed solutions are not only suitable for facilities with good infrastructure. Economic evaluation needs to be conducted to determine costs, workload, and benefits of system integration compared to using multiple applications running separately.

The entire article shows that the implementation of health statistics can improve the quality of epidemiological reporting if applied as a complete cycle. This cycle includes recording based on uniform definitions, examination of source documents, processing, analysis, interpretation, presentation, use of information, and providing feedback. Completeness and timeliness are the initial basis, but accuracy, consistency, validity, and data utilization determine the true value of information. Strengthening human resources, standardizing indicators, integrating systems, data quality audits, supervision, and culture of information use are the most consistent strategies found in Articles (1) through (27). The implementation of these strategies can transform reporting from administrative activities into instruments to understand problems, detect risks earlier, and make more precise public health decisions.

CONCLUSION

Fundamental Finding : The review results of 27 articles show that the implementation of health statistics plays an important role in improving the quality of epidemiological reporting in health service facilities. The application of health statistics helps transform routine service data into information that can be used for disease surveillance, early detection of extraordinary events, program evaluation, service planning, and public health decision-making. The quality of reporting is not only determined by completeness and timeliness but is also influenced by accuracy, consistency, validity, conformity with source documents, and the facility's ability to utilize data. **Implication :** Improving the quality of epidemiological reporting needs to be done through basic statistical training and periodic data management, standardization of indicator definitions, simplification of reporting forms, integration of information systems, automatic validation, data quality audits, and providing feedback to health service facilities. Leadership support and proportional workload sharing need to be strengthened so that recording and reporting activities are not seen merely as administrative obligations. **Limitation :** The most frequently found problems include limited staff competence, high reporting burden, use of several applications that are not yet integrated, inconsistent definition of indicators, weak data validation, limited facilities, and suboptimal supervision and feedback. Digital systems can accelerate the reporting process, but technology cannot guarantee information quality if not supported by competent human resources, clear procedures, strong governance, and a culture of data use in service activities. **Future Research :** Future research is recommended to use longitudinal, experimental, or quasi-experimental designs to measure changes in data quality before and after the implementation of an intervention. Future research also needs to examine the relationship between reporting quality and disease detection speed,

accuracy of decision-making, resource use efficiency, and health service outcomes. Studies on facilities in urban, rural, island, border, and areas with limited infrastructure are needed so that reporting quality improvement strategies can be adjusted to the conditions of each region. Evaluation of costs, workload, system sustainability, and application integration effectiveness is also important to produce a simpler, more accurate, responsive, and sustainably usable epidemiological reporting system.

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