

FACTORS INFLUENCING THE ACCURACY OF DISEASE DIAGNOSIS CODING BASED ON ICD-10 AT A COMMUNITY HEALTH CENTER

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ARTICLE INFORMATION

Received: 8 April 2026
Revised : 6 May 2026
Accepted: 12 June 2026
DOI:

KEYWORDS

Coding Accuracy, ICD-10, Medical Record, 5M Factors

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A B S T R A C T

Medical records are an important source of information in healthcare services, one of which is through the accuracy of writing disease diagnosis codes. The accuracy of diagnosis coding greatly determines data quality, service quality, and the smooth process of health cost claims. However, in practice, errors in writing codes are still frequently found, which can reduce the accuracy of medical information. This study aims to identify the factors influencing the accuracy of writing disease diagnosis codes based on ICD-10 at a community health center. The type of research used is descriptive qualitative with a case study design. The research subjects consisted of medical record officers, doctors, and the head of medical records, while the research objects were 85 outpatient medical record files. Data collection techniques were carried out through observation, interviews, and documentation studies using interview guidelines and observation checklists as instruments. The results of the study showed that out of 80 medical record files examined, 42 files (52.5%) had accurate diagnosis codes, while 38 files (47.5%) were inaccurate. The factors influencing the accuracy of diagnosis coding in terms of the 5M aspects are: (1) Man, officers did not use the ICD-10 Book in searching for diagnosis codes but instead relied on the internet or Google; (2) Material, the printed ICD-10 book was not available in the medical record room; (3) Machine, computers were available but constrained by internet network issues; (4) Money, there was no budget allocation for procuring community health center is still low. It is necessary to improve staff competencies through training, provide adequate facilities, and develop SOPs so that coding accuracy in accordance with ICD-10 standards can be achieved.

INTRODUCTION

Community health centers serve as the frontline of public health services and are mandated to provide comprehensive promotive, preventive, curative, rehabilitative, and palliative care within their service areas (Health Regulation number 19 of 2024). The delivery of these services requires an accurate recording and reporting system so that health policies can be formulated based on reliable data. Medical records, as regulated in Ministry of Health Regulation Number 24 of 2022, contain information on patient identity, examination results, medical procedures, and other services provided by healthcare professionals. The accuracy of diagnosis recording using the ICD-10 standard issued by the WHO is a key component of medical record quality. This standard facilitates the tabulation of morbidity and mortality data and ensures consistency of reports across regions and countries. Based on this foundation, proper management of medical records has become an urgent necessity in primary healthcare facilities.

In practice, the implementation of ICD-10-based disease diagnosis coding in various community health centers in Indonesia remains suboptimal. Studies by Santi et al., (2022) and Tesya & Suryani, (2024) indicate that coding errors affect data quality, financing claims, and management decision-making. This issue is also acknowledged in Ministry of Health Regulation Number 55 of 2013 which emphasizes the importance of medical recorders' competence in disease classification and codification. Several studies identify the main factors behind inaccurate diagnosis coding as the limited number of trained medical record staff and the habit of relying on unofficial sources, such as searching codes via the internet or Google, which can potentially lead to inconsistencies (Fadhilah et al., 2025). These conditions illustrate the persisting gaps in medical record management, which have implications for the quality of primary healthcare services.

Theoretically, the accuracy of diagnosis coding is influenced by managerial factors known as the 5M elements: man, material, machine, money, and method (Indawati, 2017; Saputro et al., 2022). The "man" element refers to the number and competence of medical record personnel, "material" encompasses the availability of ICD-10 manuals in both print and digital formats, "machine" relates to

computer facilities and network infrastructure, “money” denotes the budget for training and procurement of resources, while “method” signifies the presence of clear standard operating procedures (SOPs) for diagnosis coding. Agustine & Pratiwi, (2017) emphasize that without a solid understanding of medical terminology and standardized SOPs, the risk of coding errors increases significantly. Rozi & Marselina, (2022) also found that illegible physician handwriting is a contributing factor to coding inaccuracies. These factors indicate that diagnosis coding issues are not merely technical but also systemic.

The urgency of this study arises from the need to provide accurate and reliable medical record data to support health program planning at the primary care level. Several previous studies have examined the accuracy of diagnosis coding, such as Fajarwati et al., (2022) on outpatient medical records, Soviana & Husni, (2022) regarding typhoid diagnoses, Dwi Saputro Agung & Julia Siti, (2023) on diabetes mellitus cases, and Oktavia, (2017) concerning the role of medical record personnel. However, most of these studies only assessed the level of coding accuracy without comprehensively mapping the underlying factors based on the 5M approach. Therefore, a knowledge gap remains regarding how human, material, method, and financial factors collectively influence the accuracy of diagnosis coding in specific local contexts, such as the a community health center. The novelty of this study lies in combining the measurement of diagnosis coding accuracy with a thorough identification of its contributing factors using the 5M management approach.

Based on the background, observed phenomena, and identified gaps, this study aims to analyze the percentage of accuracy in disease diagnosis coding based on ICD-10 and to identify its contributing factors at the community health center. The findings are expected to provide scientific contributions to the development of medical record and health information knowledge, serve as a reference for healthcare institutions in formulating more effective diagnosis coding SOPs, and form the basis for policies to enhance the capacity of medical record personnel and the provision of adequate facilities. Thus, this study is anticipated to benefit not only health center managers but also policymakers and academics interested in advancing evidence-based health information management.

METHODS

This study employed a descriptive quantitative approach, focusing on illustrating the accuracy of disease diagnosis coding based on ICD-10 standards and identifying the influencing factors. The data used consisted of primary data obtained through direct observation of outpatient medical records and interviews with medical record personnel, as well as secondary data derived from official documents, policies, and guidelines applicable at the community health center. This approach was chosen to provide a comprehensive depiction of the actual field conditions.

The study population comprised all outpatient medical records at the community health center that contained disease diagnosis codes during the research period. The sample consisted of 80 outpatient medical records that met the inclusion criteria. Sampling was conducted using a total sampling technique, which involved analyzing the entire population that met the criteria to ensure the results represented the actual situation. This technique was selected considering the limited population size and the need to obtain complete data.

The research was carried out at the community health center from March to April 2024. Data collection was conducted in a layered manner, including direct observation of medical records to assess the accuracy of disease diagnosis coding according to ICD-10 standards, in-depth interviews with medical record personnel to identify the causes of coding inaccuracies, and document review to evaluate the availability of facilities, staff, and coding procedures. Research instruments included an observation sheet developed by the researcher based on ICD-10 standards, interview guidelines to explore factors contributing to coding inaccuracies, and a checklist for assessing the conditions of facilities, personnel, and diagnosis coding procedures at the health center.

Data analysis was conducted using both quantitative and qualitative descriptive techniques. Quantitative descriptive analysis was used to calculate the percentage of accurate and inaccurate disease diagnosis codes from the sample. Qualitative descriptive analysis was employed to elaborate on the factors causing coding inaccuracies based on the 5M approach—man, material, machine, money, and method—so that the results provide a comprehensive understanding of the accuracy of diagnosis coding and the factors influencing it at the community health center.

RESULTS & DISCUSSION

This study assessed the accuracy of disease diagnosis coding based on ICD-10 standards while simultaneously identifying the influencing factors at the community health center. The analysis was conducted on 80 outpatient medical records. The percentage of accurate and inaccurate diagnosis codes was calculated using the following formula:

$$\text{Accuracy Percentage} = \frac{\text{Number of Correct Records}}{\text{Total Number of Records}} \times 100\%$$

$$\text{Inaccuracy Percentage} = \frac{\text{Number of Incorrect Records}}{\text{Total Number of Records}} \times 100\%$$

Out of the 80 outpatient medical records analyzed, 42 records (52.5%) were coded accurately, while 38 records (47.5%) were coded inaccurately. These data are presented in Table 1 and Table 2.

Table 1. Percentage of Accurate Disease Diagnosis Coding

Number of Medical Records	Accuracy of Disease Diagnosis Coding Based on ICD-10	Percentage
80	42	52,5%

Source: Primary Data, 2025

Table 2. Percentage of Inaccurate Disease Diagnosis Coding

Number of Medical Records	Inaccuracy of Disease Diagnosis Coding Based on ICD-10	Percentage
80	38	47,5%

Source: Primary Data, 2025

These results indicate that the accuracy of diagnosis coding at the community health center has only reached slightly more than half. In other words, nearly half of the diagnosis data still do not comply with ICD-10 standards. Compared to the study by Fadhillah et al., (2025), this percentage is relatively similar, as they also found inaccuracy rates approaching 50% in primary healthcare facilities. This suggests that the issue of diagnosis coding accuracy is not limited to a single area but represents a national concern that requires serious attention.

Practically, an accuracy rate of 52.5% means that for every two medical records examined, only slightly more than one record meets the standard. Conversely, nearly one out of every two records contains coding errors. These errors can affect disease reporting, funding claims, and health program planning. Thus, inaccuracies in diagnosis coding are not merely administrative issues but also have implications for service quality and the sustainability of the healthcare system.

The man aspect is an important factor influencing the accuracy of diagnosis coding. The results of the observation checklist in Table 3 indicate that there are only three medical record staff responsible for handling all outpatient diagnosis coding.

Table 3. Results of the Observation Checklist for the Man Aspect in the Medical Records Room at Community Health Center

No	Aspects studied	Yes	No
1	Medical record staff use the ICD-10 manual		✓
2	Staff have received ICD-10 training		✓
3	Medical diagnoses are clearly written by physicians		✓

Source: Primary Data, 2025

In addition to the limited number of staff, task allocation among personnel is not proportional, the workload is relatively high, and no recent ICD-10 training has been conducted. These conditions make it difficult for staff to maintain consistency in diagnosis coding. According to the 5M theory (Indawati, 2017), the “man” factor includes the number, competence, and motivation of the workforce. When this aspect is weak, the quality of work outcomes is also affected. Oktavia, (2017) further emphasizes that a limited workforce without updated competencies increases the risk of diagnosis coding errors.

When staff rely solely on daily experience without updates through formal training, differences in diagnosis interpretation are likely to occur. For example, certain medical terms may be understood

differently, resulting in codes that do not comply with ICD-10 regulations. Therefore, increasing both the number and competence of personnel becomes an urgent necessity.

The material aspect also contributes to the accuracy of diagnosis coding. The results of the checklist in Table 4 indicate that the health center does not yet have a complete printed ICD-10 manual. The guide is only available in digital file format, and access is limited. In addition, medical terminology books and other supporting resources are still minimal.

Table 4. Results of the Observation Checklist for the Material Aspect in the Medical Records Room at Community Health Center

No	Aspects studied	Yes	No
1	Computers are available for ICD-10 data entry		✓

Source: Primary Data, 2025

The limitation of resources leads staff to frequently search for diagnosis codes via the internet or Google. This practice is prone to inconsistencies, as the information sources are not always official. Agustine & Pratiwi, (2017) emphasize the importance of having official guides to maintain coding consistency. Rozi & Marselina, (2022) further note that illegible diagnosis information increases the likelihood of errors when supporting resources are minimal. Therefore, the provision of printed ICD-10 manuals and other official sources becomes a priority to improve the quality of diagnosis coding.

The machine aspect is presented in Table 5, which shows limitations in the number of computers in the medical records room as well as an unstable internet network quality.

Table 5. Results of the Observation Checklist for the Machine Aspect in the Medical Records Room at Community Health Center

No	Aspects studied	Yes	No
1	Computers are available for ICD-10 data entry	✓	
2	Active internet connection is available to access references	✓	

Source: Primary Data, 2025.

These limitations affect both the speed and accuracy of diagnosis coding. Staff have difficulty accessing digital ICD-10 guides or health information systems in real time. Tesya & Suryani, (2024) state that limitations in information technology are associated with low accuracy in diagnosis coding. In this context, improving technological resources will not only accelerate the coding process but also assist staff in selecting the correct codes according to official guidelines.

The money aspect, presented in Table 6, shows that the health center does not yet have a dedicated budget for staff training or the procurement of coding resources. Additionally, there are no routine funds for software updates or health information systems.

Table 6. Results of the Observation Checklist for the Money Aspect in the Medical Records Room at Community Health Center

No	Aspects studied	Yes	No
1	Is there a budget for coding training?		✓
2	Is there a budget for the procurement of ICD-10 manuals?		✓

Source: Primary Data, 2025

The limited financial support increases obstacles to improving the quality of diagnosis coding. Saputro et al., (2022) emphasize that the success of medical record management is highly influenced by the availability of funds for training, resource procurement, and health information system updates. Without budgetary support, the necessary improvement interventions are difficult to implement sustainably.

The method aspect, presented in Table 7, shows that while SOPs for diagnosis coding do exist, their implementation is inconsistent. There is no mechanism for regular internal audits or routine evaluations of diagnosis coding quality.

Table 7. Results of the Observation Checklist for the Method Aspect in the Medical Records Room at Community Health Center

No	Aspects studied	Yes	No
1	Is there a policy regulating coding		✓

Source: Primary Data, 2025

This condition indicates that internal regulations have not been fully implemented. According to quality management theory, the presence of SOPs without supervision and evaluation is insufficient to ensure compliance. Soviana & Husni, (2022) also found that although most community health centers have SOPs, the accuracy of diagnosis coding remains low due to a lack of routine evaluations. Therefore, strengthening SOP implementation through internal audits and supervision is essential to improve the quality of diagnosis coding.

Overall, the results of this study indicate that the accuracy of disease diagnosis coding at the community health center remains low, as nearly half of the records do not comply with ICD-10 standards. The main contributing factors are limited personnel, insufficient guide resources, inadequate information technology facilities, lack of budgetary support, and weak SOP implementation. These findings address the research objectives outlined in the introduction.

These results support previous studies (Fajarwati et al., 2022; Soviana & Husni, 2022; Dwi Saputro Agung & Julia Siti, 2023) which demonstrate that human resources, facilities, and procedures play significant roles in the accuracy of diagnosis coding. By providing contextual evidence from the community health center, this study offers a foundation for improving medical record management at the primary care level.

CONCLUSION

This study aimed to assess the accuracy of disease diagnosis coding based on ICD-10 and to identify its contributing factors at the community health center. Analysis of 80 outpatient medical records showed that 42 records (52.5%) were coded accurately, while 38 records (47.5%) were coded inaccurately according to ICD-10 standards. Inaccuracies in diagnosis coding were influenced by various factors, including the limited number and competence of medical record personnel, incomplete availability of ICD-10 guides, inadequate computer and internet facilities, insufficient budgets for training and resource procurement, and inconsistent implementation of diagnosis coding SOPs. These findings address the research objective, indicating that improving the quality of disease diagnosis coding requires simultaneous strengthening of human resources, facilities, funding, and work methods.

This study has several limitations. First, the analyzed sample included only 80 outpatient medical records from a specific period, which may not represent the conditions of all service units in the health center. Second, the assessment of factors contributing to coding inaccuracies was based on observations and interviews, making it highly dependent on respondents' honesty and the conditions at the time of data collection. Third, the study did not examine in depth the legibility of physicians' diagnosis entries or the medical terminology used, so these factors were not measured quantitatively. Nevertheless, the results provide a comprehensive overview of the accuracy of disease diagnosis coding and its influencing factors at the community health center and can serve as a foundation for broader future research.

ACKNOWLEDGEMENTS

The author expresses sincere appreciation and gratitude to Mrs. Mega Ermasari Muzuh and Mrs. Wa Ode Sitti Budiatty as supervisors for their guidance and direction throughout the conduct of this study. Gratitude is also extended to the community health center for granting permission and providing support during data collection, as well as to all respondents who participated in this research.

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