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Meta-Analysis

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Meta-Analysis: Effects of Supervision Support, Feedback, and Training on Utilization of Routine Health Information System in Health Workers

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ABSTRACT

Background: Routine health information is an important pillar in health planning, decision making, and improving health programs, as well as providing effective and efficient health services. This study aims to estimate the magnitude of the influence of supervision support, feedback, and training on the use of routine health information systems (SIKR) using a meta-analysis.
Subjects and Method: This was a systematic review and meta-analysis using the PRISMA flow chart and the PICO format. Population: health workers. Intervention: there is supervision support, there is feedback, and there is training. Comparison: no supervision support, no feedback, and no training. Outcome: Utilization of SIKR. The online databases used are Google Scholar, PubMed, and ProQuest with the keywords (Routine Health Information Utilization" OR "Management Health Information System") AND ("Supportive Supervision" OR "Regular Supervision") AND (Feedback OR "Regular Feedback") AND Training OR "HMIS Training" AND "Health Worker" OR "Health Professionals" AND "Cross sectional" AND aOR. There were 14 cross-sectional studies published in 2013-2023 that met the inclusion criteria. Analysis was performed with RevMan 5.3.
Results: This meta-analysis included 14 cross-sectional studies from Ethiopia. The total sample was 6,088 health workers. Supervisor support (aOR= 1.77; 95% CI= 1.21 to 2.59; p=0.003), constructive feedback (aOR= 2.15; 95% CI= 1.29 to 3.58; p=0.003), and training (aOR= 2.65; CI 95 %= 1.70 to 4.13; p<0.001) increased the likelihood of SIKR use.
Conclusion: Supervisor support, constructive feedback, and training increase the likelihood of SIKR use.

Keywords: supervision support, feedback, training, use of SIKR.

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BACKGROUND

The World Health Organization (WHO) states that the Health Information System (SIK) is one of the six "building blocks" or main components in the health system. WHO defines CIS as a system that integrates data collection, processing, reporting, and use of information needed to improve the effectiveness and efficiency of health services through better management at all levels of the health

system. The main objective of SIK is to produce quality information that can be used by stakeholders to make evidence-based decisions (WHO, 2022). All health system functions depend on the availability of timely, accurate and reliable information for better clinical decision-making and health management, although CIS management is the backbone for a strong health system, most decisions are made without the utilization of data. routinely (Karijo, 2013).

The main health information problem identified by WHO is the inadequate use of existing information and evidence due to fragmentation and duplication of health information, so that decision making for health programs becomes ineffective and inefficient because it is not in line with existing facts (USAID, 2015). The use of SIKR is influenced by the organizational and individual characteristics of health professionals (Dagnew et al., 2018). Analytical skills, lack of culture of using information, lack of regular monitoring and feedback, organizational infrastructure, availability of skilled human resources, data inconsistency, completeness of data and health information management training can influence the utilization of SIKR (Kirimi, 2017).

Research conducted in the Kembata Tembaro Zone, Ethiopia reported that the use of SIKR in health institutions was influenced by training on CIC management, supportive supervision and the presence of procedures were positively associated with the use of SIKR (Kondoro et al., 2022). Health facilities and agencies should increase the capacity of health workers through the recommended training and supportive supervision.

Based on the existing literature, statistical summaries are needed to calculate estimates of the effect of supervisory support, feedback, and training on the use of SIKR. Meta-analysis is a statistical combination of results from two or more separate studies, with the aims of: (1) Increasing precision; (2) Answering questions that were not discussed by previous primary studies; and (3) Addressing controversies arising from primary studies or generating new hypotheses (Deeks et al., 2021). This study aims to analyze previous primary studies in assessing the effect of supervision support, feedback, and training on the use of SIKR.

SUBJECTS AND METHOD

1. Study Design

This was systematic review and meta-analysis study. Article search was collected from Google Scholar, PubMed, and Proquest. The keywords used are “Routine Health Information Utilization” OR “Management Health Information System” AND “Supportive Supervision” OR “Regular Supervision” AND Feedback OR “Regular Feedback” AND Training OR “HMIS Training” AND “Health Worker” OR “Health Professionals” AND “Cross sectional” AND aOR. There were 14 primary studies that met the inclusion criteria of this study.

2. Steps of Meta-Analysis

Meta-analysis analysis was carried out through 5 steps as follows:

1) Formulate research questions in PICO (Population, Intervention, Comparison, Outcome).
2) Search for articles from various databases including Google Scholar, Pubmed, and Science Direct.
3) Conduct screening and critical appraisal of primary studies using the Critical Appraisal Checklist for Cross-sectional Studies from the Center for Evidence Management
4) Perform data extraction and enter the effect size of each primary study into the RevMan 5.3 application
5) Interpret the results of the research analysis and draw conclusions

3. Inclusion Criteria

Full paper articles use a cross sectional design. The analysis used is multivariate with Adjusted Odds Ratio (aOR). The research subjects are health workers. The research interventions are supervision support, feedback, and training. The research outcome is the use of SIKR.

4. Exclusion Criteria

Articles that are not in English and articles published before 2013.

5. Operational Definition

Utilization of SIKR: integrated effort to collect, analyze, report, and use health information for planning, management, and decision-making in health facilities and organizations.

Supervision Support: direct observation and supervision of the implementation of work on a regular basis.

Feedback: provision of information about how employees are performing in terms of significant outcomes, events, critical incidents, and behaviors.

Training: activities to provide, obtain, improve and develop work competence, productivity, discipline, attitude and work ethic according to job qualifications.

6. Istrument

The quality assessment of the main articles in this study used the critical assessment checklist for cross-sectional studies published by the Joanna Briggs Institute (JBI).

7. Data Analysis

The articles in this study were collected using the PRISMA diagram and analyzed using the Review Manager 5.3 application by calculating the effect size and heterogeneity (I^2) to determine the combined research model and form the final results of the meta-analysis. The results of data analysis are presented in the form of forest plots and funnel plots.

RESULTS

The process of searching for primary articles related to the influence of supervision support, feedback, and training on the use of SIKR in this meta-analysis study was carried out on 3 online databases and the results obtained were 14 articles which can be seen in Figure 1 PRISMA Flow Diagram.

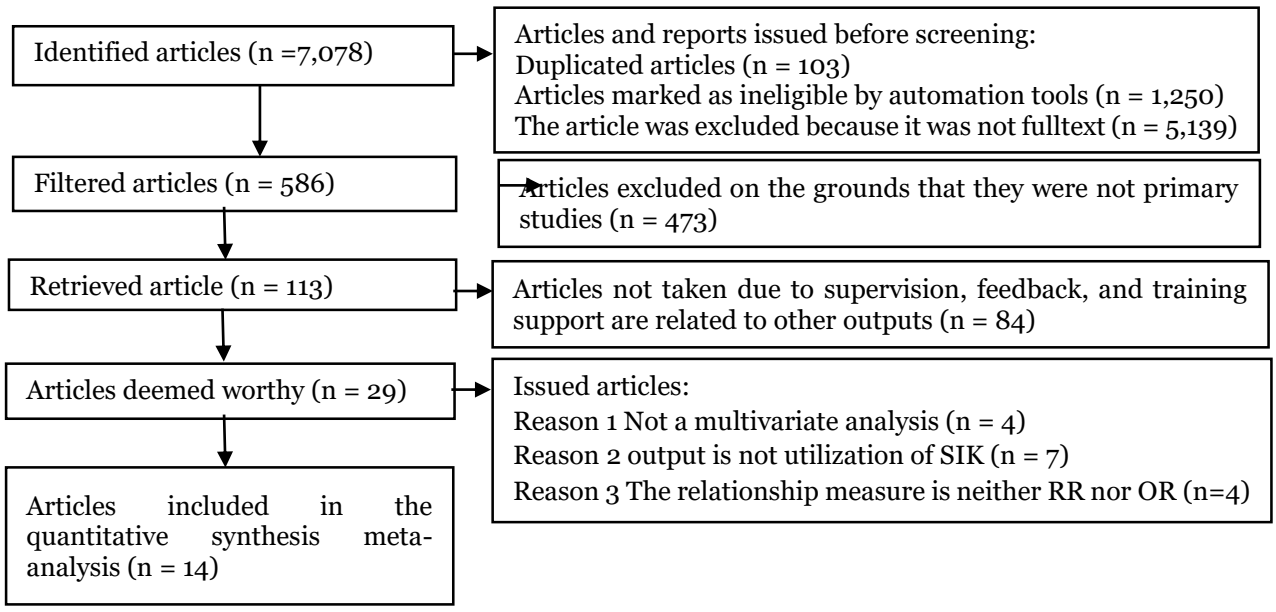

Figure 1. PRISMA Flow Diagram

The total articles in the initial search process were 7,078 articles with details of 337 articles from the PubMed database, 43 articles from the Google Scholar database, and 6,698 articles from the Proquest database. Then, 6,492 articles were deleted and 586 full text articles were eligible, 14 of which were included in the synthesis meta-analysis. Figure 2 shows the distribution area of the 14 primary articles used in this study.

Figure 2. Map of the study area on the influence of supervision support, feedback, and training on the use of SIKR

Table 1. Critical Appraisal Checklist for cross-sectional studies in the meta-analysis

No	Articles	Questions of Checklist								Total
		P1	P2	P3	P4	P5	P6	P7	P8	
1.	Adane *et al*., (2017)	2	2	2	2	2	2	2	2	16
2.	Farah *et al* (2022)	2	2	2	2	2	2	2	2	16
3.	Feleke *et al.,* (2019)	2	2	2	2	2	2	2	2	16
4	Kanfe *et al.,* (2021)	2	2	2	2	2	2	2	2	16
5.	Kebede *et al.,* (2020)	2	2	2	2	2	2	2	2	16
6.	Leda et al., (2022)	2	2	2	2	2	2	2	2	16
7.	Mekuria *et al.,* (2021)	2	2	2	2	2	2	2	2	16
8.	Negera et al., (2023)	2	2	2	2	2	2	2	2	16
9.	Ngusie *et al.,* (2021)	2	2	2	2	2	2	2	2	16
10.	Sako *et al.,* (2022)	2	2	2	2	2	2	2	2	16
11.	Seid *et al.,* (2021)	2	2	2	2	2	2	2	2	16
12.	Wariyo (2020)	2	2	2	2	2	2	2	2	16
13.	Wude *et al.,* (2020)	2	2	2	2	2	2	2	2	16
14.	Zegeye *et al.,*(2020)	2	2	2	2	2	2	2	2	16

Question Criteria Description:

1= Are the criteria for inclusion in the sample clearly defined?
2= Were the research subjects and settings explained in detail?
3= Is exposure measured in a valid and reliable way?
4= What are the standard criteria used for measuring objective conditions?
5= Were confounding factors identified?
6= Were strategies for dealing with confounding factors stated?
7= Are the results measured in a valid and reliable way?;
8= Was proper statistical analysis used?

Answer score description:

0= No

1= Can't tell

2= Yes

Table 2. PICO table summary of cross-sectional articles from primary study sources with sample size (n = 3.056)

No	Author (Year)	Country	Sample	P	I	C	O
1.	Feleke *et al.*,(2019)	Ethiopia	477	Health personnel are involved in the management of CSI > 6 months	Supervision support s	No super-vision support	Utilization of SIKR
2.	Kanfe., *et al* (2021)	Ethiopia	260	Health professional	Supervision support	No super-vision support	Utilization of SIKR
3.	Kebede *et al.*,(2020)	Ethiopia	316	Health professional/Healt h information technician	Supervision support	No super-visory support in decision making	Utilization of SIKR
4.	Leda et al.,(2022)	Ethiopia	396	All department heads and Health Professionals	Supervisory support in decision making	There is no supervisory support for CIS manage-ment activities	Utilization of SIKR
4.	Mekuria *et al.*,(2021)	Ethiopia	378	Health professionals	Supervisory support for CIS manage-ment activitie	No super-vision support	Utilization of SIKR
5.	Seid *et al.*,(2021)	Ethiopia	369	Health professional	Supervision support	No regular supervision	Utilization of SIKR
7.	Wariyo (2020)	Ethiopia	380	Health professional	Regular supervision	No super-vision support	Utilization of SIKR
8.	Wude *et al.*, 2020)	Ethiopia	480	Health personnel	Supervision support	No super-vision support	Utilization of SIKR

Table 3. Data of Adjusted Odds Ratio (aOR) and 95% confidence interval (95%CI) the effect of supervision support on the use of SIKR with a sample size (n = 3.056)

Author (Year)	aOR	CI 95%	
		Upper Limit	Lower Limit
Feleke *et al.*,(2019)	1.04	0.68	1.59
Kanfe *et al.,* (2021)	3.06	1.56	6.01
Kebede *et al., (*2020)	2.46	1.10	5.49
Leda *et al.,* (2022)	0.97	0.47	1.99
Mekuria *et al.,* (2021)	1.05	0.52	1.50
Seid *et al.,* (2021)	1.75	0.98	3.12
Wariyo, (2020)	7.87	4.90	12.63
Wude *et al.,* (2020)	2.34	1.40	3.92

The Effect of Supervision Support on SIKR Utilization

Table 2 presents descriptions of the 8 primary articles with cross-sectional studies that were included in the meta-analysis of the effect of supervision support on the use of SIKR, with a total sample of 3,056 samples.

Table 3 presents data on the Adjusted Odds Ratio (aOR) and 95% Confidence Interval (95% CI) on the effect of supervision support on the use of SIKR.

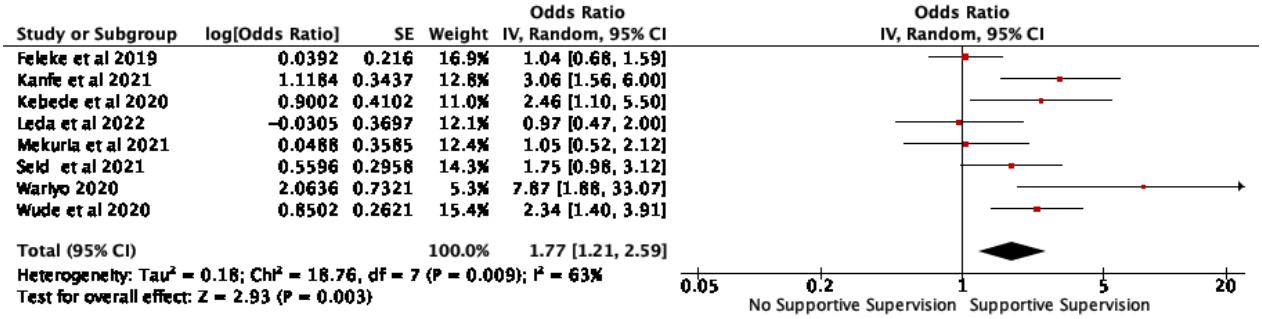

Figure 3. Forest Plot Effect of Supervision Support on SIKR Utilization

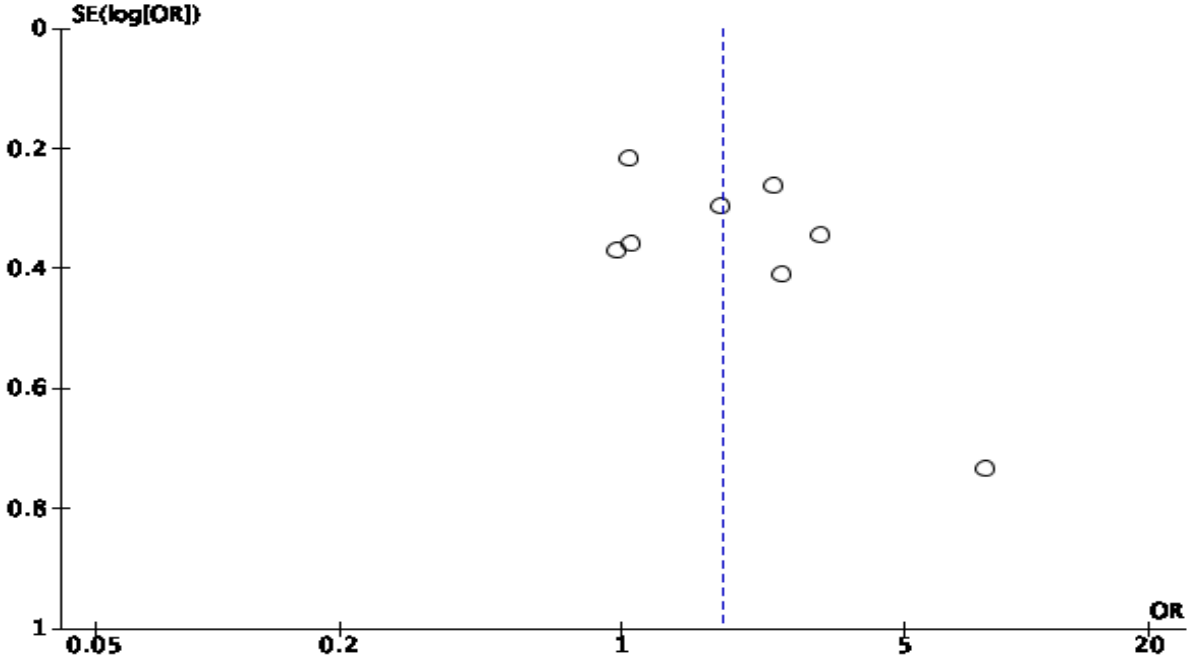

Figure 4. Funnel Plot of the Influence of Supervision Support on SIKR Utilization

a. Forest plot

The forest plot in Figure 3 shows that there is an effect of supervision support on the use of SIKR, and this effect is statistically significant. Health workers who received supervision support used CIC 1.77 times more than health workers who did not receive supervision support (aOR= 1.77; 95% CI= 1.21 to 2.59; p= 0.003). The forest plot also showed high heterogeneity of effect estimates between primary studies (I^2= 63%; p=0.009). Thus the calculation of the estimated effect is

carried out using the random effect model approach.

b. Funnel plot

The funnel plot in Figure 4 shows that the distribution of effect estimates between studies is asymmetric, that is, the distribution or distribution of effect estimates to the right of the vertical line of the average effect estimate is relatively larger than to the left (over-estimate). Thus this funnel plot indicates publication bias.

Table 4 Table PICO summary of cross-sectional articles from primary study sources with sample size (n = 3.034)

No	Author (Year)	Country	Sample	P	I	C	O
1.	Adane *et al*., (2017)	Ethiopia	416	Health Professional	Health professionals receive feedback	Not receiving feedback	Utilization of SIKR
2.	Kanfe *et al* (2021)	Ethiopia	260	Health professional	There are feedback	No feedback	Utilization of SIKR
3.	Leda et al., (2022)	Ethiopia	396	Health professional	There are regular feedbacks	No regular feedback	Utilization of SIKR
4.	Negera et al., 2023)	Ethiopia	397	Health professional	Health professionals receive feedback	Does not receive regular feedback	Utilization of SIKR
5.	Sako *et al.,* (2022)	Ethiopia	719	Health professional	Health professionals receive feedback	Not receiving feedback	Utilization of SIKR
6.	Seid *et al*., (2021)	Ethiopia	369	Health professional	There are feedback	No feedback	Utilization of SIKR
7.	Zegeye *et al* (2020)	Ethiopia	477	Health extension workers	There are regular feedbacks	No regular feedback	Utilization of SIKR

Table 5. Data of Adjusted Odd Ratio (aOR) and 95% confidence interval (95%CI) the effect of feedback on the use of SIKR with a sample size (n = 3.034)

Author (Year)	aOR	CI 95%	
		Upper Limit	Lower Limit
Adane et al., (2017)	1.48	0.92	2.37
Kanfe et al., (2021)	2.97	1.53	5.77
Leda et al., (2022)	1.91	1.01	3.61
Negera et al., (2023)	0.66	0.36	1.21
Sako et al., (2022)	3.11	1.57	6.15
Seid et al., (2021)	2.29	1.29	4.07
Zegeye et al., (2020)	5.33	3.27	8.69

The effect of feedback on the use of SIKR

Table 4 presents descriptions of the 7 primary articles with cross-sectional studies that were included in the meta-analysis of the effect of feedback on the use of SIKR, with a total sample of 3,034 samples.

Table 5 presents the Adjusted Odds Ratio (aOR) and 95% Confidence Interval (CI 95%) data on the effect of feedback on the utilization of SIKR.

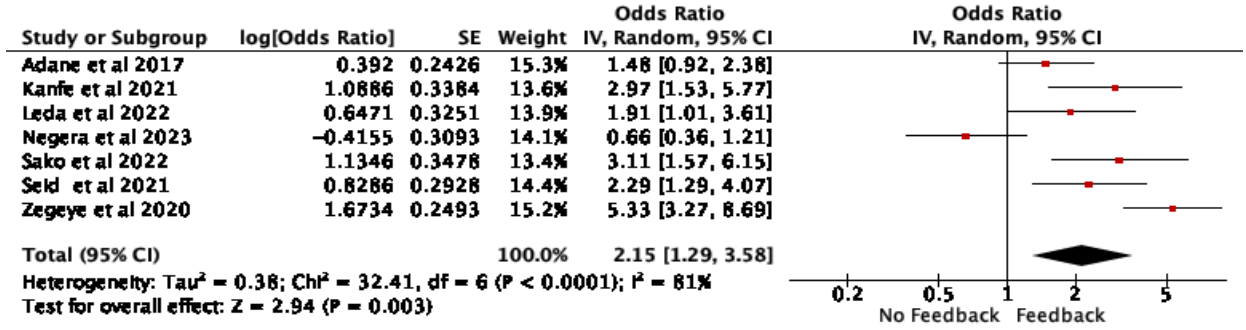

Figure 5. Forest Plot Effect of Feedback on SIKR Utilization

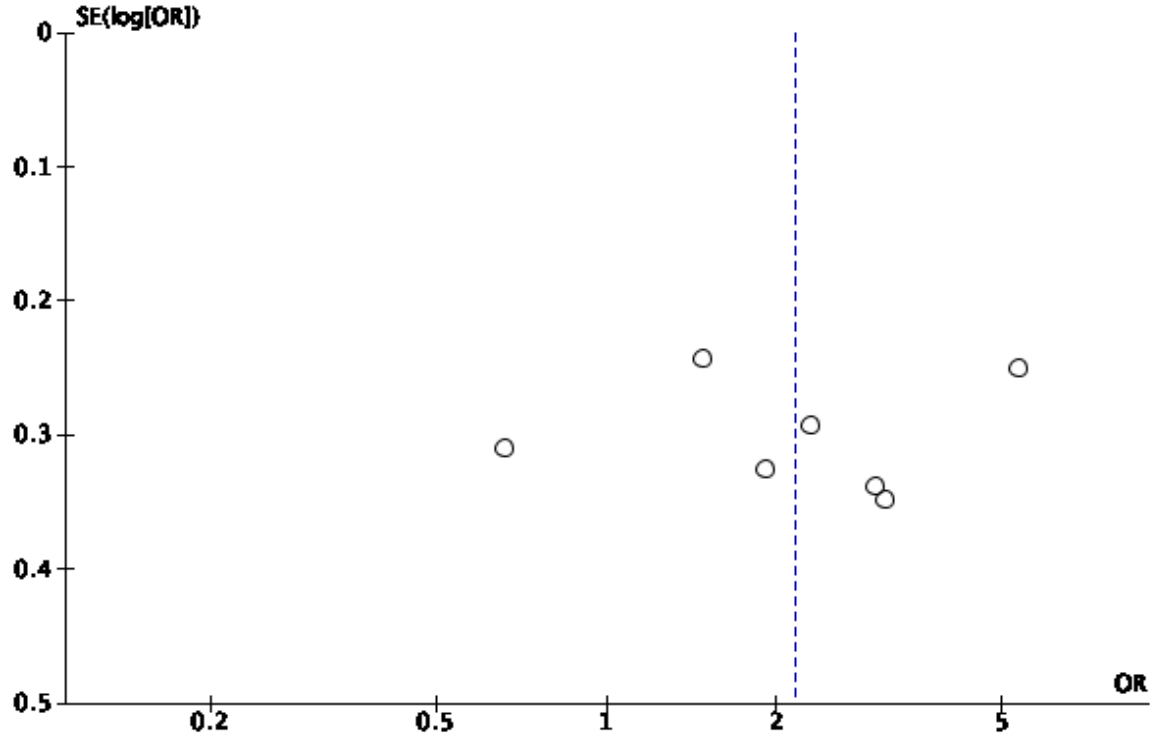

Figure 6. Funnel Plot of the Effect of Feedback on SIKR Utilization

a. Forest plot

The forest plot in Figure 5 shows that there is a feedback effect on the use of SIKR in health workers, and this effect is statistically significant. Health workers who received feedback used CIC 2.15 times more than health workers who did not receive feedback (aOR= 2.15; 95% CI= 1.29 to 3.58; p = 0.003). The forest plot also showed high heterogeneity of effect estimates between primary studies (I^2= 81%; p < 0.001). Thus the calculation of the estimated effect is carried out using the random effect model approach.

b. Funnel plot

The funnel plot in Figure 6 shows that the distribution of effect estimates between studies is more or less symmetrical, that is, the distribution or distribution of effect estimates to the right and left of the average vertical line of effect estimates is relatively the same. Thus this funnel plot indicates that there is no publication bias.

Table 6. PICO table summary of cross-sectional articles from primary study sources with sample size (n = 4.433)

No	Author (Year)	Country	Sample	P	I	C	O
1.	Adane et al., (2017)	Ethiopia	416	Health professional	There is training	No training	Utilization of SIKR
2.	Farah et al., (2023)	Ethiopia	359	Health personnel	There is training on CIS management	There is no training on CIS management	Utilization of SIKR
3.	Feleke et al., (2019)	Ethiopia	477	Health workers are involved in the manage-ment of CSI > 6 months	There is training on SIK management	There is no training on CIS management	Utilization of SIKR
4.	Kanfe *et al.*, (2021)	Ethiopia	260	Health professional	There is training	No training	Utilization of SIKR
5.	Leda *et al.*, (2022)	Ethiopia	396	Health professional	Receive training on CIS management in the workplace	Did not receive training on management of CIS in the workplace	Utilization of SIKR
6.	Ngusie *et al.*,(2021)	Ethiopia	664	Health professional	There is training on SIK management	There is no training on CIS management	Utilization of SIKR
7.	Sako *et al.*,(2022)	Ethiopia	719	Health personnel	There is training on SIK management	There is no training on CIS management	Utilization of SIKR
8.	Seid et al., (2021)	Ethiopia	369	Health professional	There is training on SIK management	There is no training on CIS management	Utilization of SIKR
9.	Wariyo, (2020)	Ethiopia	380	Health professional	There is formal training	There is no formal training	Utilization of SIKR
10.	Wude *et al.*,(2020)	Ethiopia	480	Health personnel	There is training on routine health information	There is no training on routine health information	Utilization of SIKR

Table 7. Data of Adjusted Odds Ratio (aOR) and 95% confidence interval (95%CI) the effect of training on the utilization of SIKR with a sample size (n = 4.433)

Author (Year)	aOR	CI 95%	
		Upper Limit	Lower Limit
Adane et al., (2017)	1.52	0.88	2.62
Farah et al., (2023)	2.30	0.67	7.90
Feleke et al., (2019)	0.95	0.62	1.47
Kanfe et al., (2021)	3.90	1.95	7.79
Leda et al., (2022)	3.49	1.89	6.44
Ngusie et al., (2021)	1.05	0.52	1.50
Sako et al., (2022)	1.51	0.81	2.80
Seid et al., (2021)	2.30	1.35	4.26
Wariyo, (2020)	7.03	1.87	26.38
Wude et al., (2020)	8.12	4.33	15.23

The effect of training on the utilization of AIR

Table 6 presents descriptions of the 10 primary articles with cross sectional studies that were included in the meta-analysis of the effect of training on the utilization of routine health information systems (SIKR). with a

total sample of 4,433 samples. Table 7 presents data on Adjusted Odds Ratio (aOR) and 95% Confidence Interval (95% CI) the effect of training on the use of SIKR.

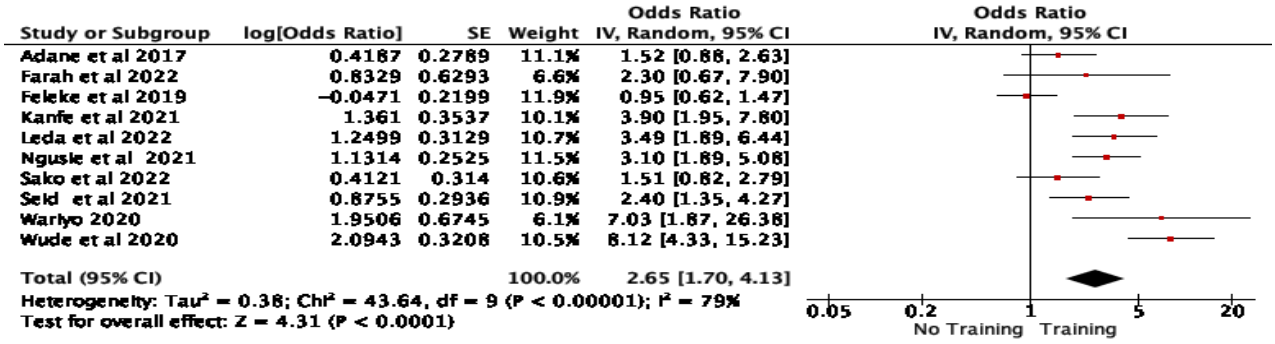

Figure 7. Forest Plot Effect of Training on SIKR Utilization

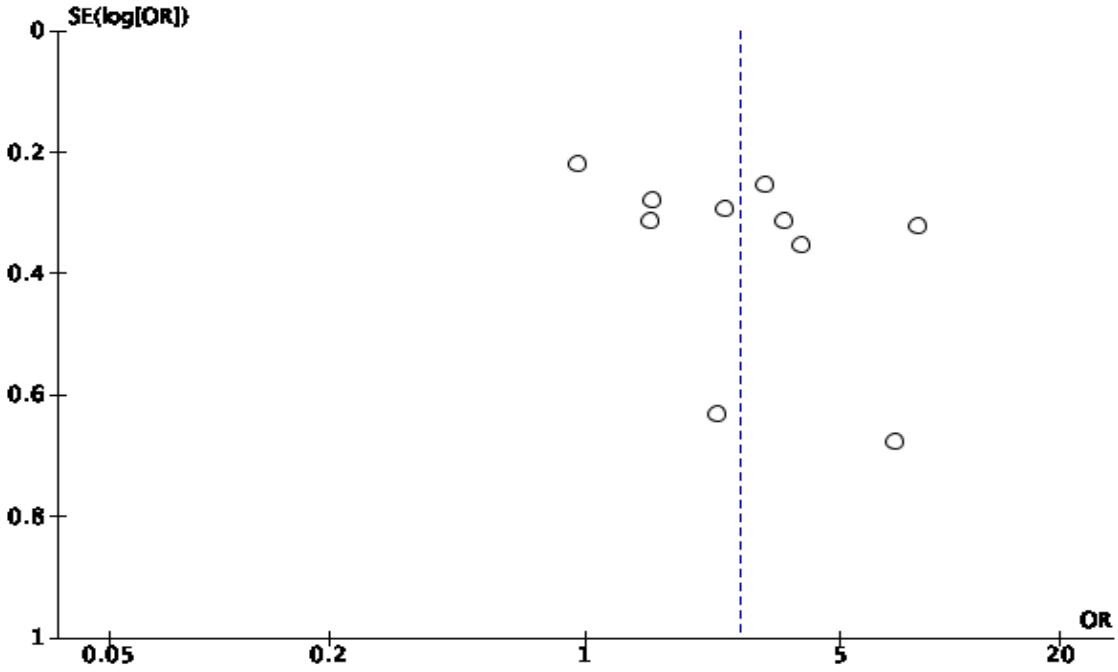

Figure 8. Funnel Plot The Effect of Training on SIKR Utilization

a. Forest plot

The forest plot in Figure 7 shows that there is an effect of training on the use of SIKR in health workers, and this effect is statistically significant. Health workers who received training used CIC 2.65 times more than health workers who did not receive training (aOR= 2.65; 95% CI= 1.70 to 4.13; p<0.001). The forest plot also showed high heterogeneity of effect estimates between primary studies (I^2= 90%; p<0.001). Thus the calculation of the estimated effect is carried out using the random effect model approach.

b. Funnel plot

The funnel plot in Figure 8 shows that the distribution of effect estimates between studies is symmetrical, that is, the distribution or distribution of effect estimates to the right and left of the vertical line of the average effect estimates is relatively the same. Thus this funnel plot indicates that there is no publication bias.

DISCUSSION

1. The effect of supervision support on the use of SIK

The main objective of SIK is to produce quality information that can be used by stakeholders to make evidence-based decisions (WHO, 2022). Based on the PRISM Tool framework, one of the determinants that influence the use of SIKR is organizational factors, such as the absence of supervisory support (Aqil et al., 2009). Supervision is defined as direct observation or supervision of the implementation of work that is routine in nature. The purpose of supervision is to try to optimize comfortable working conditions including the physical environment and work atmosphere among employees as well as the amount of inventory and the feasibility of facilities to facilitate the implementation of tasks (Swansburg, 2000).

Based on the results of a meta-analysis of 8 primary studies in this study, it is known that health workers who receive supervised support use CIC 1.77 times more than health workers who do not receive supervised support (aOR= 1.77; 95% CI= 1.21 to 2.59; p = 0.003). The results of this study are in line with research by (Wude et al., 2020) which shows that consistent supervisory support is 2.34 times more likely to utilize CIC than health workers who do not receive supervision support (aOR= 2.34; 95% CI= 1.40 to 3.92). Research by Kanfe et al., 2021 also showed similar results, namely health workers who received supervised support 3.06 times to utilize CIC compared to health workers who did not receive supervised support (aOR = 3.06; 95% CI = 1.56 to 6.01).

2. The effect of feedback on the use of AIR

Feedback is the provision of information about how employees are performing in terms of significant outcomes, events, critical incidents, and behaviors (Armstrong, 2009). The results of a meta-analysis of 7 primary studies in this study showed that health workers who received feedback used CIC 2.15 times more than health workers who did not receive feedback (aOR=2.15; 95% CI= 1.29 to 3.58; p = 0.003).

The results of this study are in line with research by Sako et al., 2022 which showed that health personnel who received feedback were 3.11 times more likely to utilize CIC than health workers who did not receive feedback (aOR=3.11; 95% CI= 1.57 to 6.14; p <0.001). Research by Leda et al., 2022 also showed similar results, this study showed that regular feedback was a significant factor in the use of CIC (aOR=1.91; 95% CI =1.01 to 3.60).

3. The effect of training on the utilization of AIR

Training is a whole activity to provide, obtain, improve, and develop work competence, productivity, discipline, attitude, and work ethic at a certain skill and expertise level in accordance with the level and qualifications of the position or job (Depnaker, 2003). The results of a meta-analysis of 10 primary studies in this study revealed that health workers who received training used CIC 2.65 times more than health workers who did not receive training (aOR= 2.65; 95% CI= 1.70 to 4.13; p <0.001).

This study is in line with Ngusie et al. (2022) which showed that health workers who received training were 3.10 times more likely to use CIC than health workers who did not receive training (aOR=3.10; 95% CI= 1.89 to 5.07). Study by Seid et al. (2021) shows that health workers who receive training are 2.40 times more likely to use CIC than health workers who do not receive training (aOR=2.40; 95% CI=1.35 to 4.26).

AUTHOR CONTRIBUTION

Dinta Lestari is the main researcher who selects topics, searches and collects articles, analyzes data and writes manuscripts. Didik

Tamtomo and Bhisma Murti helped analyze the data and review research documents.

CONFLICT OF INTEREST

There was no conflict of interest in the study.

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