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Meta-Analysis
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Determinants of Health Worker Performance in Health Care Facilities: Meta-Analysis

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ABSTRACT

Background: Performance is the result of a certain process carried out by all components of the organization on certain resources used. In addition, performance affects organizational goals. This study aims to analyze the influence of training, education level, and gender on performance in health workers.

Subjects and Method: This study is a systematic study and meta-analysis, with the following PICO: Population= Health workers, Intervention= Training, Higher education level, Female, Comparison= No training, Low education level, Male, Outcome= Performance. The articles used in this study were obtained from several databases, including Google Scholar, PubMed, and ScienceDirect which were published from 2014 to 2024. These articles were collected over a period of 4 weeks. The keywords used by the researcher in searching the database include Community Health Workers OR CHW AND Job Performance OR Work Performance AND Training AND Education Level AND Gender OR Sex. The articles included in this study are full-text articles with a cross sectional study design. Articles are collected using PRISMA flow diagrams. Articles are analyzed using the Review Manager 5.3.

Results: A total of 14 articles were reviewed in this meta-analysis study from Malaysia, China, India, Ethiopia, Uganda, Cameroon and Ghana. Studies show that healthcare workers with training (aOR= 2.94; CI 95%= 1.33 to 6.46; p= 0.007), higher education level (aOR=2.16; CI 95%= 1.62 to 2.88; p <0.001) had a significant influence on performance. Meanwhile, women (aOR=0.92; CI 95%= 0.57 to 1.49; p=0.75) had an insignificant effect on performance.

Conclusion: Training and higher education levels can significantly improve performance in health workers, and statistically insignificant performance differences between men and women, women have the possibility of performing well.

Keywords: performance, training, education level, gender, health worker

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BACKGROUND

Health is an important thing that needs to be considered and is a basic need of every human being. Every country, both developed and developing countries makes the level of health an indicator of welfare for their people, in Indonesia itself health problems are still not fully resolved, based on data from the Central Statistics Agency (BPS) there are 29.94% of the Indonesian population who have health complaints in 2022. Therefore, in an effort to create a good level of health for the community in a country, several factors can be influenced, one of which can be seen from existing health services.

The main indicator that can be a benchmark for the success of health service quality is to assess the level of satisfaction of service users in this case, namely patients. Patient satisfaction is an assessment of the good and bad quality of health services received by patients. Patients can feel satisfied when the health services they receive meet or even exceed their expectations. The level of patient satisfaction is very important and will be closely related to the rate of patient return visits and will be related to patient confidence in health services (Effendi and Junita, 2020).

Another success indicator that can be a benchmark for success in health services is the provision of quality health services to patients. The quality service in question is in accordance with the standards that have been set and can serve all levels of society. The more effective a health service is provided, the higher the quality of the health service (Widianti et al., 2018).

To create quality and satisfactory health services for patients, in this case it is very closely related to existing health workers. Health service facilities need to pay attention to sufficient health workers, both in number, type, and quality. The insufficient availability of health workers, both in number, type, and quality, as well as uneven distribution, will have an impact on the low public access to quality health services (Oktaviana and Wahyono, 2020). Therefore, the performance role of health workers in health services is very important to support the smooth running of all existing health services.

According to Tsauri (2014), the definition of performance itself is a result (output) of a certain process carried out by all components of the organization to certain resources used (input). Furthermore, performance is also carried out in order to achieve certain goals in the organization. In the organizational framework, there is a relationship between individual performance and organizational performance. Therefore, there are many factors that can affect the high and low performance of health workers because achieving better performance is not easy.

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SUBJECTS AND METHOD

1. Study Design

This type of research is a systematic study and meta-analysis. The articles used in this study were obtained from 3 databases, including Google Scholar, PubMed, and ScienceDirect.

2. Steps of Meta-Analysis

The meta-analysis is carried out through the following 5 steps:

1) Formulate research questions using the PICO model. In this study, the PICO is as follows: population= health workers, intervention= training, higher education level, women, comparison = no training, low education level, male, outcome = performance.
2) Searching for primary study research articles. In this study, 3 online databases were used, namely Google Scholar, PubMed, and ScienceDirect with keywords such as Community Health Workers OR CHW AND Job Performance OR Work Performance AND Training AND Education Level AND Gender OR Sex.
3) The next step is to conduct screening and critical appraisal of primary studies.
4) Then perform data extraction and data analysis into the Review Manager 5.3 (RevMan 5.3) application.
5) Finally, interpret the results of the research analysis and draw conclusions

3. Inclusion Criteria

The inclusion criteria applied by the researcher in this study are a full paper article with a cross sectional study design and the research outcome is job performance and the relationship measure used is adjusted odds ratio (aOR) and 95% confidence interval in the research period from 2014 to 2024.

4. Exclusion Criteria

The exclusion criteria applied by the researchers in this study included: articles that were not full papers; articles that did not use a cross-sectional study design; studies in which the outcome was not job performance; studies that only reported statistical results in the form of bivariate analysis; articles published before 2014; and articles published in languages other than English.

5. Operational Definition

Performance refers to work results both in quality and quantity that can be achieved by an employee in carrying out their duties in accordance with their responsibilities.

Training refers to an effort to develop human resources, especially to develop intellectual and personality abilities.

Level of education refers to the formal level that individuals undergo during their school years until they enter the world of work.

Gender is the difference between a woman and a man biologically from the moment a person is born.

6. Instrument

The research instrument used in this study is using the Critical Appraisal Checklist for

Cross-sectional Studies from The Joanna Briggs Institute (JBI).

7. Data Analysis

The articles in this study were collected using PRISMA diagrams and analyzed using the Review Manager 5.3 application (RevMan 5.3). The results of data analysis in the form of forest plots and funnel plots.

RESULTS

The search for articles in this study was through 3 databases, namely Google Scholar, PubMed, and ScienceDirect and selected using PRISMA diagrams as shown in figure 1. The initial search process obtained 1,105 articles, then 359 duplicate articles were deleted, then the remaining 746 articles were re-filtered because they did not meet the criteria of 679 articles. The number of articles considered worthy is 67. Then it was issued with the reason that 53 articles were released so that the rest of the articles and included in the meta-analysis amounted to 14 articles.

An overview of the research location consisting of 14 research articles can be seen in figure 2 that the research articles that will be included in the meta-analysis come from 2 continents, namely the Asian and African continents consisting of 7 countries including Malaysia, China, India, Ethiopia, Uganda, Cameroon and Ghana.

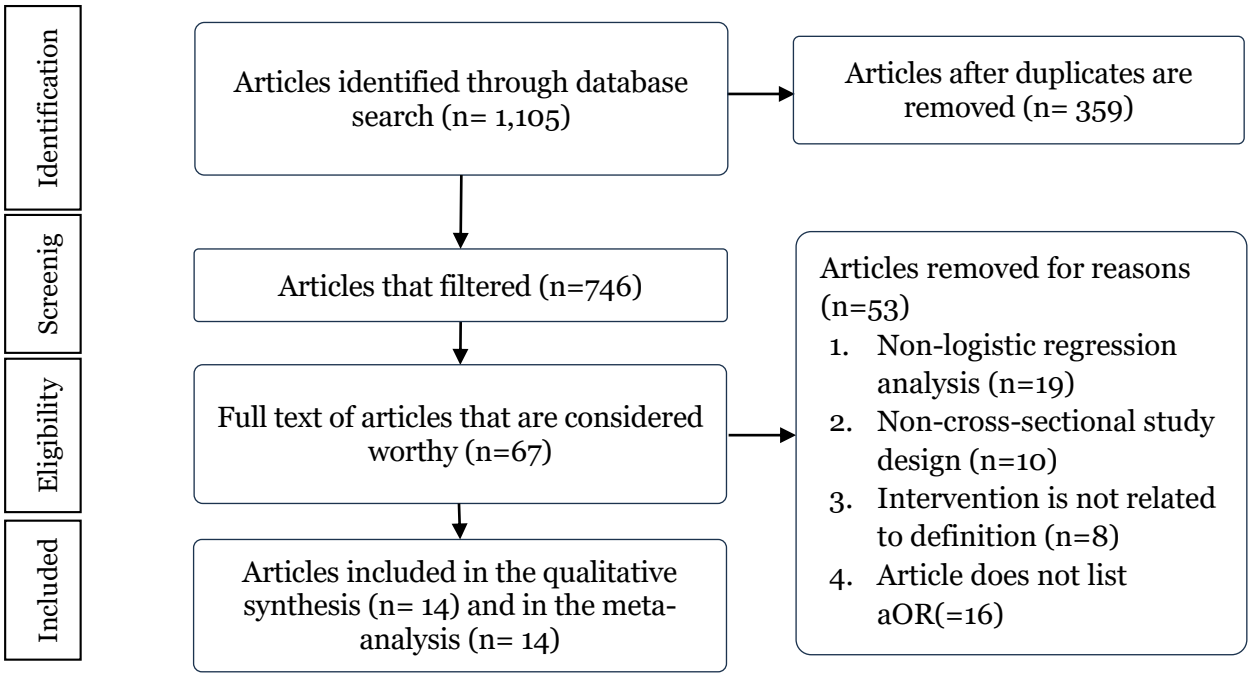

Figure 1. PRISMA diagram result

Figure 2. Overview of the research location

Table 1. Critical Appraisal checklist cross sectional study determinants of performance of health workers in health care facilities.

Author (Year)	Criteria of Question													Total
	1a	1b	1c	1d	2a	2b	3a	3b	4	5	6a	6b	7	
Fenta *et al* (2023)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Musoke *et al* (2019)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Wanduru *et al* (2016)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Ousman and Worku (2022)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Tsague *et al* (2020)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Wang *et al* (2023)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Alemu *et al* (2017)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Hallidu *et al* (2023)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Bagonza *et al* (2014)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Baraki *et al* (2017)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Kuule *et al* (2017)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Ambushe *et al* (2023)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Kumari *et al* (2024)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Chung *et al* (2017)	2	2	2	2	2	2	2	2	2	2	2	2	2	26

Description of the answer score:

0 : No 1 : unclear 2 : yes

Question criteria descriptions:

1. **Fromulation of research questions in the acronym PICO**

a. Is the population in the primary study the same as the population in the PICO meta-analysis?

b. Is the operational definition of intervention, i.e. the state of exposure in the primary study, the same as the definition intended in the meta-analysis?

c. Is the comparison, i.e. the unexposed status used by the primary study the same as the definition intended in the meta-analysis?

d. Are the outcome variables studied in the primary study the same as the definition intended in the meta-analysis?

2. Methods for selecting research subjects

a. In cross-sectional analytical studies, do researchers select samples from the population randomly?

b. Alternatively, if the cross-sectional analysis of the sample is not randomly selected, do the researchers select the sample based on the outcome status or based on the intervention status?

3. Methods for measuring exposure (intervention) and outcome variables

a. Are exposures and outcome variables measured with the same instruments in all primary studies?

b. If the variables are measured on a categorical scale, are the cutoffs or categories used the same between primary studies?

4. Design-related bias

5. Methods for controlling confusion

6. Statistical analysis methods

a. Did the researcher analyze the data in this primary study with a multivariate analysis model?

b. Do primary studies report effect measures or relationships of multivariate analysis outcomes?

7. Conflict of interest

Table 2. Summary of PICO table from primary study of determinants of health worker performance in health care facilities (n=4,445)

Author (Year)	Country	Sample	P	I	C	O
Fenta et al (2023)	Ethiopia	636	Midwives	Training	No Training	Job Performance
Musoke et al (2019)	Uganda	201	Health Workers	Training	No Training	Job Performance
Wanduru et al (2016)	Uganda	393	Health Workers	Secondary	Primary	Job Performance
Ousman and Worku (2022)	Ethiopia	422	Health Workers	Male	Female	Job Performance
Tsague et al (2020)	Kamerun	111	Health Workers	Training	No Training	Job Performance
Wang et al (2023)	China	315	Health Workers	Training	No Training	Job Performance
Alemu et al (2017)	Ethiopia	46	Laboratory Professionals	Training	No Training	Job Performance
Hallidu et al (2023)	Ghana	375	Health Workers	Male	Female	Job Performance
Bagonza et al (2014)	Uganda	336	Health Workers	Male	Female	Job Performance
Baraki et al (2017)	Ethiopia	200	Nurse	Degree	Diploma	Job Performance
Kuule et al (2017)	Uganda	508	Health Volunteers	Beyond primary	Up to primary	Job Performance
Ambushe et al (2023)	Ethiopia	422	Nurse	BSC Degree of above	Diploma	Job Performance
Kumari et al (2024)	India	270	Nurse	MSC Nursing	Diploma in Nursing	Job Performance
Chung et al (2017)	Malaysia	210	Health Volunteers	Tertiary	Primary	Job Performance

Table 3. aOR of training with health worker performance

Author (Year)	aOR	95% CI	
		Lower limit	Upper limit
Alemu et al (2017)	7.00	1.50	32.67
Musoke et al (2019)	12.79	1.02	160.40
Tsague et al (2020)	3.30	1.01	10.78
Wang et al (2023)	3.17	1.39	7.25
Fenta et al (2023)	1.19	1.19	1.89

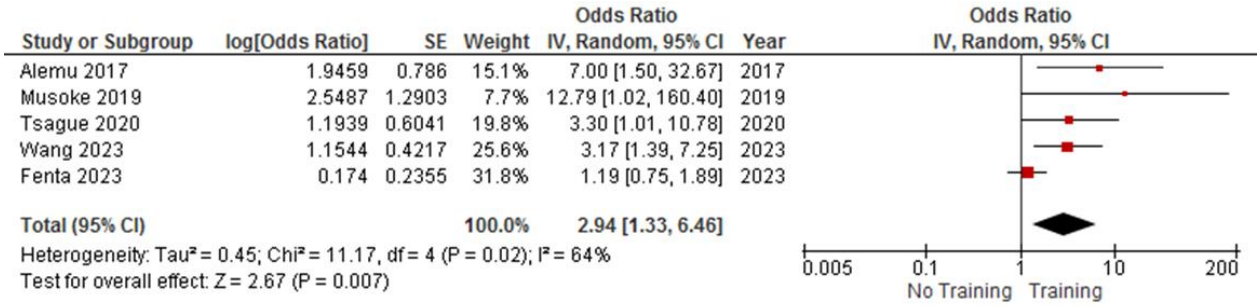

Figure 3. Forest plot regarding the effect of training on performance on health workers

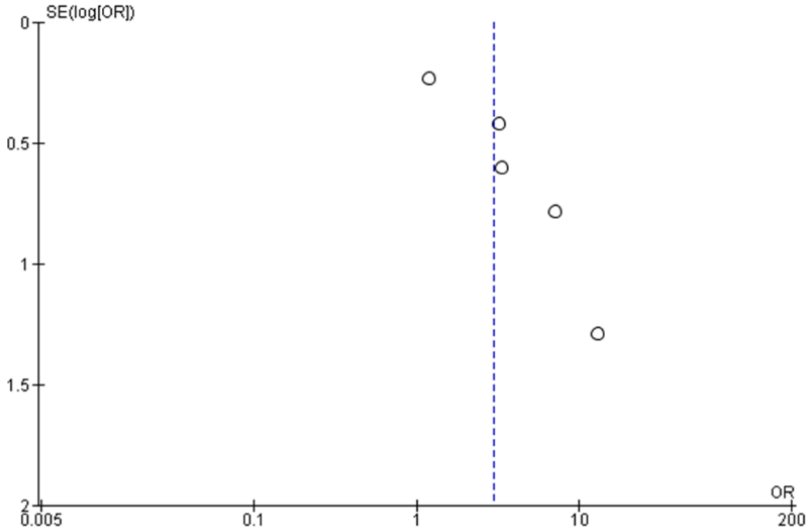

Figure 4. Training plot funnel with healthcare worker performance

1. Effect of training on performance on health workers

Table 3 shows that of the five articles that display aOR values related to training and health worker performance. The highest aOR value was in the study of Musoke et al (2019) (aOR=12.79; CI 95%= 1.02 to 160.4).

a. Forest plot

The forest plot in Figure 3 shows that training improves performance in health workers and the effect is significant. Health-care workers who received training were 2.94 times more likely to perform well compared to no training (aOR=2.94; CI 95%= 1.33 to 6.46; p= 0.007). The forest plot also showed a high heterogeneity of effect estimates between studies (I^2= 64%; p= 0.02). Thus, the calculation of the average

effect estimate is carried out using the Random Effect Model.

b. Funnel plot

The plot funnel in Figure 4 shows that the distribution of effect estimation is located more to the right than to the left of the effect estimation vertical line. Thus, the plot funnel shows that there is a publication bias. Because the distribution of the effect estimate is more located to the right of the vertical line of the effect estimate in the same plot funnel as the

If the diamond is in the forest plot which is also located to the right of the zero hypothesis line, the publication bias tends to overestimate the actual effect (overestimate).

Table 4. aOR of education level with health worker performance

Author (Year)	aOR	95% CI	
		Lower limit	Upper limit
Wanduru et al (2016)	2.72	1.50	4.93
Baraki et al (2017)	6.97	1.13	43.09
Alemu et al (2017)	2.00	0.60	6.67
Kuule et al (2017)	1.40	0.90	2.18
Chung et al (2017)	4.65	1.01	21.50
Musoke et al (2019)	3.93	1.17	13.20
Ambushe et al (2023)	3.57	1.40	9.10
Kumari et al (2024)	2.04	0.67	6.21

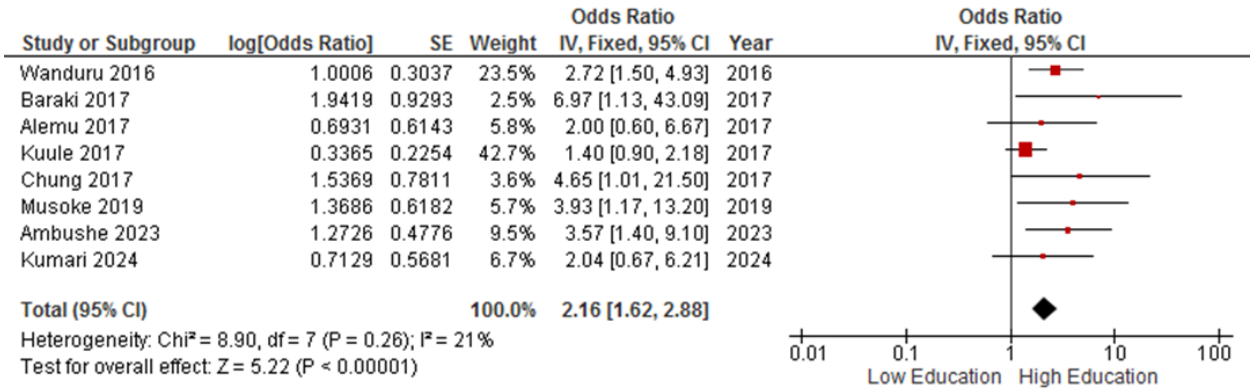

Figure 5. Forest plot of education level with the performance of health workers

2. Effect of education level on performance on health workers

Based on Table 4, it shows that of the eight articles that display the aOR value related to the level of education and the performance of health workers. The highest aOR value was in the Baraki et al (2017) study (aOR=6.97; CI 95%= 1.13 to 43.09).

a. Forest plot

The forest plot in Figure 5 shows that the level of continuing education or bachelor's degree improves performance in health workers and the influence is significant. Healthcare workers with advanced education or bachelor's degree were 2.16 times more likely to perform well than initial education or diploma levels (aOR=2.16; CI

95%= 1.62 to 2.88; p<0.001). The forest plot showed low heterogeneity of effect estimates between studies (I2= 21%; p=0.26). Thus, the calculation of the average effect estimate is carried out using the Fixed Effect Model.

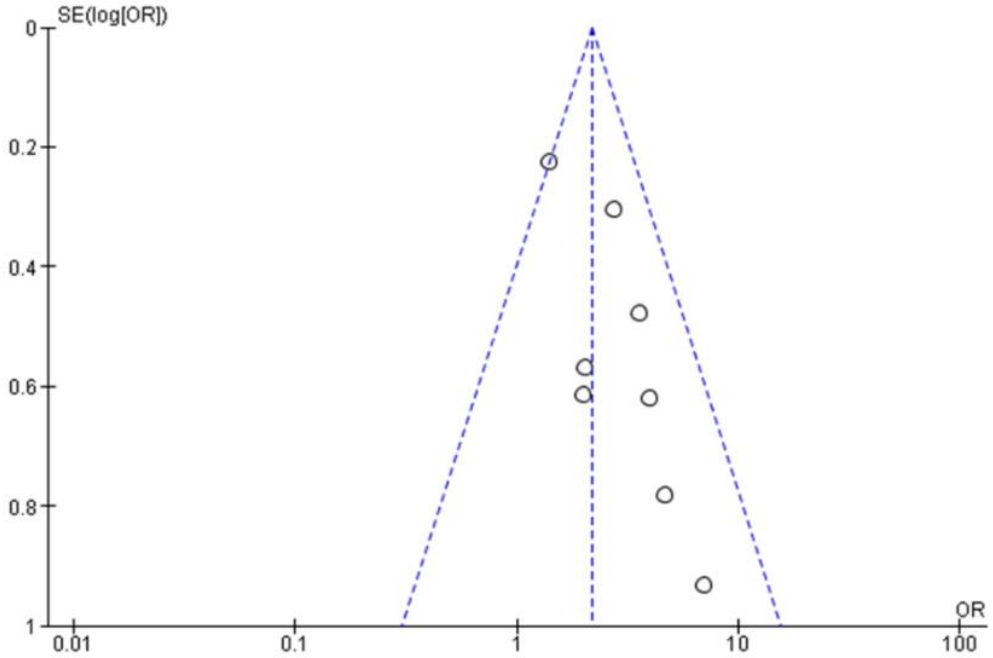

Figure 6. Funnel plot of education level with the performance of health workers

b. Funnel plot

The plot funnel in Figure 6 shows the distribution of effect estimates located more to the right than to the left of the effect estimate vertical line. Thus, the plot funnel shows that there is a publication bias. Because the distribution of effect estimates is more located to the right of the vertical line of effect estimation in the same plot funnel as the location of diamonds in the forest plot which is also located to the right of the zero hypothesis line, the publication bias tends to overestimate the actual effect (overestimate).

Table 5. aOR of gender with health worker performance

Author (Year)	aOR	95% CI	
		Lower limit	Upper limit
Bagonza *et al* (2014)	2.65	1.29	5.44
Baraki *et al* (2017)	2.00	0.10	40.00
Alemu *et al* (2017)	0.44	0.10	1.94
Kuule *et al* (2017)	1.43	1.00	2.04
Musoke *et al* (2019)	0.48	0.14	1.65
Ousman and Worku (2022)	1.90	1.13	3.18
Hallidu *et al* (2023)	0.41	0.20	0.88
Ambushe *et al* (2023)	0.66	0.35	1.24
Wang *et al* (2023)	0.53	0.31	0.91

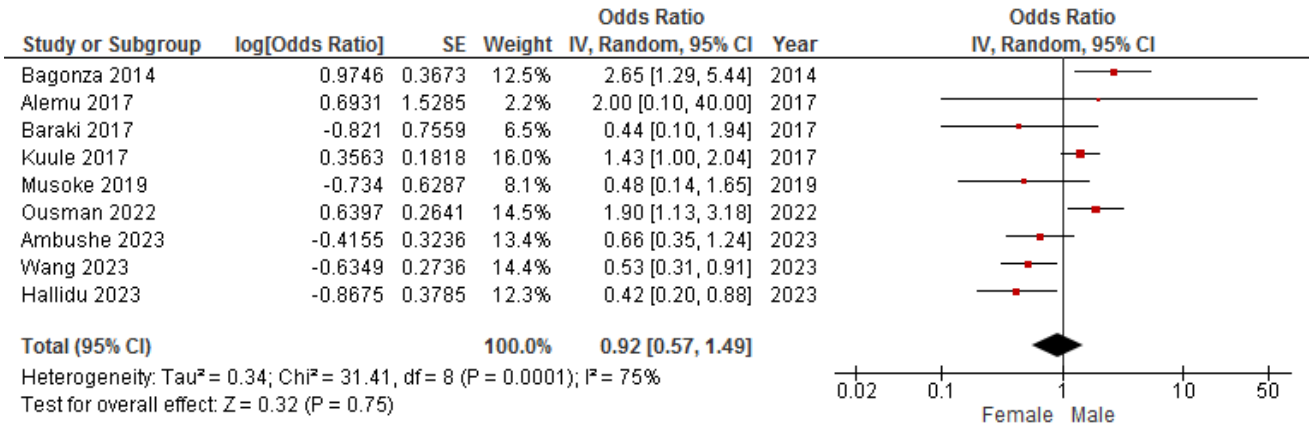

Figure 7. Forest plot gender with health worker performance

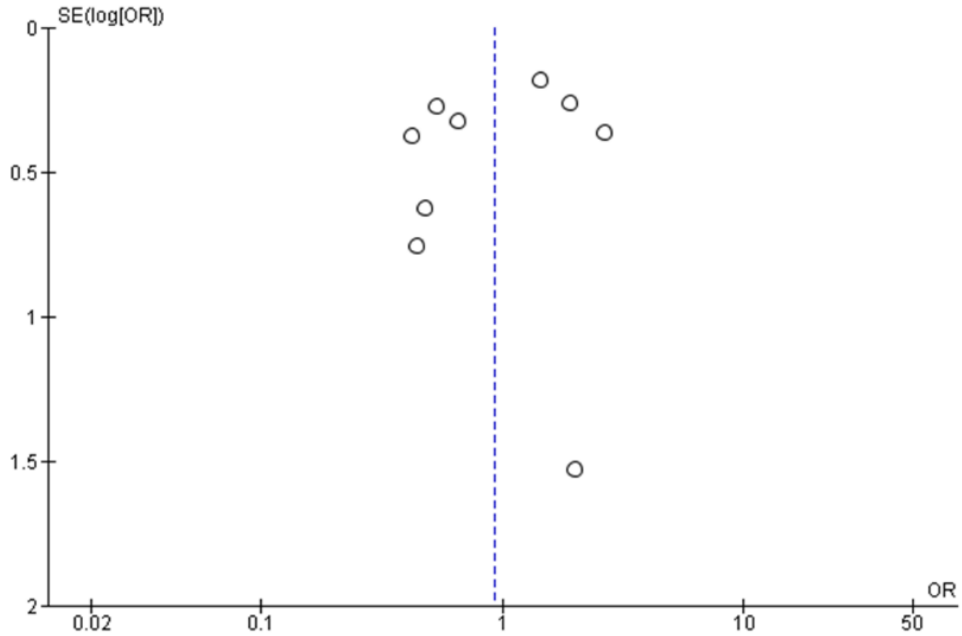

Figure 8. Gender plot funnel with healthcare worker performance

3. Effect of gender on performance in health workers

Based on Table 5, it shows that of the nine articles that display aOR values related to gender with the performance of health workers. The highest aOR value in the Bagonza et al (2014) study (aOR=2.65; CI 95%= 1.29 to 5.44).

a. Forest plot

The forest plot in Figure 7 shows a statistically insignificant difference in performance between men and women. Female health workers were 0.92 times more likely to perform well compared to males (aOR=0.92; CI 95%= 0.57 to 1.49; p= 0.75). The forest plot showed high heterogeneity of effect estimates between studies (I^2= 75%; p=0.001). Thus, the calculation of the average effect estimate is carried out using the Random Effect Model.

b. Funnel plot

The plot funnel Figure 8 shows a more or less balanced distribution of effect estimates to the right and left of the average vertical line of effect estimation. Thus, the plot funnel does not indicate publication bias.

DISCUSSION

1. Training with health worker performance

This study found that training increased health worker's performance. This findings are in line with Ivelia (2018) from Kenya, in 314 health workers. They state that training has a positive influence on the performance of health workers at the Kakamega Regional General Education and Referral Hospital. Another study conducted by Turan and Unver (2021) stated that training is important to increase capacity and fill gaps, as well as gain the latest practices in science and art for life-saving procedures. Based on research conducted by Gadalla and Mukhtad (2021) which shows that health workers who undergo training programs at health institutions with the aim of considering performance and improving performance. The results show that training can broadly improve worker performance, but training is not the only factor that can improve worker performance, but rather a combination of several factors such as job satisfaction. Job satisfaction in health tests is very important in building employee motivation (Mugizi et al, 2015). A high level of job satisfaction has a positive impact on quality of life, work performance, job retention, and quality of health service delivery.

The results of this study also show that there is a publication bias with statistically significant results, the cause of publication bias in the sample size study is smaller which can be seen in the funnel plot in Figure 4 which in the figure shows that the distribution of effect estimation tends to be located more to the right of the average vertical line of effect estimation than to the left. In addition, the publication bias that occurs is also due to the fact that this meta-analysis study only includes published studies, there are still many studies whose results are negative but not published and not used as a source of meta-analysis, besides that the publication bias tends to overestimate the real effect (overestimate).

2. Education level with health worker performance

This study found that education increased health worker's performance. This findings are in line with Atarhim et al. (2019) from Malaysia, which concluded that better education for healthcare workers is needed to satisfy clients and maintain patient outcomes. Another study concluded that lack of education affects clinical practice (Rahman et al, 2015). Healthcare workers who are highly educated perform better. Higher educational background is a positive factor that makes healthcare workers able to do their jobs better and improve their performance (Chung et al, 2017). A high level of education will help to better understand health knowledge which is one of the indicators of performance. In addition, healthcare workers with higher educational status will easily understand how to write and deliver their monthly reports (Boozaripour et al, 2018). Therefore, a certain level of education must be one of the criteria in the selection of health workers.

The results of this study also show that there is a publication bias with statistically significant results, the cause of publication bias in the sample size study is smaller which can be seen in the funnel plot in Figure 6 which in the figure shows that the distribution of effect estimation tends to be located more to the right of the average vertical line of effect estimation than to the left. In addition, the publication bias that occurs is due to the fact that this meta-analysis study only includes published studies, there are still many studies whose results are negative but not published and not used as a source of meta-analysis, besides that the publication bias tends to overestimate the real effect (overestimate).

3. Gender with health worker performance

Out meta-analysis found that female has better work performance than male health workers. This study is supported by Hallidu et al. (2023), which states that gender is related to work performance. Female is likely to be two times higher in good job performance than male. Female health workers perform more effectively than men (Bagonza et al, 2014).

AUTHOR CONTRIBUTION

Mashaf Fahrur Murdo Furqon as the main researcher selects topics, searches and collects articles, processes and compiles the results of the research. Didik Tamtomo and Bhisma Murti helped analyze data and review research documents.

CONFLICT OF INTEREST

There is no conflict of interest in this study.

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