

Meta Analysis the Effects of Maternal Education, Residence, and Birth Delivery Place, on Exclusive Breastfeeding

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ABSTRACT

Background: Health and intelligence are the main foundation for creating quality Human Resources (HR). Exclusive breastfeeding is one of the best steps to improve the quality of human resources from an early age, in the first six months of a baby's life. The success of exclusive breastfeeding is due to several factors including age, relatively low level of education, lack of utilization of health facility services, and increased marketing of formula milk in urban areas. This study aims to analyze the effect of mother's education, geographic location of mother's residence, and place of delivery on exclusive breastfeeding.

Subjects and Method: The researcher uses a systematic review and meta-analysis research, by formulating the researcher's assessment in the PICO as follows. Population: Breastfeeding mothers. Intervention: basic education, rural areas, health facility services. Comparison: Higher education, urban, without health facility services. Outcome: Exclusive breastfeeding. The articles were obtained from PubMed, Google Scholar, Science Direct, MDPI, and Scopus databases. The search keywords for the article are "maternal education" AND "residence" AND "delivery place" AND "exclusive breastfeeding" AND cross-sectional. The inclusion criterias were full-text, cross-sectional study, and reported adjusted odds ratio (aOR). Data were analyzed by Review Manager application (RevMan 5.3).

Results: 20 cross-sectional studies involving 107,952 lactating mothers from Asia, Europe, and Africa were selected for systematic review and meta-analysis. This meta-analysis showed that mothers with high education were 1.27 times more likely to exclusively breastfeed than mothers with low education (aOR= 1.27; 95% CI=1.01 to 1.59; p= 0.040). Mothers who live in rural areas are 2.16 times more likely to give exclusive breastfeeding than mothers who live in urban areas (aOR= 2.16; 95% CI= 1.17 to 4.01; p=0.010). Mothers who give birth in health care facilities are 1.79 times more likely to give exclusive breastfeeding compared to mothers who give birth at home (aOR= 1.79; 95% CI= 1.54 to 2.07; p=0.005)

Conclusion: Maternal education, geographic location, and place of delivery increase the likelihood of exclusive breastfeeding.

Keywords: maternal education, residence, delivery place, exclusive breastfeeding

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BACKGROUND

Health and intelligence are the main foundation for creating quality Human Resources (HR). Exclusive breastfeeding is one of the best steps to improve the quality of human resources from an early age. WHO and UNICEF have recommended exclusive breastfeeding for the first six months of life to achieve optimal growth, development and health, provision of complementary feeding with sufficient nutrition, and followed by breastfeeding until the age of two (Robert et al., 2019).

Through the breastfeeding process, mothers are self-protective against breast and ovarian cancer, minimizing the occurrence of type 2 diabetes, this is shown in research (Chowdhury et al., 2015) that breastfeeding can reduce the risk of breast cancer by 26%, ovarian cancer by 37%, and decrease 32% are affected by type 2 diabetes. The Indonesian government has paid special attention to the importance of exclusive breastfeeding in the growth and development of infants through the Government Regulation of the Republic of Indonesia Number 33 of 2022 concerning exclusive breastfeeding, that exclusive breastfeeding is breast milk given to babies from birth for six months, without adding or replacing other food and drinks (Ministry of Health, 2022).

In the last three years, the percentage of exclusive breastfeeding has decreased from 68.7% in 2018, to 65.8% in 2019, and again decreased to 53.9% in 2020 (Ministry of Health RI, 2022). This is supported by the existence of several regions in Indonesia which have not been able to achieve success in exclusive breastfeeding, including Gorontalo (49.29%), Maluku (43.35%), Papua (41.42%) and the western region of Papua (41.12%). (Qurniyawati et al., 2022). The obstacles to the success of exclusive breastfeeding are caused by several factors including age, education level which is quite low,

so that it affects the lack of knowledge of mothers about the importance of exclusive breastfeeding, lack of utilization of health facility services both in the process of pregnancy to delivery, and increased marketing of formula milk in urban areas (Yousef et al., 2021). Based on research conducted at the multiregional level in Europe, it shows that mothers with less education levels will be more likely to stop exclusive breastfeeding before the age of six months, this shows that education has an important role in exclusive breastfeeding. In this study, two other elements were taken into consideration in the success of exclusive breastfeeding, namely the geographical location of the mother's residence and the place of delivery. Based on the results of research in Central Ethiopia, it shows that the region of residence contributes to exclusive breastfeeding, mothers who live in urban areas have a smaller chance of exclusive breastfeeding compared to mothers who live in rural areas, this is supported by the ease of access and availability of milk formula in urban areas, thus encouraging mothers with insufficient milk to use formula milk as additional intake for babies (Asfaw et al., 2015). Study Umi et al. (2020) show mothers who live in rural areas are 2.3 times more likely to give exclusive breastfeeding compared to mothers who live in urban areas.

In delivery planning, the target for deliveries in health care facilities is 85% to increase the accessibility and acceptability of maternal and child health services (Ministry of Health RI, 2015). Maternity places play an important role for mothers in the delivery process. The higher the intensity of deliveries in health facilities, the higher the baby's success in obtaining exclusive breastfeeding, with the supervision provided by health service facilities, in recommending exclusive breastfeeding during antenatal and postnatal visits, with an emphasis on the importance of maintaining exclusive breastfeeding for the

first six months of a baby's life. Um et al., 2020). As the WHO and UNICEF global programs through the Baby Friendly Hospital program, can increase initiation, duration, and support health promotion programs in exclusive breastfeeding (Robert et al., 2019). Research conducted by Emmanuelle found that a high proportion of exclusive breastfeeding was shown by babies born in health care facilities, namely 76.5% (Robert et al., 2019).

Based on this background description, a comprehensive study is needed from various primary studies on the influence of education, geographical location of place of residence, and place of delivery. The purpose of this research is to analyze the influence of education, geographical location of place of residence, and place of delivery, with a meta-analysis of the primary studies conducted by the previous authors.

SUBJECTS AND METHOD

1. Study Design

This research is a systematic research and meta-analysis. The articles used were obtained from the PubMed, Google Scholar, Science Direct, MDPI and Scopus databases between 2012 and 2022. Identification of articles using the PRISMA flowchart. Search keywords "maternal education" AND "residence" AND "delivery place" AND "exclusive breastfeeding" AND cross-sectional.

2. Steps of Meta- Analysis

The meta-analysis was carried out through five steps, as follows:

- a. Defining research questions in the PICO form (Population, Intervention, Comparison, Outcome).
- b. Search for main study articles from various electronic databases such as Google Scholar, PubMed, Science Direct, MDPI, and Scopus.
- c. Conduct screening and critical appraisal of the main study articles.

d. Extracting data and synthesizing effect estimates into Rev-Man 5.3.

e. Interpret and draw conclusions.

3. Inclusion Criteria

The inclusion criteria in this research article were full text using a cross-sectional design, research subjects were breastfeeding mothers, exclusive breastfeeding was used to measure the relationship using multivariate analysis with adjusted Odds Ratio (aOR).

4. Study Variable

The independent variable is the mother's education, the geographical location of the mother's place of residence, the mother's place of delivery, and the dependent variable is exclusive breastfeeding.

5. Variable Operational Definitions

Mother's education is the last formal education level taken by the mother to get a diploma, divided into basic education (O) and higher education (I).

Geographical location of the mother's Residence is the location of the mother's residence, divided into urban areas (O) and rural areas (I).

Maternity places are places where mothers receive delivery assistance and postpartum care, divided into homes (O) and health care facilities (I).

6. Instrument

This study is guided by the PRISMA flowchart and assessment of the quality of research articles using the Critical Appraisal Checklist For Cross-sectional study (CEBM, 2014). The following are indicators in critical assessment:

- a. Does the study address clearly focused questions/ problems?
- b. Are the research methods (research design) appropriate to answer the research questions?
- c. Was the method of selecting research subjects clearly explained?
- d. Does the chosen sampling technique introduce bias (selection)?

- e. Does the subject sample represent the population to which the findings will refer?
- f. Was the sample size based on pre-study considerations of statistical power?
- g. Was a satisfactory response rate achieved?
- h. Is the measurement (questionnaire) valid and reliable?
- i. Was statistical significance assessed?
- j. Are confidence intervals given for the main outcome?
- k. Could there be confounding factors that have not been taken into account?
- l. Can the results obtained be applied later?

7. Data Analysis

The analysis in this study is the Review Manager application (RevMan 5.3). Forest plots and funnel plots are used to determine the degree of relationship and heterogeneity of the data.

RESULTS

The research process begins with conducting a research question to obtain a PICO which will be used as a reference for searching related articles. Google Scholar, PubMed, Science Direct, MDPI and Scopus are databases for searching articles.

Figure 1 Review of articles can be seen

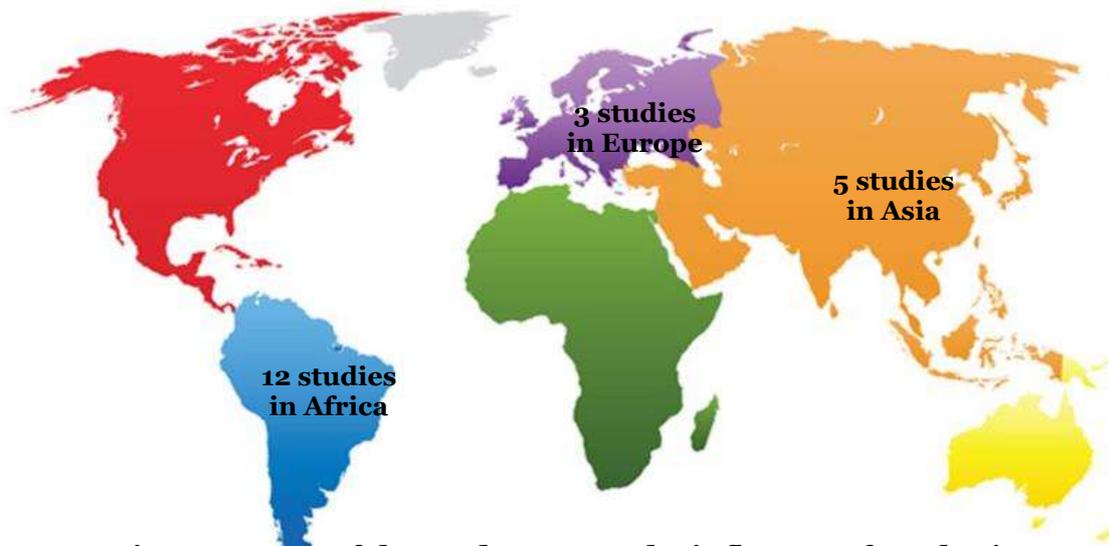


Figure 2. Map of the study area on the influence of mother's education, geographic location of mother's place of residence, and place of delivery on exclusive breastfeeding

through the PRISMA flowchart. Research related to the influence of mother's education, geographic location of mother's place of residence, and place of delivery on exclusive breastfeeding consisted of 20 articles, from the initial search process there were 720 articles, after the deletion of articles published as many as 253 of which were full articles that met the requirements and were considered for full text review a further 20 articles that met the quality assessment were included in the quantitative synthesis using a meta-analysis.

Figure 2 research articles from 3 continents, namely Europe (Romania, Italy, Georgia), Asia (Japan, Vietnam, Cambodia, China) and Africa (Nigeria, Ethiopia, Ghana). Table 1 the researcher conducted an assessment of the quality of the study on 20 articles through the 2014 CASP. Table 2 describes 20 articles from cross-sectional studies which have evidence that there is an effect of mother's education, geographic location of residence, and place of delivery on exclusive breastfeeding. Table 3 describes the value of the Adjusted Odds Ratio (aOR).

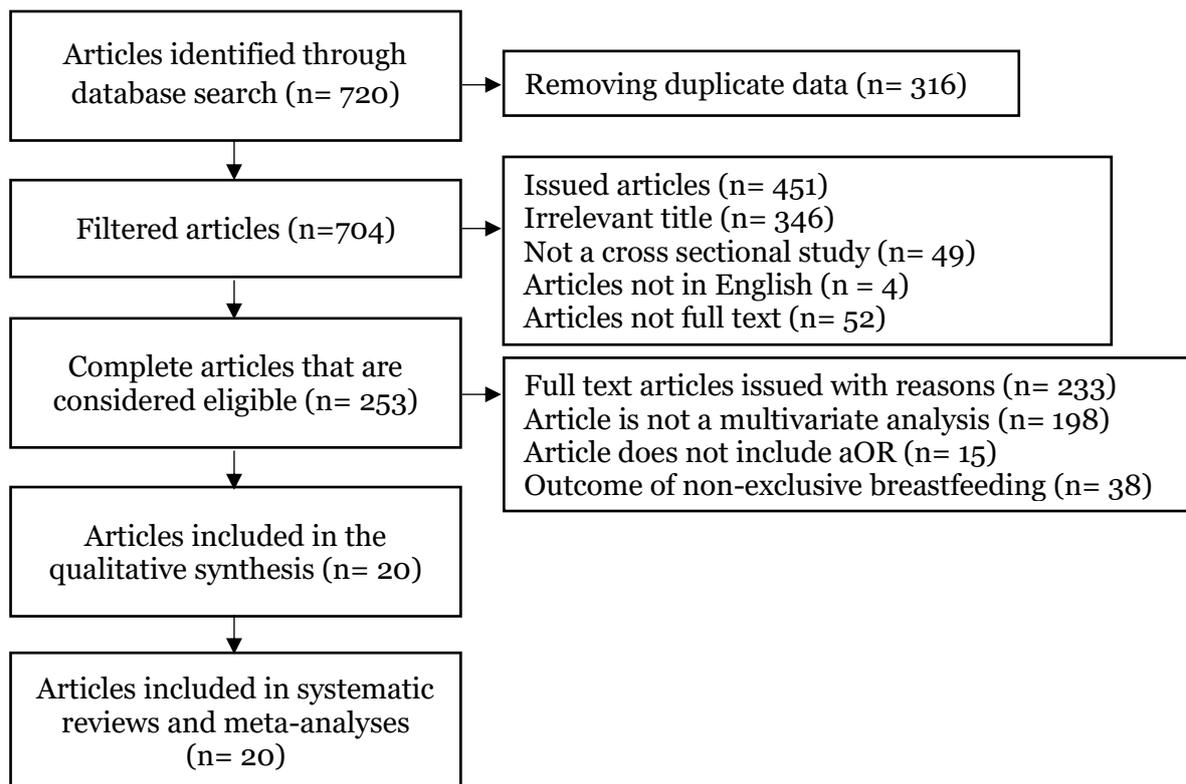


Figure 1. PRISMA flowchart diagram the effects of maternal education, residence, and birth delivery place, on exclusive breastfeeding

Table 2. Quality assessment of studies published by CEBM (2014)

No	Author	Question												Total
		1	2	3	4	5	6	7	8	9	10	11	12	
1	Petrut et al. (2021)	2	2	2	1	2	2	2	2	2	2	1	2	22
2	Ogbo et al. (2015)	2	2	2	1	2	2	2	2	2	2	1	2	22
3	Inano et al. (2021)	2	2	2	2	2	2	2	2	2	2	1	2	23
4	Giang et al. (2022)	2	2	2	2	2	2	2	2	2	2	1	2	23
5	Li et al. (2019)	2	2	2	1	2	2	2	2	2	2	1	2	22
6	Colombo et al. (2018)	2	2	2	2	2	2	2	2	2	2	1	2	23
7	Asfaw et al. (2015)	2	2	2	1	2	2	2	2	2	2	1	2	22
8	Lande et al. (2020)	2	2	2	2	2	2	2	2	2	2	1	2	23
9	Duan et al. (2021)	2	2	2	1	2	2	2	2	2	2	1	2	22
10	Tariku et al. (2017)	2	2	2	2	2	2	2	2	2	2	1	2	23
11	Aduguna et al. (2017)	2	2	2	1	2	2	2	2	2	2	1	2	22
12	Um et al. (2020)	2	2	2	1	2	2	2	2	2	2	1	2	22
13	Arthur et al. (2021)	2	2	2	2	2	2	2	2	2	2	1	2	23
14	Ahmed et al. (2019)	2	2	2	2	2	2	2	2	2	2	1	2	23
15	Tsegaw et al. (2021)	2	2	2	1	2	2	2	2	2	2	1	2	22
16	Hagos et al. (2020)	2	2	2	2	2	2	2	2	2	2	1	2	23
17	Tadesse et al. (2019)	2	2	2	1	2	2	2	2	2	2	1	2	22
18	Mekebo et al. (2022)	2	2	2	1	2	2	2	2	2	2	1	2	22
19	Tsegaye et al. (2019)	2	2	2	2	2	2	2	2	2	2	1	2	23
20	Asemahagn et al. (2020)	2	2	2	1	2	2	2	2	2	2	1	2	22

Answer: 2 = Yes, 1 = Can't tell, 0 = No

Table 1. Description of the main studies included in the primary study meta-analysis (n = 107,952)

Author (year)	Country	Desain study	Sample	P Population	I Intervention	C Comparison	O Output
Petrut et al. (2021)	Northwestern, Romania	Cross-sectional	1,399	Breastfeeding mothers (0-23 months)	Higher education	Basic education	exclusive breastfeeding
Ogbo et al. (2015)	Nigeria	Cross-sectional	958	Breastfeeding mothers (< 24 months)	Higher education	Basic education	exclusive breastfeeding
Inano et al. (2021)	Jepang	Cross-sectional	80,491	Breastfeeding mothers (0-6 months)	Higher education	Basic education	exclusive breastfeeding
Giang et al. (2022)	Vietnam	Cross-sectional	846	Breastfeeding mothers	Higher education	Basic education	exclusive breastfeeding
Li et al. (2019)	China	Cross-sectional	494	Breastfeeding mothers (0-10 months)	Higher education	Basic education	exclusive breastfeeding
Colombo et al. (2018)	Italia	Cross-sectional	640	Breastfeeding mothers (0-12 months)	Higher education	Basic education	exclusive breastfeeding
Asfaw et al. (2015)	Ethiopia	Cross-sectional	634	Breastfeeding mothers (0-6 months)	Higher education	Basic education	exclusive breastfeeding
Lande et al. (2020)	Georgian	Cross-sectional	7,134	Breastfeeding mothers (0-24 months)	Higher education	Basic education	exclusive breastfeeding
Duan et al. (2021)	China	Cross-sectional	5,287	Breastfeeding mothers (0-6 months)	Higher education	Basic education	exclusive breastfeeding
Tariku et al. (2017)	Ethiopia	Cross-sectional	553	Breastfeeding mothers (0-16 months)	Higher education	Basic education	exclusive breastfeeding
Aduguna et al. (2017)	Ethiopia	Cross-sectional	529	Breastfeeding mothers (0-6 months)	Higher education	Basic education	exclusive breastfeeding
Um et al. (2020)	Kamboja	Cross-sectional	717	Breastfeeding mothers (0-23 months)	Higher education	Basic education	exclusive breastfeeding
Arthur et al. (2021)	Ghana	Cross-sectional	180	Breastfeeding mothers (0-6 months)	Rural	Urban	exclusive breastfeeding
Ahmed et al. (2019)	Ethiopia	Cross-sectional	3,861	Breastfeeding mothers (0-6 months)	Rural	Urban	exclusive breastfeeding
Tsegaw et al. (2021)	Ethiopia	Cross-sectional	1,185	Breastfeeding mothers (0-6 months)	Rural	Urban	exclusive breastfeeding
Hagos et al. (2020)	Ethiopia	Cross-sectional	572	Breastfeeding mothers (0-23 months)	Health facility	Not health facility	exclusive breastfeeding
Tadesse et al. (2019)	Ethiopia	Cross-sectional	558	Breastfeeding mothers (< 24 months)	Health facility	Not health facility	exclusive breastfeeding
Mekebo et al. (2022)	Ethiopia	Cross-sectional	566	Breastfeeding mothers (0-6 months)	Health facility	Not health facility	exclusive breastfeeding
Tsegaye et al. (2019)	Ethiopia	Cross-sectional	631	Breastfeeding mothers	Health facility	Not health facility	exclusive breastfeeding
Asemahagn et al. (2020)	Ethiopia	Cross-sectional	717	Breastfeeding mothers (0-5 months)	Health facility	Not health facility	exclusive breastfeeding

Table 3. AOR value of mother's education, geographical location of mother's residence, and place of birth

Author (year)	aOR	Lower limit	Upper limit
Petrut et al. (2021)	1.34	0.82	2.21
Ogbo et al. (2015)	1.87	1.24	2.82
Inano et al. (2021)	1.32	1.25	1.39
Giang et al. (2022)	0.74	0.51	1.09
Li et al. (2019)	2.15	1.24	3.71
Colombo et al. (2018)	1.70	0.90	3.1
Asfaw et al. (2015)	0.32	0.16	0.66
Lande et al. (2020)	0.75	0.59	0.97
Duan et al. (2021)	1.53	1.14	2.07
Tariku et al. (2017)	2.10	1.63	2.71
Aduguna et al. (2017)	1.09	0.55	2.16
Um et al. (2020)	1.94	0.89	4.25
Arthur et al. (2021)	0.75	0.19	3.03
Ahmed et al. (2019)	1.32	0.76	2.31
Tsegaw et al. (2021)	3.41	0.82	14.10
Hagos et al. (2020)	2.07	1.15	3.73
Tadesse et al. (2019)	1.00	0.50	2.2
Mekebo et al. (2022)	2.51	1.12	5.63
Tsegaye et al. (2019)	1.7	1.1	2.7
Asemahagn et al. (2020)	2.18	1.22	4.35

1. The effect of education on exclusive breastfeeding

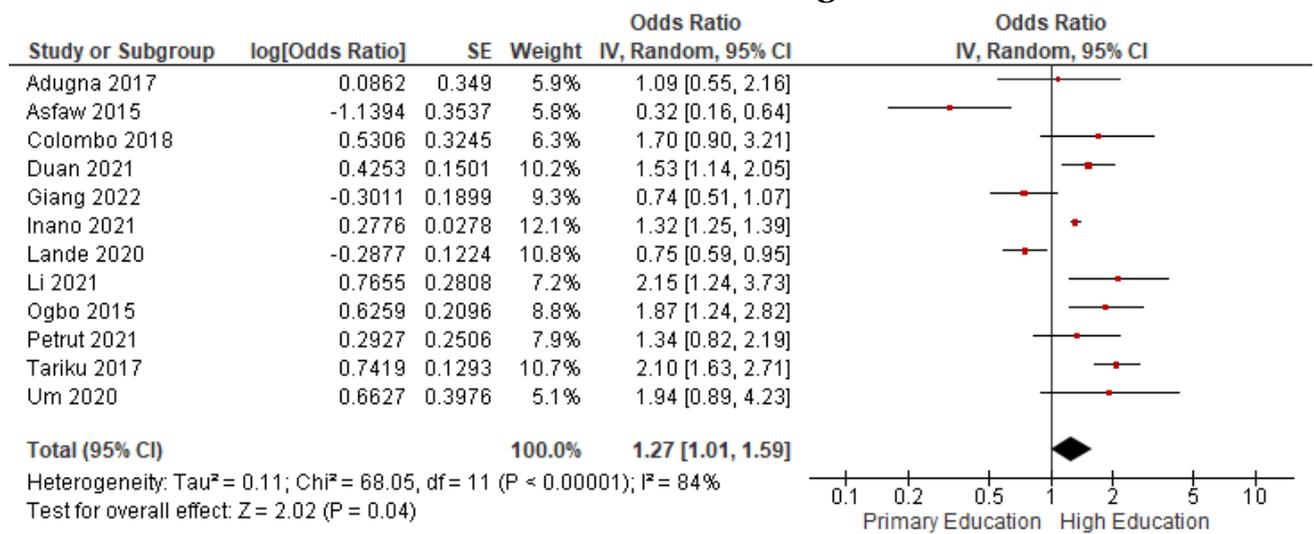


Figure 3. Forest plot of the effect of education on exclusive breastfeeding

The forest plot in Figure 3 shows that there is an effect of mother's education on exclusive breastfeeding, and this effect is statistically significant. Mothers with higher education are 1.27 times more likely to give exclusive breastfeeding than those with low education (aOR=1.27; 95% CI= 1.01 to 1.59; p=

0.040). The forest plots show a high heterogeneity in the distribution of effect estimates (I²=84%; p<0.001). Thus, the calculation of the average effect estimate is carried out using the random effect model approach.

The funnel plot in Figure 4 shows that the distribution of effect estimates is located

to the right of the vertical line more than to the left, thus indicating publication bias. Because the effect estimates are mostly located to the right of the vertical line, which is the same as the location of the average

effect estimate (diamond shape) in forest plots which is also located to the right of the vertical line, the publication bias tends to overstate the true effect (over estimate).

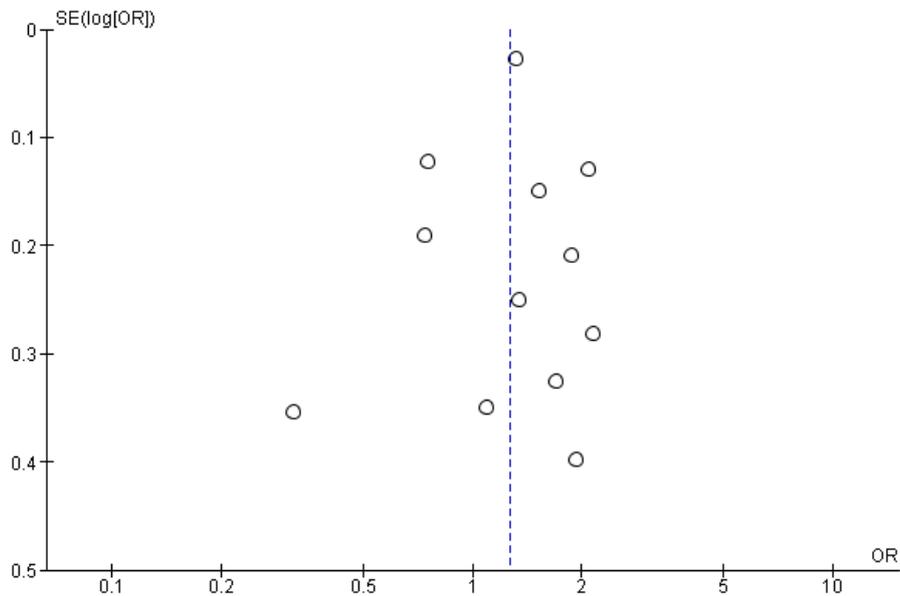


Figure 4. Funnel plot of the effect of education on exclusive breastfeeding

2. The effect of the geographic location of the mother's residence on exclusive breastfeeding

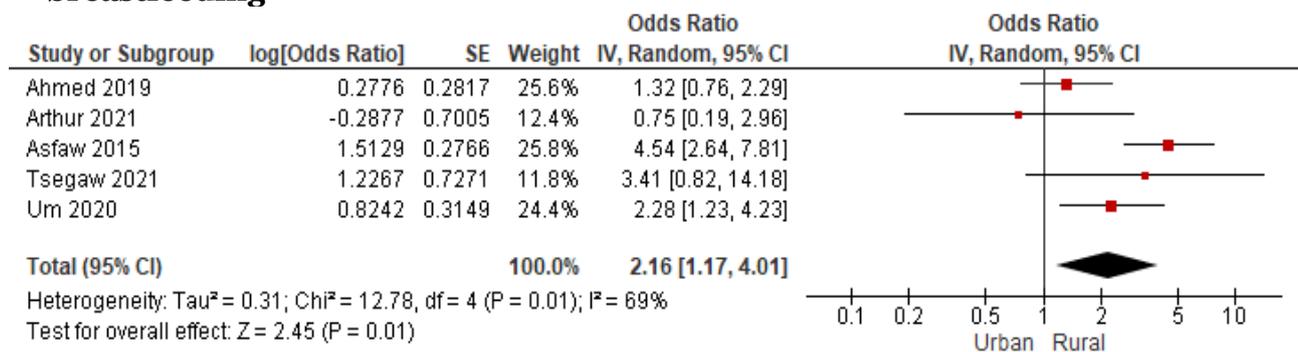


Figure 5. Forest plot of the effect of geographic location of residence on exclusive breastfeeding

The forest plot in Figure 5 shows that there is an effect of geographic location of residence on the likelihood of exclusive breastfeeding, and this effect is statistically significant. Mothers who live in rural areas are 2.16 times more likely to give exclusive breastfeeding than those in urban areas

(aOR= 2.16; 95% CI= 1.17 to 4.01; p= 0.010). The forest plot also shows high heterogeneity of effect estimates (I²= 69%; p= 0.010) therefore the calculation of effect estimates uses a random effect model approach. The funnel plot in Figure 6 shows

a symmetrical distribution of effect estimates to the right and left of the vertical line.

Thus, the funnel plot shows no publication bias in this meta-analysis.

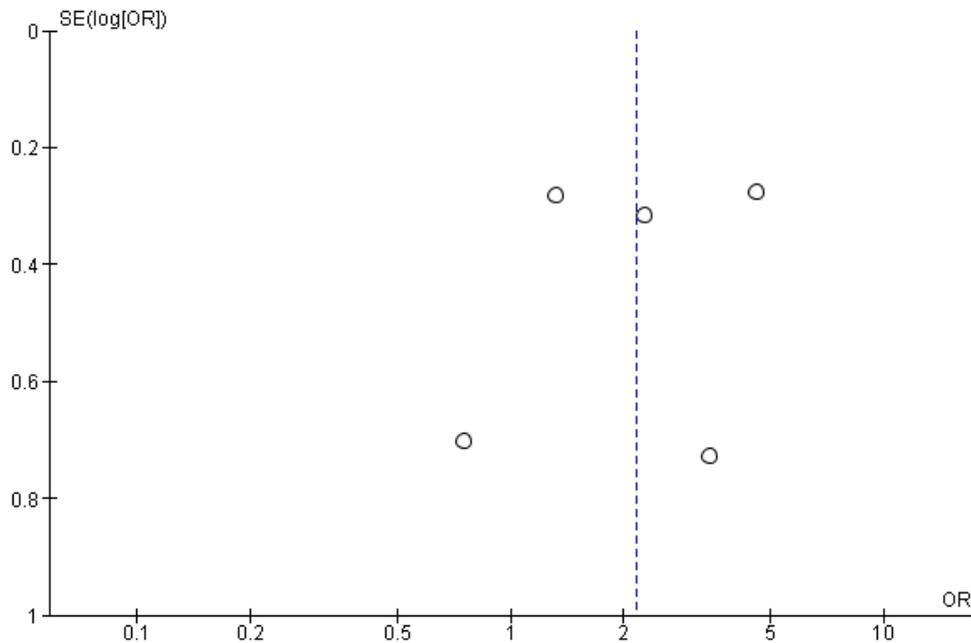


Figure 6. Funnel plot of the effect of geographic location of residence on exclusive breastfeeding

3. The effect of the mother's place of delivery on exclusive breastfeeding

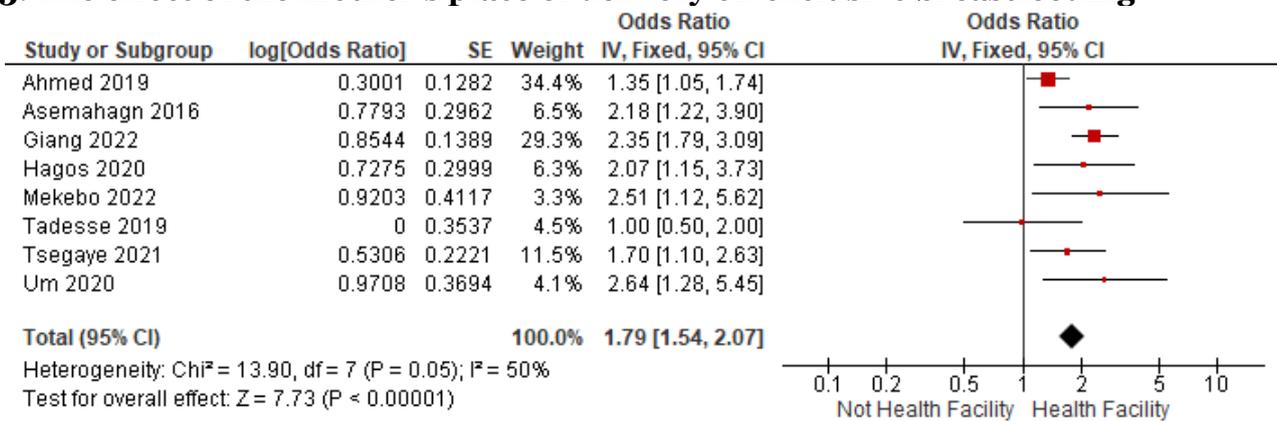


Figure 7. Forest plot of the effect of place of delivery on exclusive breastfeeding

The forest plot in Figure 7 shows that there is an effect of place of delivery on exclusive breastfeeding, and this effect is statistically significant. Mothers who give birth in health care facilities are 1.79 times more likely to give exclusive breastfeeding than at home

(aOR=1.79; 95% CI= 1.54 to 2.07; p= 0.005). The forest plots also show moderate heterogeneity of effect estimates between studies (I²=50%; p=0.005). Thus, the calculation of effect estimation is carried out using the fixed effect model approach.

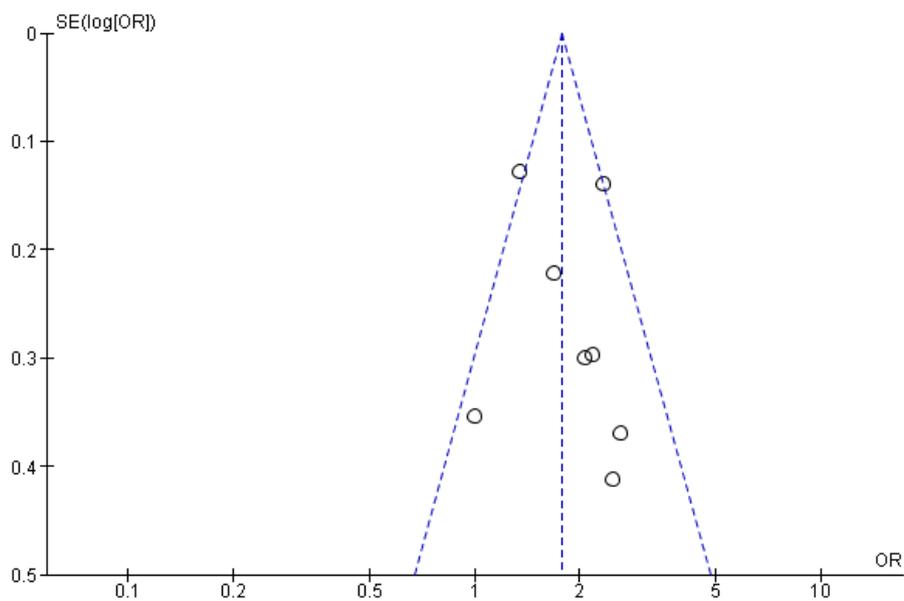


Figure 8. Funnel plot of the effect of place of delivery on exclusive breastfeeding

The funnel plot in Figure 8 shows the distribution of effect estimates which are located to the right of the average vertical line of effect estimates, thus indicating a publication bias. Because the effect estimates are mostly located to the right of the vertical line, which is the same as the location of the average effect estimate (diamond shape) which is also to the right of the vertical line in the forest plot image, the publication bias overestimates the actual effect.

DISCUSSION

The systematic study and meta-analysis in this study had a significant effect between education, geographic location of the mother's place of residence, and place of delivery on exclusive breastfeeding. This study discusses education, geographic location of the mother's residence, and place of delivery which are considered important for exclusive breastfeeding.

Government programs related to promotion and public awareness of breastfeeding continue to be encouraged to support the achievement of complete nutrition for

infants. There is a significant relationship between education level and exclusive breastfeeding. The level of education is related to the mother's understanding of important information that needs to be done to improve the health of mothers and children, the lower the education, the lower a person's basic ability to make decisions, especially in exclusive breastfeeding (Ampu, 2021).

In the analysis of the relationship between education and exclusive breastfeeding conducted by (Lindawati, 2019) a p value was obtained 0.027 (p value <0.05), meaning that statistically there is a relationship between education and exclusive breastfeeding, quantity exclusive breastfeeding is more for mothers with higher education levels. Based on the results of research at the multiregional level in Europe, it shows that with a better level of education it has an influence on knowledge and more confidence in fulfilling the nutrition the baby needs, while mothers with less education level will be more inclined to stop breastfeeding before the age of six months

(Cozma-Petruț et al., 2021).

Geographically, the area of residence is related to exclusive breastfeeding. A cross-sectional study conducted in Central Ethiopia, shows that region of residence contributes to exclusive breastfeeding. Mothers who live in urban areas have a smaller chance of exclusive breastfeeding compared to mothers who live in rural areas. This is supported by the ease of access and availability of formula milk in urban areas, thus encouraging mothers with insufficient breast milk to use formula milk as intake. Adjunct for babies (Asfaw et al., 2015). Based on previous research, it was explained that mothers who live in rural areas are 2.3 times more likely to provide exclusive breastfeeding compared to mothers who live in urban areas (Um et al., 2020). Basic Health Research Report, the coverage of exclusive breastfeeding in Indonesia, for urban areas is 25.2% while for rural areas it is 29.3% (Dwiani et al., 2014). A mother living in a rural area gets less influence and exposure regarding breastmilk substitutes delivered through media marketing compared to urban areas, which has reduced understanding of the importance of exclusive breastfeeding (Pries et al., 2016). There are greater employment opportunities in urban areas, prompting them to spend less time at home, so they have less opportunity to provide exclusive breastfeeding (Um et al., 2020).

Another aspect that affects exclusive breastfeeding is the place of delivery. Place of delivery is a major consideration for a mother in labor. In a previous study that was being conducted (Qurniyawati et al., 2022), the higher the inclusion of deliveries in health care facilities, the higher the inclusion of babies receiving exclusive breastfeeding. Deliveries carried out in health care facilities are related to the role of health workers in exclusive breastfeeding. This is in accordance with the results of research

being conducted in Cambodia, explaining that babies born in hospitals have a three times higher likelihood of obtaining exclusive breastfeeding compared to mothers who give birth outside health care facilities (Tsegaye et al., 2019). The results of research conducted in Ethiopia explain that deliveries carried out in health care facilities have a 2.2 times chance of success in exclusive breastfeeding compared to mothers who deliver at home (Tsegaw et al., 2021). In a survey being conducted by Heriaty, the results show that only 5% of mothers with babies aged 0-6 months give exclusive breastfeeding, 95% of them do not give exclusive breastfeeding for various reasons, one of which is caused by mothers who do deliveries at home resulting in a lack of health education received by mothers regarding exclusive breastfeeding (Berutu, 2021). Mothers who routinely carry out pregnancy and health checks have good knowledge of breastfeeding practices, as well as infant nutrition education (Qurniyawati et al., 2022).

Availability of health facilities, support from health promoters, and health workers in increasing exclusive breastfeeding, has an influence in supporting the success of exclusive breastfeeding. Visits of health workers to remote areas, the provision of adequate and equitable health care facilities is a form of support that can influence the attitude of mothers in giving exclusive breastfeeding. Providing support to mothers, through good interpersonal communication, will build mothers' confidence in supporting exclusive breastfeeding (Rahman et al., 2020).

The conclusion of a meta-analysis conducted from 20 studies on education, geographic location of residence, and place of delivery on exclusive breastfeeding came from the continents of Asia, Europe, Africa and this study showed that there was an

effect of education on exclusive breastfeeding (aOR= 1.27; CI 95 %=1.01 to 1.59; p= 0.040). Geographical location of residence towards exclusive breastfeeding (aOR= 2.16; 95% CI= 1.17 to 4.01; p=0.010). Place of delivery to exclusive breastfeeding (aOR= 1.79; CI 95%= 1.54 to 2.07; p= 0.005). The limitations of this study are that there is a bias in the research, considering that researchers only use English in the articles analyzed, and there is a search bias because in this study only uses several databases including Google Scholar, PubMed, Science Direct, MDPI, and Scopus.

AUTHOR CONTRIBUTION

Ade Amallia is the main researcher who selects topics, searches for and collects research data. Meanwhile, Eti Poncorini Pamungkasari and Rita Benya Adriani analyzed the research data and reviewed the document.

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This study is self-funded.

CONFLICT OF INTERESTS

There is no conflict of interest in this study.

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