

# SELF-EFFICACY, BENEFIT, CUES TO ACTION AS THE MAIN DETERMINANTS OF COVID-19 PREVENTION BEHAVIOR: META ANALYSIS OF CROSS-SECTIONAL STUDY

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## Keywords:

Health belief model, Covid preventive behavior, Meta-analysis

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## ABSTRACT

The fact that Covid-19 virus will not vanish completely requires people to have healthy behavior to control and prevent the spread (Covid-19 Preventive Behavior CPB). This is a systematic review and meta-analysis study that aims at providing a more reliable summary with a high level of evidence to estimate the scale of the effect of each component or perception of the HBM theory on Covid-19 prevention behavior. Articles were searched through databases from January – November 2022. The sources were from various databases such as: PUBMED and Google Scholar. No attempt was conducted to specifically search for unpublished articles. The keywords used were “Health Belief Model”[Mesh]” AND “covid preventive behavior”, AND “covid-19 preventive behavior”. 6 articles were eligible to be analyzed using RevMan5.4. the analysis results of the HBM predictor for increasing CPB are: susceptibility (RR: 1.03; 95% CI: 0.92 - 1.16; p value = 0.62), low self-efficacy, statistically these results are significant (RR: 1.48; 95% CI: 1.06 - 2.06; p value= 0.05), severity (RR: 1.05; 95%CI: 1.02 - 1.08; p value = 0.0006), perceived barrier (RR: 0.82; 95%CI: 0.75 – 0.90; p value < 0.0001), perceived benefit (RR: 1.22; 95%CI: 1.06 – 1.41; p value = 0.006), Cues to action (RR: 1.38; 95%CI: 1.03 – 1.85; p value < 0.00001). Self-efficacy, severity, perceived barrier, perceived benefit, and cues to action have significant effects on CPB. These results indicate that HBM can be used as one of the bases in efforts to establish Covid-19 prevention behavior.



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## 1. Introduction

Since the virus was first detected in Wuhan, China in December 2019 [1] up to this point, it still infects and causes illness and death. Until November 2022, WHO has not revoked the status of a global pandemic or

health emergency [2], [3]. This virus has infected more than 216 countries. This condition demands the world to prepare new post-pandemic life habits [4]. In fact, there has been an increase in cases of death due to Covid-19 in the last few weeks.

Scientists keep continuing to research and develop treatments or vaccines for COVID 19. The fact that the virus will not vanish and the uncertainty of this pandemic will end, makes scientists continue to find a way so that people are ready to survive until the status changes to endemic and to prepare if a pandemic may return in the future. Communities also need to be prepared to have positive behaviors to control and prevent disease [4]. This preventive behavior must be carried out not only during or after pandemic, even further and apply as a habit of healthy behavior for the next generation.

Intervention through education and health promotion is a great approach for people to behave healthily in preventing the massive spread of Covid-19 infection. It needs proper planning, monitoring and evaluation with the intention that the implementation remains effective. It is necessary to know people's beliefs about the prevention and control of COVID 19 and their motivation to engage in preventive behavior, such as maintaining personal hygiene, using personal protective equipment (PPE), keeping a distance, and staying at home [5]. Therefore, the psychological response and behavior of the public play an important role for the prevention and control of this pandemic.

The theory of the health belief model (HBM) is the most used by public health experts. It was introduced in 1950 by social researchers in the U.S. Public Health Service and proposed as an appropriate model for describing and predicting behavior related to public health. This is a psychological assessment theory that is usually used to predict preventive behavior towards a disease or health problem [6- 9].

The research that is related to the effectiveness of applying HBM theory to the formation of COVID-19 preventive behavior (CPB) has been widely reported, [10] indicating that perceived barrier and self-efficacy are two elements of HBM that have significant predictions on CPB among middle school students. Other findings also explain that HBM can be applied to understand CPB. Recognition of belief and health practice that are perceived is important for developing CPB strategies [11]. Various reported studies certainly have different results, so this study is aimed to provide a more reliable summary with a high level of evidence to estimate the scale of the effect of each component or perception of the HBM theory on Covid-19 prevention behavior. People's behavior of ignoring preventive measures is one of the factors that can have a strong influence on the spread of infection, which in recent weeks has recorded the number of death and infection rates.

## **2. METHODS**

### ***2.1 Searching strategy***

The Articles were searched through the database from January – November 2022 from various databases such as: PUBMED and Google Scholar. No attempt was conducted to specifically search for unpublished articles. The keywords used were “Health Belief Model”[Mesh] AND “covid preventive behavior”, AND “covid-19 preventive behavior”

### ***2.2 Inclusion criteria***

Articles were published in English or Indonesian. It was free full text or articles that can be downloaded for free (open-accessed). The study was a cross-sectional design, the results of the statistical analysis were multivariate which controlled for confounding factors marked by adjusted RR or B, results of multiple

linear regression, SE, and confidence intervals (SE and adjusted B are mandatory). The subjects of the research were at least 12 years old or high school students who were able to organize and determine behavior independently. Articles were published from 2019-2022. The correlation assessment between Health Belief Model and CPB must be valid and reliable and use a 3-stage HBM questionnaire.

### 2.3 Exclusion criteria

Articles were published in Chinese, Japanese, Spanish and Arabic. Subjects aged less than 19 years. The case study designs were quasi-experimental, Random Controlled trial, observational, case reports, and case controls.

### 2.4 Quality assessment strategy and data synthesis

All identified studies were independently assessed by all authors for relevance based on title and abstract. Afterwards, the full text version of all relevant possibilities, disagreements among the authors were decided through discussion forums. The filtered data were presented in a flow table according to PRISMA items (preferred items of systematic review and meta-analysis) [12], [13]. The study quality assessment used *The Joanna Briggs Institute critical appraisal tools for cross-sectional study* (JBI 2020). Articles that were not included in the qualitative criteria would be discussed in this article and used as a reference source

## 3. RESULT

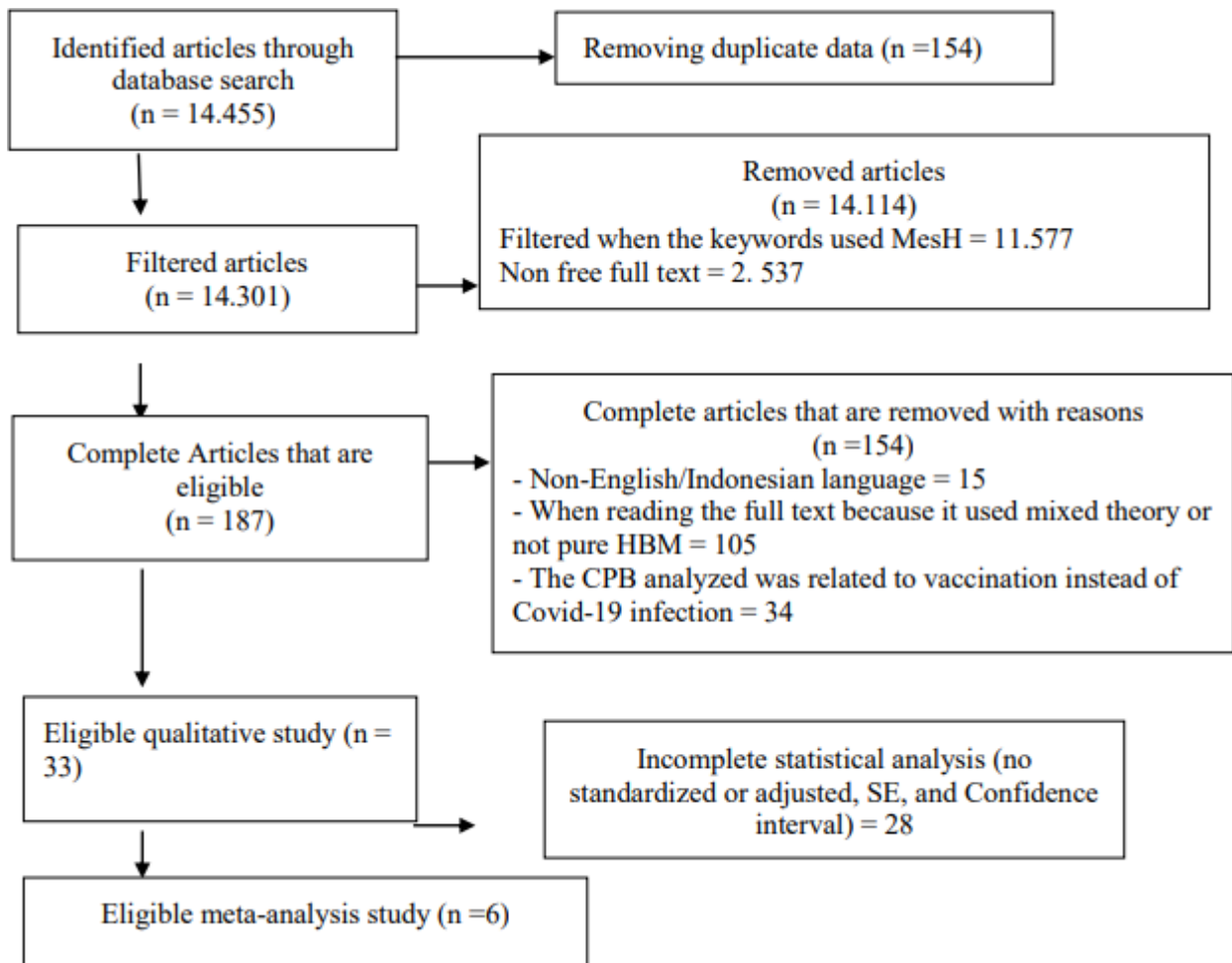


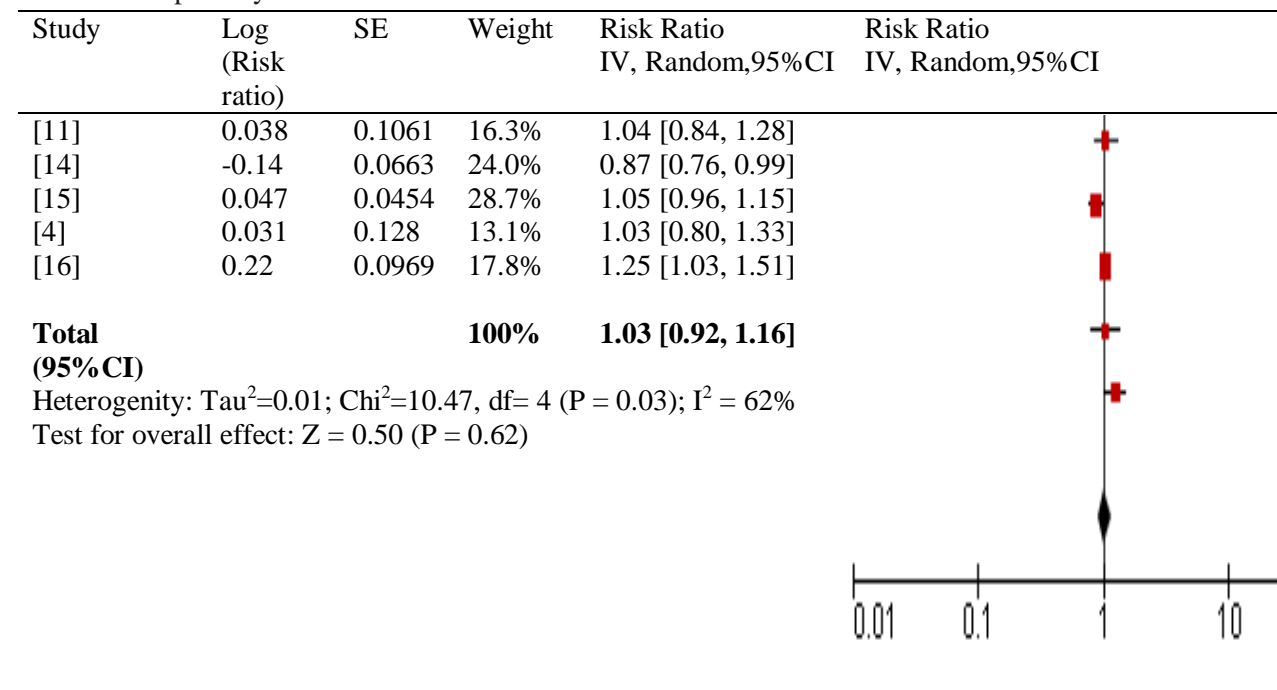
Figure 1. PRISMA research flow chart

Table 1. Summary of primary research results

Study	Country	Subjects	Measured CPB	Results summary
[11]	Saudi Arabia	General Public	<ul style="list-style-type: none"> <li>- Washing hands for 20 seconds</li> <li>- Touching eyes, nose and mouth with unwashed hands</li> <li>- The use of disinfectants when soap and water are not available</li> <li>- Covering mouth and nose when coughing or sneezing</li> <li>- Staying home when sick</li> <li>- Contact with an infected person</li> <li>- Lockdown compliance</li> </ul>	The HBM theory can be applied in forming covid-19 prevention behavior, especially perceived benefits and perceived barriers
[14]	Iran	797 teenagers	<ul style="list-style-type: none"> <li>- "General community quarantine and self-quarantine</li> <li>- Wearing a mask and gloves</li> <li>- Physical distancing and hand disinfection</li> <li>- Social distancing and not attending parties</li> </ul>	The HBM model has significant predictive power for preventing action against coronavirus disease in adolescents (Adj R = 0.46 p <0.001). Positive correlation on perceived benefit and perceived severity, while negative correlation on perceived susceptibility and perceived barrier
[15]	Khuzestan Province, Iran	1090 subjects aged $\geq 15$ years	<ul style="list-style-type: none"> <li>- Washing hands for 20 seconds after touching surfaces or after outdoors activity</li> <li>-Using a mask in public places</li> <li>- Refusing to attend crowds and parties</li> <li>- Covering mouth when sneezing or coughing</li> <li>-Disinfecting surfaces with disinfectant</li> <li>- Complying with social distancing</li> </ul>	The results showed that the construction of HBM such as perceived benefits, perceived barriers, and cues to action were significantly related to COVID-19 prevention behavior (p <0.05). Health information campaigns need to emphasize the benefits of preventive behavior, avoiding the possibility of disease, highlighting suggestions for overcoming obstacles, displaying various reminders on social media and focusing on men.
[4]	24 provinces in Iran	558 subjects of adults	<ul style="list-style-type: none"> <li>- Providing health items such as: masks and gloves</li> <li>- Maintaining a distance of at least one meter from people with symptoms of COVID-19.</li> </ul>	The HBM model in the Self-efficacy indicators, perceived barriers, and perceived benefits are the main determinants for prevention behavior of COVID-19 on subjects.
[16]	Golestan Province,	750 subjects aged at least	-No shaking hands and kissing	A one unit increase in the standard deviation from the score

	Iran	18 years old	- Washing hands when entering the house -Unnecessariness of leaving the house -Using a tissue or having proper etiquette for coughing -Washing hands with soap and water -Maintaining a distance of at least 1 meter.	of the self-confidence factor and perceived benefits increased the COVID-19 preventive behavior score by 0.22 and 0.17 units respectively. On the other hand, a one unit increase in the standard deviation score of the barrier factor will decrease the score of the preventive behavior from COVID-19 by 0.36 and 0.19 units respectively.
[10]	Ethiopia	370 subjects	- Washing hands -Maintaining the distance -Wearing a mask	The HBM concept shows utility in predicting CPB among students, where perceived barriers and self-efficacy emerged as significant predictors of CPB.

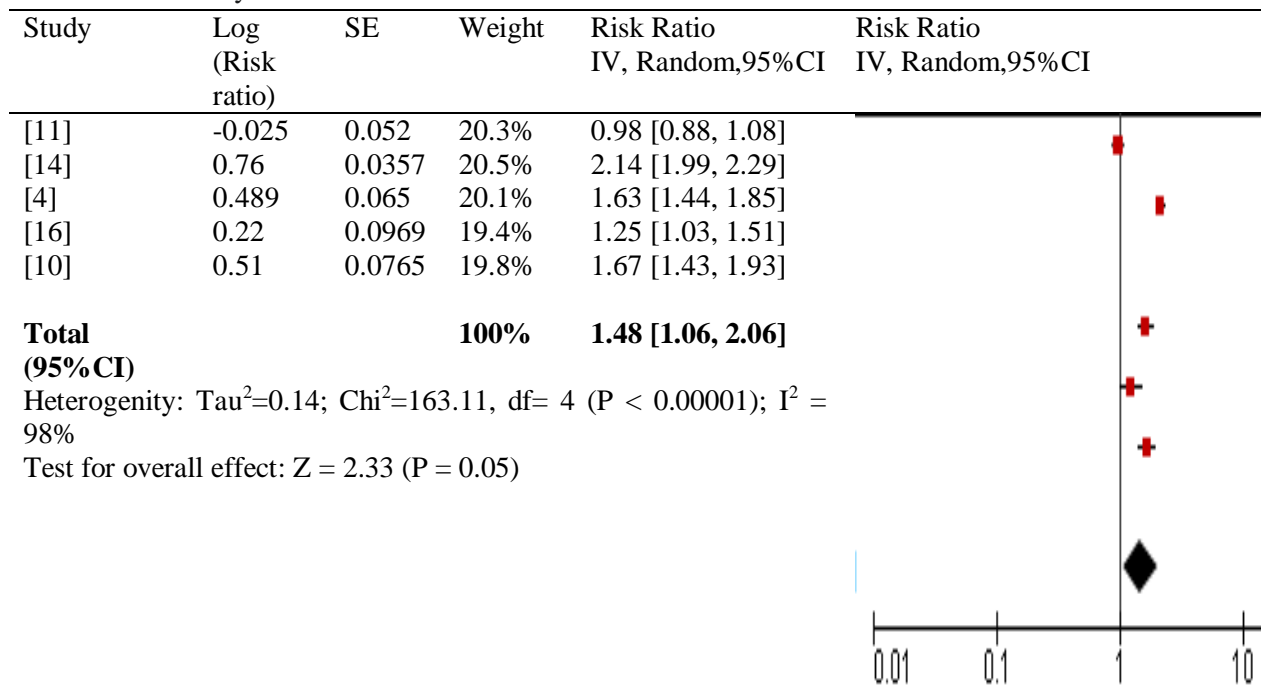
1. Susceptibility



**Figure 2.** forest plot for susceptibility

Subjective perception (susceptibility) of person who is at high risk of getting infected by Covid-19 will increase the possibility of forming a Covid-19 prevention behavior by 1.03 units compared to people with low susceptibility (RR: 1.03; 95%CI: 0.92 - 1.16; p value= 0.62).

2. Self-efficacy

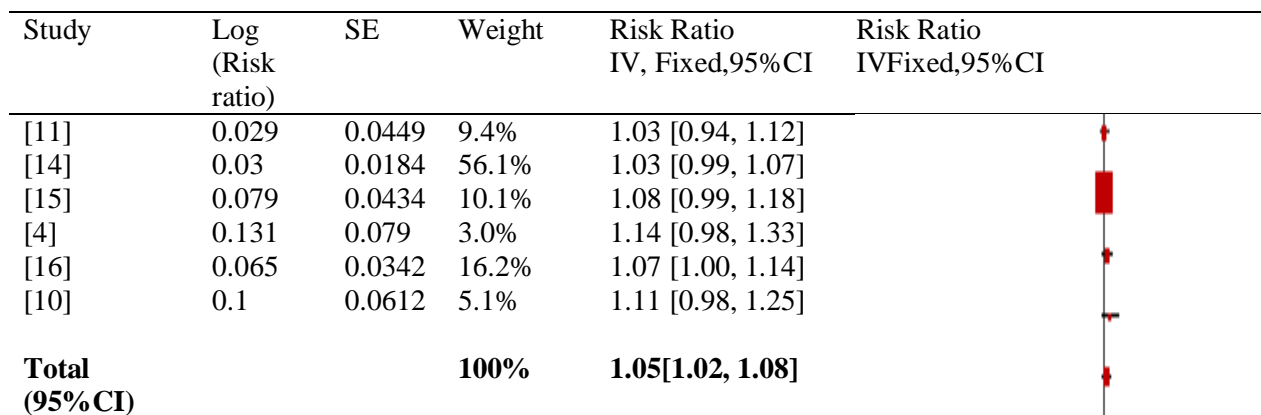


**Figure 3.** forest plot for self-efficacy

A person's high self-efficacy will increase the possibility of creating attitudes and behaviors for preventing Covid-19 1.48 units higher than person with low self-efficacy, this result is significant statistically (RR: 1.48; 95%CI: 1.06 - 2.06; p value= 0.05).

3. Severity

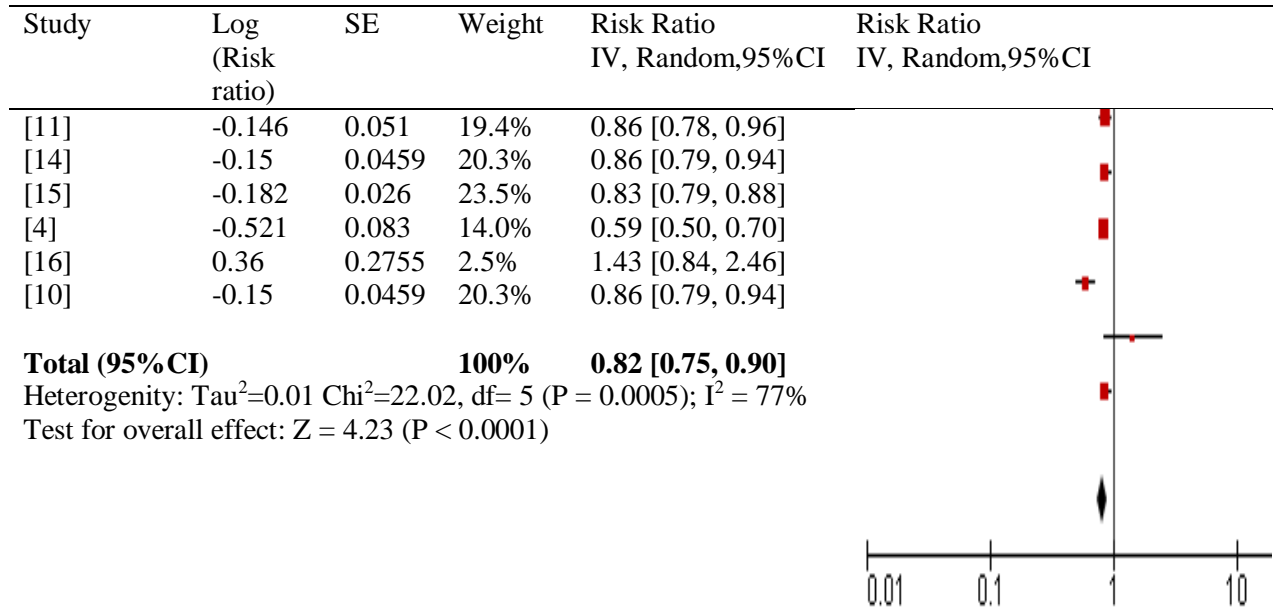
Severity is a belief of seriousness or severity of the disease. These results show that person who has a high perceived severity of Covid-19 is more likely to carry out Covid-19 prevention behavior 1.05 times and it is significant statistically (RR: 1.05; 95%CI: 1.02 - 1.08; p value = 0.0006).



Heterogeneity:  $\text{Chi}^2=3.72$ ,  $\text{df}= 5$  ( $P = 0.59$ );  $I^2 = 0\%$   
Test for overall effect:  $Z = 3.42$  ( $P = 0.0006$ )

**Figure 4.** forest plot for severity

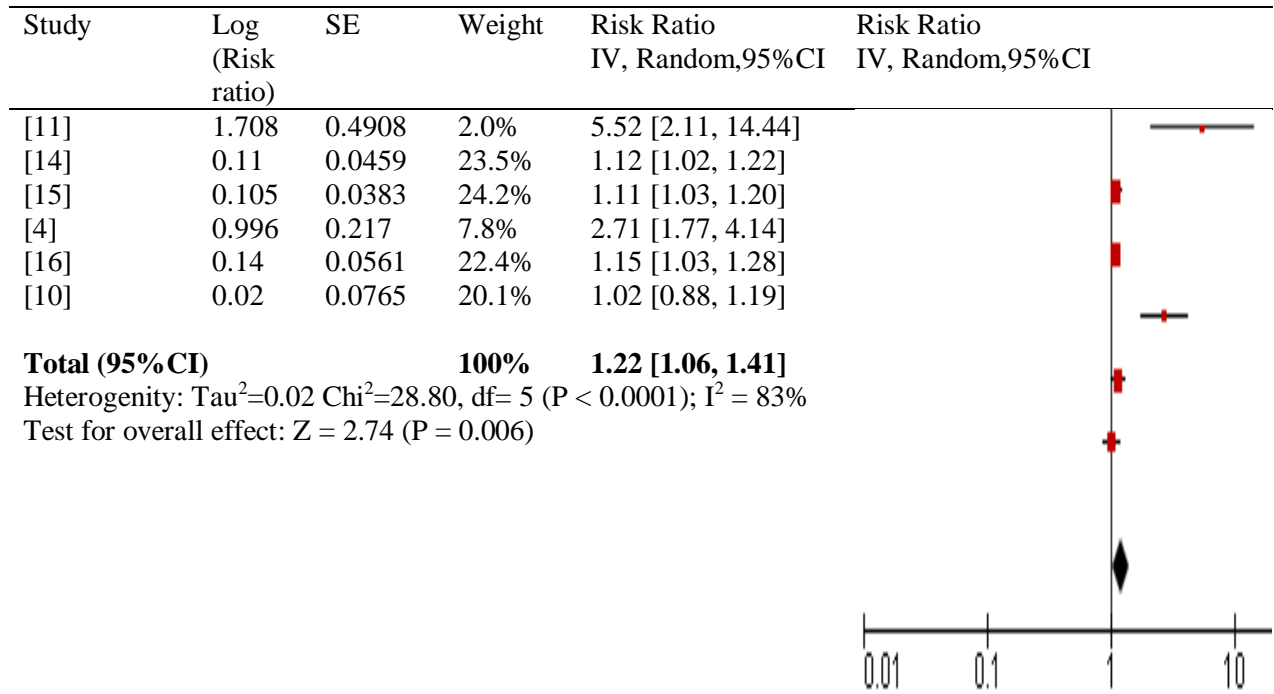
4. Perceived Barrier



**Figure 5.** forest plot for perceived barrier

Perceived barrier relates to one's presupposition about the level of social, personal, environmental, and economic obstacles to perform certain behaviors. This study shows inverse results between perceived barriers and the possibility of Covid-19 prevention behavior of 0.82 and it is significant statistically (RR: 0.82; 95%CI: 0.75 – 0.90; p value < 0.0001)

5. Benefit

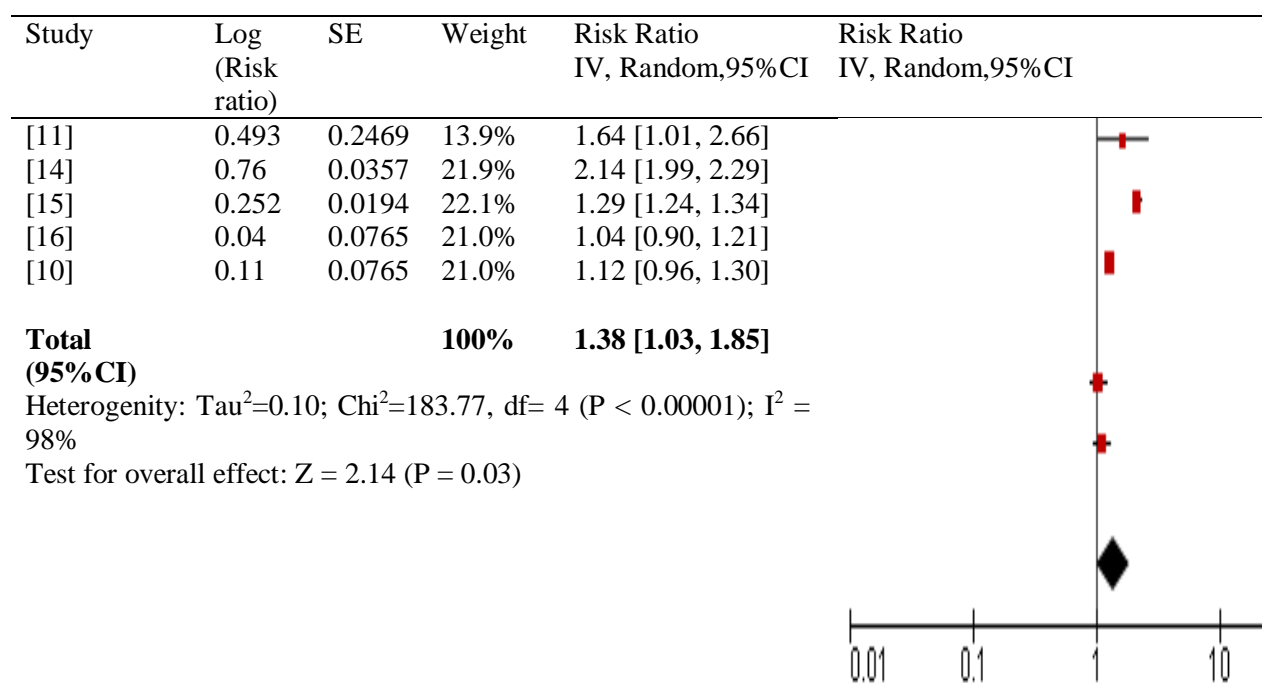


**Figure 6.** forest plot for benefit

Perceived benefit refers to a belief about the effectiveness of the actions, so that people who feel that Covid-19 preventive measures are effective are more likely to continue and maintain their behavior by 1.22 units compared to people who think that Covid-19 preventive measures will not have an effective impact. This result is significant statistically (RR: 1.22; 95%CI: 1.06 – 1.41; p value = 0.006)

6. Cues to action

Cues to action are signals to act or things that trigger people to change behavior. The higher the signal to act to prevent the transmission of covid-19, then 1.38 units more likely the person is to carry out various behaviors to prevent covid-19 and it is significant statistically (RR: 1.38; 95% CI: 1.03 – 1.85; p value < 0.00001).



**Figure 7.** forest plot for cues to action

**Table 2.** Critical assessment table

Assessment criteria	Study					
	(11)	(14)	(4)	(15)	(16)	(10)
Are the sample criteria explained?	Yes	Yes	Yes	Yes	Yes	Yes
Are the research subjects and settings described in detail?	Yes	Not detail	Not detail	Yes	Not detail	Yes
Are the outcome measures valid and reliable??	Yes	Yes	Yes	Yes	Yes	Yes
Is the study objective and does it use standard criteria in measuring the condition?	Yes	Not explained	Yes	Not explained	Yes	Yes
Are confounding factors	Yes	Yes	Yes	Yes	Yes	Yes



analyzed?							
Are the strategies for managing the confounding factors explained?	Yes	Yes	Not explained	Not explained	Yes	Yes	Yes
Are measured results valid and reliable?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is the statistical analysis appropriate?	Yes	Yes	Yes	Yes	Yes	Yes	Yes

#### 4. DISCUSSION

According to the results of our meta-analysis, only subjective perceptions are not significant in influencing the Covid-19 prevention behavior. Other indicators show results that are in accordance with the theory and are significant statistically. These results indicate that HBM can be used as one of the bases in efforts to establish Covid-19 prevention behavior.

##### 4.1 Self-efficacy

This meta-analysis results that the effect of self-efficacy in the formation of behavior to prevent the transmission of Covid-19 is almost one and a half times and it is significant statistically. Similar results in previous health emergencies such as Ebola and SARS-CoV1 were also reported by [17- 21] they explained that self-efficacy is important factors, and it influences the formation of prevention behavior against infections of infectious disease. With a high level of self-efficacy, a person has motivation and realize good environmental opportunity and manage this chance in an effort to maintain his own health from disease transmission. This can be seen from their efforts to maximize the use of personal protective equipment, comply with government programs, and use government assistance wisely and optimally.

##### 4.2 Severity

Previous researches that support the results of our meta-analysis explained that a person's vulnerability or perception of the seriousness of an illness that could impact health played an important role in changing behavior, especially during the Covid-19 pandemic, especially in increasing one's awareness to use masks [22]. Even during previous pandemic, it was reported that a person with higher awareness of the severity of influenza infection would increase the effectiveness of wearing a mask with the difference of maximum score: 10, mean: 7.8 and 7.3 compared to those with a lower perceived severity [23], [24]. Awareness of disease severity will also increase vaccine acceptance [25], even give a major impact of the completeness of vaccination [26].

##### 4.3 Perceived Benefit

Our study results the belief that person who feels that taking Covid-19 prevention will benefit him is more likely to continue and maintain his behavior. Previous research has also reported that perceived benefits can significantly affect up to 78% - 96.7% with prevention behavior related to COVID-19 [2], [27]. Based on the commonly asked questionnaires, the belief of perceived benefits is in preventive actions in the form of behaviors that prevent infection like wearing masks, preventing to meet or gather in public area, self-isolating when sick, and maintaining social distancing [28]. Moreover, the type of health service that is used has an impact on perceived benefits, someone who maintains to choose private health facilities tends to have a higher perceived benefit.

##### 4.4 Perceived Barrier

The inverse results between perceived barriers and the possibility of Covid-19 prevention behavior are very

logical. Person who feels that the acts of prevention are troublesome and cause many obstacles will find it difficult to get used to CPB. Some of the reported statements regarding barriers include: It takes too much time to implement CPB measures. Prevention such as disinfectants, slit lamp shields, gloves, masks, and hand sanitizers are not adequately provided by institutions and require a huge amount of money to provide them personally. Also, one cannot cancel the appointments [29].

#### **4.5 Cues to action**

Cues to act will trigger readiness to form appropriate behavior, so that various inputs regarding the effectiveness of Covid-19 prevention behaviors that are received by a person will lead to natural action cues which will eventually make a person maintain to CPB [30] even after the pandemic is over. According to the HBM theory, modifying several factors simultaneously like perception of disease, perception of behavior, and cues to act will lead a person to do a preventive healthcare that is recommended [31- 33]. The results of the same study were also reported by [34] that cues to act were positively correlated with CBP in the form of complying with government advice for physical-distancing and self-quarantine at home.

#### **4.6 Limitation**

The author realizes that meta-analysis has some biases and limitedness. The first is publication bias, it is a possibility of some articles that has a potential to be analyzed but those are not published. The second is statistical bias that has many possibilities that the studies are unpublished because the statistical results are not significant [35]. Third, the generalization of this study is generally conducted in Middle East and African countries. Also, the lack of research in European and Asian countries makes the research samples still imperfect. The fourth, studies included in this analysis were heterogeneous due to sample characteristics, design of study, and objective of study [36].

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