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Enhancing Content Validity of the Designed Hierarchy of Controls Instrument in Preventing Infectious Diseases on Construction Sites: A Multidimensional Approach

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ABSTRACT

The study aims to examine the content validity index (CVI) and Kappa statistics (K) with the Hierarchy of Controls instrument, which was made to reduce the risk of spreading infectious diseases on construction sites. The examination of validity that the investigation will assess will involve the item-level ICV (I-CVI), scale-level CVI (S-CVI), Probability of chance agreement (P_c), and Kappa value (K). The study employs a questionnaire evaluation form frequently used in quantitative research to gather data. Hence, the process of developing a research instrument that guarantees the accuracy of data necessitates the validation of a questionnaire. A panel of six experts in the field has been invited to offer suggestions to improve the questionnaire's validity. The instrument comprises a total of 36 items, which are divided into two distinct categories. All products within the two domains had an I-CVI of 0.67 to 1. In planning, implementation, and evaluation, the average score for relevance and clarity on the S-CVI was 0.94, which exceeded 0.80, indicating a strong content validity of the items. Consequently, the designed questionnaire is deemed suitable for implementation in an actual research investigation. Nevertheless, it is recommended that additional face validity assessments and pilot studies be conducted to test the instrument's validity, reliability, and usability. Hence, it is imperative to ensure that the development and validation validity processes are diligently conducted in order to effectively implement preventive measures against infectious diseases at the designated site.

1. Introduction

The construction industry is the largest and fastest-growing provider of the nation's economic growth. Generally, a building site is a parcel of ground where specialists can carry out their activities and projects. However, even though the building sector contributes to the production of the product, it is inappropriate for health and safety since diseases can cause several health problems. Compared to other industries, construction workers face more health risks [1].

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The COVID-19 epidemic demonstrates that construction workers are likely to contract infectious illnesses. Based on Amoah and Simpeh [2] and Heaney *et al.*, [3], construction workers recently encountered the continuous spread of community diseases during the COVID-19 outbreak. COVID-19, influenza, and other contagious diseases can spread to construction workers if they must work closely with other workers, clients, and visitors. Hence, the prevention approach on-site should be accomplished. For example, the hierarchy of controls is one theory that can be applied to prevent infectious diseases on-site.

In order to organize the necessary actions during each stage of a pandemic and review the supporting data, the hierarchy of controls is often used as a framework. This framework can be used in occupational safety and health to assess the relative efficacy of various risk-reduction measures and to guide the selection of workable and efficient solutions [4]. Therefore, the researcher applies this framework to study the infectious disease prevention approach among construction sites. The first step in this top-down strategy is to eliminate the risk. If the danger cannot be removed, the second step is to replace the fear [5]. The next step is to provide hazard isolation with engineering and administrative measures if it is not feasible or sufficient. In addition, it is advised to use face masks to prevent infectious diseases, such as Covid-19 [6]. In this study, a validation test should be carried out to validate the designed questionnaire based on the five levels of the Hierarchy of Controls. Validity measures how well the data collected covers the actual area of study [7]. In practice and research, validity is one of the most important things to consider when choosing and using an instrument. It is "the extent to which evidence and theory support how test scores should be interpreted given the proposed use of tests [8]." In other words, validity is how well the tool measures what it's supposed to measure. There are numerous validation tests of the questionnaire. For example, construct validity, content validity, face validity, and criterion validity [9]. For this study, the content validity index (CVI) and modified Kappa (K) will be applied to verify the validation of the designed questionnaire.

2. Literature Review

2.1 Previous Study of Strategies for Health and Safety Issues on Construction Sites

Due to the apparent risks of the industry, addressing the health and safety concerns of construction workers was a primary concern in many countries. Several methods and actions have been applied to enhance worker safety, but challenges remain for many reasons. Based on the Buniya *et al.*, [10] study, offering construction workers thorough safety training and education is necessary to ensure they know about potential dangers and the right way to stay safe. But, these training programs will be challenged by language barriers, turnover rates, and a lack of consistent enforcement [11]. Language and communication barriers were considered severe issues, especially for the construction workers in Singapore [12]. The barriers can be thought of as making it harder for an organisation to reach its goals [13]. Trajkovski and Loosemore's [14] study also agrees that construction workers, especially migrant workers, have a high risk of language issues. These workers might not understand what the site supervisors or managers conveyed about the hazard prevention actions.

According to Lette *et al.,* [15] and Abbas, Mneymneh, and Khoury [16] studies, strict safety rules and guidelines need to be followed to make the construction industry a safer place to work. Unfortunately, guaranteeing consistent compliance and adjusting to shifting circumstances can be challenging due to the lack of regulations, regulatory complexity, and emerging safety standards [17,18]. Moreover, personal protective equipment (PPE) is also one of the strategies for protecting site workers from danger. This idea was supported by the Ammad *et al.,* [19] study, which described using suitable PPE, such as harnesses, gloves, helmets, and safety glasses, to reduce injuries. PPE, such as face masks, is essential to prevent Covid-19 on construction sites [20]. However, due to discomfort, a lack of accessibility, or underestimating risks, workers may not continually wear or use PPE, which could result in ongoing incidents [21].

Furthermore, Safety Occupational and Administration and Health [22] recommended inspecting and auditing construction sites regularly to look for safety problems and take immediate measures, which can reduce the site worker's safety risk on-site. Inspection is essential on construction sites. For example, Agyekum *et al.,* [23] supported that companies with lower accident rates had more detailed safety practices, spent a lot of money on safety programmes, spent more time training employees on safety, had more structured safety inspections every month, and had more safety meetings. Tang *et al.,* [24] study mentioned that standardized safety training and periodic inspections are the two most crucial safety instruction techniques. Nevertheless, adequate and timely inspections may be hampered by resource limitations [25] and a shortage of trained inspectors [26].

Pandit *et al.,* [27] study was previously conducted to promote safety communication and collaboration among contractors, workers, and supervisors to address safety concerns collectively. Collaboration is essential because construction projects require collaboration, and project participants realize that knowledge and information sharing are vital to a successful contractual relationship [28]. Durdyev and Hosseini [29] argue that ineffective communication channels, power dynamics, and competing priorities hamper practical collaboration efforts.

Next, offering rewards, incentives, and recognition to organizations and people prioritizing and excelling at construction site safety can help prevent infectious diseases. Panekenan, Tumbuan, and Rumokoy [30] described a reward as a reward and punishment in work contexts, with the gift indicating acceptance of the behaviour and actions and the sentence indicating rejection. Hopefully, by implementing rewards and punishments, the corporation will improve employee performance and reach its final objective. For example, practising encouraging learners as a reward to increase their motivation is usual. In addition, it provides an efficient tool for ensuring that they adhere to best practices. Similarly, employer incentives for safe workplace conduct are an excellent method for increasing safety awareness in the workplace. However, the effectiveness of this strategy may be constrained by the emphasis on short-term financial gains, the lack of standardized reward systems, and the lack of consistent recognition processes [31].

The effectiveness of these strategies may be endangered by many elements, including insufficient enforcement, cultural attitudes toward safety, economic pressures, and a construction environment that is changing quickly. A comprehensive strategy that addresses these underlying issues is required to bring about more significant and long-lasting change. For instance, a systematic approach should be applied to ensure the safety of the site workers, like the hierarchy of controls theory.

2.2 Hierarchy of Construction Site Infection Control

The Safety Hierarchies are referred to as the Control Hierarchy. Rather than investigation, each level was formed through agreement or speculation [2]. A structure known as a hierarchy is one in which individuals or things are placed at distinct levels or ranks according to their relative significance [3]. Therefore, the progression of controls in the hierarchy of controls for the workplace is gradually strategic in order to reduce the impact of the identified risk in the workplace [32].

The hierarchy of controls is a blueprint used in health and safety at work to comprehend the relative efficacy of various risk reduction strategies and to decide how and where to implement suitable and efficient solutions [4]. The hierarchy of controls has five levels. Roy *et al.,* [33] study that a hierarchy-of-controls strategy can help to determine how to implement successful workplace preventive measures. For instance, level 1 refers to elimination, level 2 to substitution, level 3 to engineering controls, level 4 to administrative controls, and level 5 to personal protective equipment (PPE). This control system was ranked from the highest type of safety to the weakest level of protection, starting with the highest level [34].

Consequently, in order to validate the questionnaire created based on the five levels of the Hierarchy of Controls, a validity test must be conducted for this study. Validity is the degree to which a method accurately measures what it is supposed by Middleton [9]. For any research to be valid, these activities to improve the instruments and the pilot study are essential [35].

2.3 Content Validity

Content validity is the degree to which the parts of an evaluation tool are relevant and represent the constructs that are meant to be measured [36,37]. Any procedure in which each respondent is asked to answer the same set of questions in the same sequence concurrently is referred to as a questionnaire [38]. A questionnaire is a broad phrase [1]. The content validity index is a metric that can be used to represent evidence of content validity conducted by Shrotryia and Dhanda [39]. Therefore, the content validity index (CVI) and Kappa (K) statistics will be carried out to test the validation of the proposed questionnaire.

2.4 Kappa (K)

The kappa statistic indicates the fraction of agreement that remains after eliminating the possibility of agreement [40]. Researchers widely employ the content validity index (CVI) to evaluate content validity. Nevertheless, it does not consider the potential for inflated values due to chance agreement. Therefore, Kappa statistics play a vital role. It is a crucial addition to CVI because Kappa can provide information on the degree of agreement that cannot be explained by chance alone [41]. Based on the K values, the Kappa statistic (K) was calculated, and agreement was classified [42]. The formula calculation will be determined in Eq. (5) and Eq. (6). Muslim *et al.,* [43] applied the kappa value to determine whether each K value is excellent (0.75 – 1.00), good (0.60 – 0.74), fair (0.40 – 0.59), poor (0.40 – 0), or remove (0 – -1). Moreover, the questionnaire validation testing will be detailed in the following section.

3. Methodology

This study assessed the validity of justification measuring instruments based on the professional judgement of an expert panel to determine the content and question formulation validity of the questions. Hence, the evaluation of validity in this study incorporates experts' opinions. This investigation can be done in five steps to ascertain the validity index of the content in

Fig. **1** [44-46].

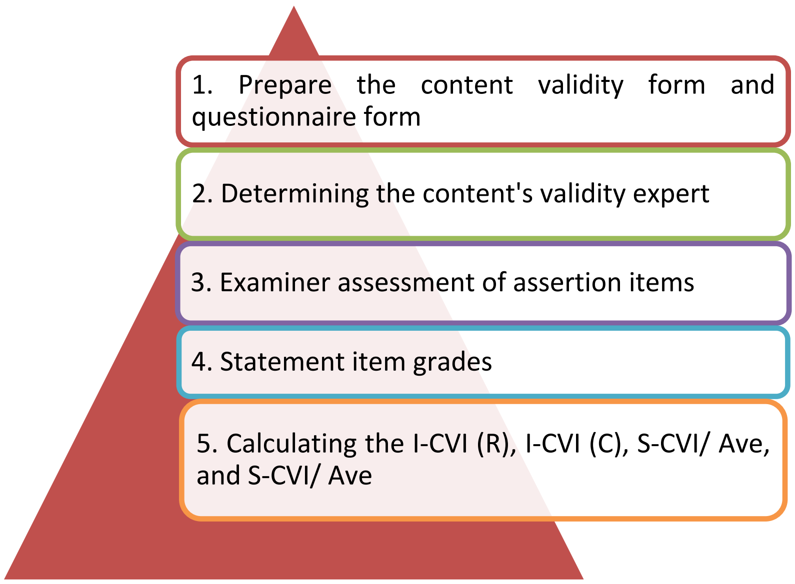

Fig. 1. Five steps of content validity index (CVI)

3.1 Prepare the Content Validity Form

The validity evaluation form is constructed so professionals can quickly interpret the questionnaire's content, make suitable evaluations, and recommend sentence corrections [44]. The degree of relevance and clarity assessment scales (
Table **1**) were applied to each item to determine its grade.

Table 1
Experts' Grading Scale of Degree of Relevance and Clarity

Degree of Relevance		Degree of Clarity	
1	not relevant	1	not clear
2	somewhat relevant	2	clear but need major revision
3	quite relevant	3	clear but need minor revision
4	very relevant	4	very clear

The content validity evaluation form consists of 36 items, of which 7 questions are demographic information and 29 questions about the hierarchy of controls theory to prevent infectious diseases on construction sites, as shown in 2.

Table 2
Design questionnaire

Questions	
Q1.	Gender
Q2.	Race
Q3.	Age
Q4.	Education Level
Q5.	Grade of the Company
Q6.	Types of Company
Q7.	Town/ City (Where is your company located?)
Q8.	Have your site workers been infected with infectious diseases before this?
Q9.	What types of infectious diseases have occurred among your site workers?
Q10.	Do you agree that the elimination level can prevent infectious diseases?

Q11.	Avoid touching asbestos, silica, pigeon, bat, and legionella bacteria on construction sites can prevent infectious diseases.
Q12.	Avoid touching unclean and hazardous sanitary facilities can prevent infectious diseases on construction sites.
Q13.	Sick workers should be banned from worksites to prevent the spread of the virus.
Q14.	Reducing exposure to harmful construction materials can prevent infectious diseases on construction sites.
Q15.	Work hours, lunch breaks, and workgroup assignments for employees are organized to reduce overlap and minimize the risk of infection among staff and participants.
Q16.	On construction sites, guest registration should be relocated and simplified, especially during a disease outbreak.
Q17.	Are you agree that the substitution level can prevent infectious diseases?
Q18.	Replaces hazardous components and working methods with safer alternatives can prevent infectious diseases on construction sites.
Q19.	Construction materials containing silica and asbestos can be replaced with less harmful and cancer-causing materials to reduce the cause of infectious disease on construction sites.
Q20.	In asbestos, silica, and pigeon or bat droppings-contaminated areas, construction workers should use wet materials instead of dry sweeping, shoveling, or other dry-cleaning procedures before and during cutting, crushing, or other acts that release dust or debris into the air.
Q21.	Reducing workplace respirable silica exposure will dramatically reduce TB prevalence in exposed populations.
Q22.	Sandstone grinding wheels (which cause severe respiratory sickness due to silica conversion to synthetic wheels like aluminum oxide) can prevent infectious diseases on construction sites.
Q23.	Do you agree that engineering controls can prevent infectious diseases?
Q24.	Along with social distancing, putting plexiglass, stainless steel, and other barriers between construction workers, contractors, owners, and others will help avoid diseases at work, according to OSHA.
Q25.	On building sites, clean, gender specific restrooms with handwashing facilities reduce infectious diseases caused by poor sanitation.
Q26.	Designing and installing welfare facilities for site workers can prevent infectious diseases on construction sites.
Q27.	Are you agree that the level of administrative control can prevent infectious diseases?
Q28.	Providing specialized training on risks to site workers can prevent infectious diseases on construction sites.
Q29.	Regular inspections and adjustments are required to ensure employees adhere to policies and procedures.
Q30.	Employers must train workers on biological dangers connected with construction occupations, preventive methods to control illness spread, resources to support recovery, and pre-and post-exposure care.
Q31.	Signboards that warn of biological hazards and remind workers of safety requirements, social distancing, hand washing, and using PPE and respiratory protection during construction lower the incidence of infectious diseases.
Q32.	Employers may check, disinfect, and create a safe workplace by encouraging workers to wash their hands before and after using the restroom.
Q33.	Remind site workers to drain water systems before renovating or demolishing legionella-prone structures.
Q34.	Instruct site workers to empty containers and other mosquito breeding storage facilities in a mosquito-prone building site and use insect repellent.
Q35.	Are you agree that PPE can prevent infectious diseases?
Q36.	Personal protective equipment includes safety helmets, noise-reducing earmuffs, and gloves that can prevent infectious diseases on construction sites.

3.2 Determining the Content's Validity Expert

Content vetting requires at least two experts, but most recommend six [47]. On the other hand, based on Akmal *et al.,* [8] study, it was suggested that five to ten experts were involved in the validation procedure. As a result, this study has six experts regarding the recommendations (5-10) and the author's experience. This study's content testing is conducted with the assistance of six specialists in their respective domains. These selected experts comprised three professors, one scientist, one senior civil engineer, and one proofreader. The selected six experts are shown in Table 3.

Table 3
List of the chosen experts of this study

Panel	Position	Years of experience	Organization	Type of validation
1.	Professor	11 years	HBP, USM	Content validity
2.	Professor	6 years	HBP, USM	Content validity
3.	Professor	5 years	HBP, USM	Content validity
4.	Scientist	5 years	Pan-United	Content validity
5.	Senior Civil Engineer	15 years	Bahagian Pengurusan Korporat & Strategik Cawangan Kejuruteraan Awan & Struktur Ibu Pejabat JKR Malaysia, Kuala Lumpur	Content validity
6.	Proofreader	5 years	Freelance author in heritage building conservation	Content validity

3.3 Examiner Assessment of Assertion Items

The researchers will conduct a content validity evaluation of the questionnaire using online platforms and email distribution. The researcher offers information about the conducted research and asks experts for authorization to serve as validators. Before analyzing the constructed questions, the researcher discusses the study's research questions, objectives, and goals. Experts are requested to remark on the significance of each item and to enhance its grammar and content [44]. The researchers also provided a 4-point Likert scale for the expert to evaluate relevance and clarity. At the bottom of the column, experts can comment on each questionnaire item using their respective areas of expertise.

3.4 Statement Item Grades

The relevance measure utilized in this study was a 4-point Likert scale. The ranking range is between 1 and 4, with the following details: 1 = not relevant, 2 = not relevant, 3 = somewhat relevant, and 4 = very relevant. Ratings 1 and 2 are considered invalid, but ratings 3 and 4 are valid [7,47]. In addition, a 4-point Likert scale was utilized for the clarity rating ranges. 1 = not clear, 2 = clear but need major revision, 3 = clear but requires minor revision, and 4 = very clear [48]. According to Kulsum and Suryadi [45], using expert opinion, I-CVI, S-CVI / AVE, and S-CVI / UA were calculated to evaluate the content validity. Each question will assess relevancy and provide clarification. According to Shrotryia and Dhanda [39], the I-CVI for six experts should not be lower than 0.78 for products with I-CVI. Alternatively, according to Mohammed *et al.,* [49], the S-CVI results scale suggests that S-CVI should have a minimum acceptance threshold of 0.80.

3.5 Calculating the I-CVI (R), I-CVI (C), S-CVI/ Ave, and S-CVI/ UA

The I-CVI (R), I-CVI (C), S-CVI/ Ave, and S-CVI/ UA formulas are listed in the following equation [8,45-50]. The formula for I-CVI (R) [item-level content validity index (Relevance)] is presented by Eq. (1) as follows:

$$1 - CVI\ (R)\ = \frac{Nr}{N} \tag{1}$$

where Nr is the number of experts voting Eq. (3) or Eq. (4), and N is the total number of recruited experts. Second, the formula for I-CVI (C) [item-level content validity index (Clarity)] is presented by Eq. (2) as follows:

$$1 - CVI\ (C)\ = \frac{Nr}{N} \tag{2}$$

where Nr is the number of experts voting Eq. (3) or Eq. (4), and N is the total number of recruited experts. Thus, the S-CVI/Ave [scale-level content validity index based on the average method] can be calculated based on Eq. (3).

$$S - CVI/\ Ave\ = \frac{\sum I - CVI}{Number\ of\ Test\ Items} \tag{3}$$

where $\sum I - CVI$ is the item-level content validity index. Next, the formula for S-CVI/UA [scale-level content validity index based on the universal agreement method] is presented by Eq. (4) as follows:

$$S - CVI/\ UA\ = \frac{\sum UA\ scores}{Number\ of\ Test\ Items} \tag{4}$$

Furthermore, the researchers also test for K [Kappa statistics]. The kappa statistic (K) measures experts' agreement on an item's relevance and clarity [50]. As part of the calculation for the Kappa statistic (K), the chance agreement probability (P_c) will be determined. The formula P_c [Probability of chance agreement] is presented by Eq. (5) as follows:

$$P_c\ =\ [\frac{N!}{A!\ (N - A)!}]\ \times\ 0.5^N \tag{5}$$

where N represents the number of experts, and A represents the number of experts who agreed. Finally, the collected data is based on the items and equation before this to test the K [Kappa statistics]. K [Kappa statistics] is presented by Eq. (6) as follows:

$$K\ = \frac{(I - CVI)\ -\ P_c}{1\ -\ P_c} \tag{6}$$

where P_c is the probability of chance agreement, and I-CVI is the Item-level content validity index.

4. Results and Discussion

The purpose of the discussion section is to interpret and analyse the results of the Content Validity Index (CVI) calculations and the associated Kappa statistics to conclude the questionnaire's effectiveness in measuring relevance and clarity. The Item-Level Content Validity Index (I-CVI) evaluation revealed that most of the 36 questionnaire items (

) met both the relevance and clarity thresholds. This indicates that expert reviewers found the language and intent of these items to be relevant and clear. A notable exception was found with Item 2, which received a relevance score 0.67 on the I-CVI. This score is lower than the established minimum of 0.78 [17]. Consequently, it is necessary to revise Item 2 to increase its relevance and content validity.

The Kappa statistics (K) were utilized to determine the level of consensus among reviewers regarding the items' relevance and clarity. While most items demonstrated excellent agreement, Item 2's Kappa score for relevance was average. This indicates that the wording or intent of Item 2 may be causing reviewers confusion, necessitating a thorough review and possible revision. The relevance and clarity of the Scale Content Validity Index (S-CVI) were then evaluated. Both S-CVI/Ave scores exceeded the minimum acceptable level of 0.80 [1], reaching a remarkable 0.94. This indicates that most questionnaire items have a high level of content validity in terms of relevance and clarity.

Based on these findings, it is possible to conclude that the questionnaire is generally effective at measuring relevance and clarity. Strong S-CVI/Ave scores validate the instrument's content validity. Most items are suitable for subsequent testing phases, such as reliability evaluation. However, the identified issues with the relevance of Item 2 and the fair Kappa score for the relevance of Item 2 require attention. It is likely that addressing these concerns through careful revision will result in a questionnaire that is more robust and accurate. It is essential to recognize that this study has some limitations. The outcomes depend on the particular group of expert reviewers and the inherent subjectivity of content validity evaluation. In addition, the scope of the study did not include any other validity or reliability assessments besides content validity.

Moreover, the Hierarchy of Controls is a systematic approach to mitigating risks in various industries, including construction, to prevent occupational hazards such as infectious diseases. Incorporating the Content Validity Index (CVI) and Kappa statistics into implementing the Hierarchy of Controls can significantly enhance its effectiveness in preventing infectious diseases on construction sites. CVI ensures that hierarchy control questions match this study construction site infectious disease risks. It confirms that the controls address construction-specific challenges and disease transmission modes, improve disease prevention strategies, and are suitable for conducting a research study. At the same time, the Kappa statistic measures the concordance and clarity of communication regarding the chosen controls. It is essential to effectively communicate control measures so selected experts can understand and verify the designed questions.

Table 4
Result of the Calculation of I-CVI (R), I-CVI (C), S-CVI/ Ave, S-CVI/ UA, and Kappa Statistics (K)

Items	Expert in agreement (R)	I-CVI (R)	UA (R)	Y/ N	P_c (R)	K (R)	Interp.	Expert in agreement (C)	I-CVI (C)	UA (C)	Y/ N	P_c (C)	K (C)	Interp.
1	5	0.83	0	Y	0.09	0.82	Excellent	6	1.00	1	Y	0.02	1.00	Excellent
2	4	0.67	0	N	0.23	0.56	Fair	6	1.00	1	Y	0.02	1.00	Excellent
3	5	0.83	0	Y	0.09	0.82	Excellent	6	1.00	1	Y	0.02	1.00	Excellent
4	6	1.00	1	Y	0.02	1.00	Excellent	6	1.00	1	Y	0.02	1.00	Excellent
5	6	1.00	1	Y	0.02	1.00	Excellent	5	0.83	0	Y	0.09	0.82	Excellent
6	6	1.00	1	Y	0.02	1.00	Excellent	6	1.00	1	Y	0.02	1.00	Excellent
7	6	1.00	1	Y	0.02	1.00	Excellent	5	0.83	0	Y	0.09	0.82	Excellent
8	5	0.83	0	Y	0.09	0.82	Excellent	5	0.83	0	Y	0.09	0.82	Excellent
9	5	0.83	0	Y	0.09	0.82	Excellent	5	0.83	0	Y	0.09	0.82	Excellent
10	6	1.00	1	Y	0.02	1.00	Excellent	6	1.00	1	Y	0.02	1.00	Excellent
11	5	0.83	0	Y	0.09	0.82	Excellent	5	0.83	0	Y	0.09	0.82	Excellent
12	6	1.00	1	Y	0.02	1.00	Excellent	6	1.00	1	Y	0.02	1.00	Excellent
13	6	1.00	1	Y	0.02	1.00	Excellent	6	1.00	1	Y	0.02	1.00	Excellent
14	6	1.00	1	Y	0.02	1.00	Excellent	6	1.00	1	Y	0.02	1.00	Excellent
15	6	1.00	1	Y	0.02	1.00	Excellent	6	1.00	1	Y	0.02	1.00	Excellent
16	5	0.83	0	Y	0.09	0.82	Excellent	5	0.83	0	Y	0.09	0.82	Excellent
17	6	1.00	1	Y	0.02	1.00	Excellent	6	1.00	1	Y	0.02	1.00	Excellent
18	5	0.83	0	Y	0.09	0.82	Excellent	5	0.83	0	Y	0.09	0.82	Excellent
19	6	1.00	1	Y	0.02	1.00	Excellent	6	1.00	1	Y	0.02	1.00	Excellent
20	6	1.00	1	Y	0.02	1.00	Excellent	6	1.00	1	Y	0.02	1.00	Excellent
21	6	1.00	1	Y	0.02	1.00	Excellent	6	1.00	1	Y	0.02	1.00	Excellent
22	5	0.83	0	Y	0.09	0.82	Excellent	5	0.83	0	Y	0.09	0.82	Excellent
23	5	0.83	0	Y	0.09	0.82	Excellent	5	0.83	0	Y	0.09	0.82	Excellent
24	6	1.00	1	Y	0.02	1.00	Excellent	6	1.00	1	Y	0.02	1.00	Excellent
25	6	1.00	1	Y	0.02	1.00	Excellent	6	1.00	1	Y	0.02	1.00	Excellent
26	6	1.00	1	Y	0.02	1.00	Excellent	6	1.00	1	Y	0.02	1.00	Excellent
27	6	1.00	1	Y	0.02	1.00	Excellent	6	1.00	1	Y	0.02	1.00	Excellent
28	6	1.00	1	Y	0.02	1.00	Excellent	6	1.00	1	Y	0.02	1.00	Excellent
29	6	1.00	1	Y	0.02	1.00	Excellent	6	1.00	1	Y	0.02	1.00	Excellent
30	6	1.00	1	Y	0.02	1.00	Excellent	6	1.00	1	Y	0.02	1.00	Excellent
31	6	1.00	1	Y	0.02	1.00	Excellent	6	1.00	1	Y	0.02	1.00	Excellent
32	6	1.00	1	Y	0.02	1.00	Excellent	6	1.00	1	Y	0.02	1.00	Excellent

Table 4
Result of the Calculation of I-CVI (R), I-CVI (C), S-CVI/ Ave, S-CVI/ UA, and Kappa Statistics (K)

Items	Expert in agreement (R)	I-CVI (R)	UA (R)	Y/ N	P_c (R)	K (R)	Interp.	Expert in agreement (C)	I-CVI (C)	UA (C)	Y/ N	P_c (C)	K (C)	Interp.
33	6	1.00	1	Y	0.02	1.00	Excellent	6	1.00	1	Y	0.02	1.00	Excellent
34	6	1.00	1	Y	0.02	1.00	Excellent	5	0.83	0	Y	0.09	0.82	Excellent
35	5	0.83	0	Y	0.09	0.82	Excellent	5	0.83	0	Y	0.09	0.82	Excellent
36	5	0.83	0	Y	0.09	0.82	Excellent	5	0.83	0	Y	0.09	0.82	Excellent
	S-CVI/Ave	0.94						S-CVI/Ave	0.94					
	S-CVI/ UA		0.67					S-CVI/ UA		0.67				

5. Conclusions

In terms of construction site safety and the prevention of infectious diseases, the integration of the Content Validity Index (CVI) and Kappa statistics within the framework of the Hierarchy of Controls is an effective strategy. The strategic alignment between these methodologies increases the efficacy of disease prevention strategies by ensuring that control measures are crucial, clear, thoroughly comprehended, and consistently implemented. When the CVI is used, it confirms that the controls in the hierarchy are appropriate for the unique infectious disease risks on construction sites. This validation process improves the effectiveness of the chosen controls by addressing problems and ways of spreading diseases unique to each site. The use of Kappa statistics helps people communicate and understand each other better. By looking at how clear and consistent the questionnaire was developed, this method ensures that the experts chosen for this study are clearer and provide insightful feedback for validating the designed question. In conclusion, the Hierarchy of Controls is a robust model for preventing infectious diseases and ensuring safe construction sites. Hence, the content validity index (CVI) and Kappa statistics methods can help to ensure the quality of the developed question for real data collection.

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