



## Knowledge and Behavior of Traditional Vendors Regarding The Use of Borax (Sodium Tetraborate) in Cilok Snacks in The Taman Surawisesa Kawali Area

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### ABSTRACT

**Introduction:** Food safety is essential for public health. However, some street foods still contain prohibited food additives such as borax, which can harm consumers, especially children

**Objective:** The objective is to assess the level of knowledge and behavior of cilok vendors regarding the use of food additives, particularly borax, the use of which has been strictly prohibited by the government.

**Method:** The approach taken in this study is “socio-legal research” due to its multidisciplinary or interdisciplinary nature, and thus includes case studies and field studies. The research was conducted in May 2026 with a population of cilok vendors in the Surawisesa Kawali park area, using total sampling of 16 individuals.

**Result** Regarding awareness of the ban on the use of borax, 14 cilok vendors (87.5%) were aware of it, while the other 2 vendors (12.5%) were not. Regarding compliance with the ban on the use of borax, 9 vendors complied, while the other 7 vendors did not.

**Conclusion:** Education provided by officials to food vendors is crucial so that vendors can properly select and sort raw materials for production. Producers must recognize their responsibility—which goes beyond simply pursuing profit and prioritize the provision of safe food above all else. Food safety must be the guiding principle for producers, supported by government oversight and consumers’ ability to recognize the signs of unsafe street food.

**Keywords:** Borax, food safety, knowlage, Traditioal Vendors

### Introduction

Food is a basic human need and an essential determinant of public health. The availability of safe, nutritious, and quality food contributes to the development of healthy and productive human resources. Therefore, food safety has become a global public health priority because unsafe food may result in foodborne diseases, malnutrition, and economic losses. In Indonesia, the right to obtain safe food is protected through Law No. 18 of 2012 concerning

Food, while hygiene and sanitation requirements for street food are regulated by the Undang-Undang Dasar Negara Republik Indonesia Tahun 1945 No. 942/MENKES/SK/VII/2003, emphasizing that food production and distribution must ensure consumer safety (Indonesian Ministry of Health. (2003)

Street food plays an important role in providing affordable and accessible food for communities. However, inadequate hygiene practices and the misuse of prohibited food additives remain major food safety concerns, particularly in low- and middle-income countries. The World Health Organization (WHO) emphasizes that food handlers should apply the Five Keys to Safer Food to reduce the risk of foodborne diseases and improve food safety throughout the food chain (World Health Organization [WHO], 2022).

One hazardous substance that is still illegally used in traditional foods is borax (sodium tetraborate). Borax is an industrial chemical that should not be used in food because long-term exposure may cause adverse health effects, including gastrointestinal disorders, liver and kidney damage, and neurological impairment. Consequently, the Indonesian government prohibits its use in food products through the Regulation of the Minister of Health No. 33 of 2012 concerning Food Additives (Ministry of Health of the Republic of Indonesia, 2012).

Food poisoning continues to be a significant public health problem in Indonesia. According to the National Agency of Drug and Food Control (BPOM), there were 219 suspected food poisoning outbreaks in 2025 involving 21,084 victims across 140 districts/cities in 31 provinces. Approximately 17% of these outbreaks were associated with chemical contamination, while street foods accounted for a considerable proportion of foodborne incidents, indicating the need for improved food safety monitoring and vendor education (BPOM, 2025).

Previous evidence has shown that the knowledge and behavior of street food vendors are closely associated with food safety practices. A systematic review and meta-analysis by Desye et al. (2023) involving 2,989 street food vendors found that only 62% had good food safety knowledge and 51% demonstrated good food safety practices. The study also reported that food safety training and adequate knowledge significantly improved hygienic food handling practices, highlighting the importance of continuous education for food vendors.

Despite increasing attention to food safety, studies specifically examining the knowledge and behavior of traditional *cilok* vendors regarding the prohibition of borax remain limited, particularly in rural areas of Indonesia. Understanding vendors' knowledge and compliance is important because effective implementation of food safety regulations depends not only on legal enforcement but also on behavioral change among food producers. Therefore, this study aimed to assess the knowledge and behavior of traditional *cilok* vendors regarding the use of borax in the Surawisesa Kawali area using a socio-legal approach.

### **Objective**

This study aimed to assess the knowledge and behavior of traditional *cilok* vendors regarding the use of borax as a prohibited food additive in the Surawisesa Kawali area. The study also evaluated vendors' exposure to food safety education, halal certification status, and their association with compliance toward the prohibition of borax use.

## Method

### ***Design and setting***

This study employed a socio-legal research approach using a descriptive cross-sectional design. The socio-legal approach integrates legal analysis with social science perspectives to examine the implementation of legal regulations within community practices. This design was selected to assess the knowledge and behavior of traditional *cilok* vendors regarding the prohibition of borax use as a food additive while considering the implementation of food safety regulations in daily food production practices. The study was conducted in May 2026 in the Surawisesa, Kawali, Ciamis, West Java, Indonesia, which is one of the locations where traditional *cilok* vendors are concentrated..

### ***Population and sampling***

The target population consisted of all traditional *cilok* vendors operating in the Surawisesa Park area during the study period. Because the total number of vendors was relatively small, a total sampling technique was applied, resulting in 16 respondents being included in the study. This sampling technique ensured that every eligible vendor participated in the research and minimized sampling bias. Inclusion criteria included vendors who were actively selling *cilok* during the study period and were willing to participate after receiving an explanation of the study objectives.

### ***Instrument and measurement***

Primary data were collected using a structured questionnaire developed by the researchers based on Indonesian food safety regulations and previous literature concerning food additives and food safety. The questionnaire consisted of several sections, including respondent characteristics, production practices, knowledge regarding the prohibition of borax use, food safety education received, halal certification status, and vendors' behavior related to compliance with food safety regulations. Knowledge was measured using questions regarding awareness of borax prohibition, while behavior was assessed based on vendors' compliance with the prohibition of borax use in food production. Secondary data related to food safety regulations and previous reports were obtained from government documents and the local health center.

### ***Data collection and analysis***

Data collection was conducted through direct interviews with respondents using the structured questionnaire after obtaining informed consent. Supporting secondary data were collected from the local Public Health Center (Puskesmas Kawali) and relevant government documents. Data were checked for completeness before analysis. Descriptive (univariate) statistical analysis was performed to summarize respondents' characteristics and study variables. The findings are presented as frequencies and percentages in tables to describe vendors' knowledge, behavior, production practices, food safety education, and halal certification status. Cross-tabulation was also performed to describe the distribution of

knowledge, food safety education, and halal certification according to vendors' behavior regarding compliance with the prohibition of borax use.

### Result

A total of 16 traditional *cilok* vendors participated in this study. The respondents were all vendors operating in the Surawisesa Park area, Kawali District, Ciamis Regency, during the study period. The results describe vendors' production practices, knowledge regarding the prohibition of borax, exposure to food safety education, halal certification status, and their behavior toward compliance with food safety regulations.

Table 1. Distribution of respondents according to production practices

| Variables                      | f  | %    |
|--------------------------------|----|------|
| <b>Production Practice</b>     |    |      |
| Self-produced                  | 11 | 68.8 |
| Purchased from other producers | 5  | 31.2 |

Table 1 presents the distribution of respondents according to their production practices. Most respondents (68.8%) produced *cilok* independently, whereas (31.2%) obtained *cilok* from other producers for resale. This finding indicates that the majority of vendors were directly involved in the food production process and therefore had greater responsibility for selecting ingredients and ensuring food safety.

Table 2. Knowledge regarding the prohibition of borax use

| Variables        | f  | %    |
|------------------|----|------|
| <b>Knowledge</b> |    |      |
| Aware            | 14 | 87.5 |
| Not aware        | 2  | 12.5 |

Table 2, most respondents (87.5%) were aware that the use of borax in food is prohibited, whereas (12.5%) reported that they were unaware of the regulation. These findings suggest that awareness of food safety regulations among vendors was relatively high, although a small proportion still lacked knowledge regarding the prohibition of borax use.

Table 3. Distribution of respondents according to food safety education

| Variables                    | f  | %    |
|------------------------------|----|------|
| <b>Food Safety Education</b> |    |      |
| Received education           | 1  | 6.3  |
| Never received education     | 15 | 93.7 |

Table 3. Only one respondent (6.3%) had ever received food safety education from health personnel, while 15 respondents (93.7%) had never participated in such educational activities. This result indicates that food safety education among traditional *cilok* vendors in the study area remains very limited.

Table 4. Halal certification status

| Variables                  | f | %    |
|----------------------------|---|------|
| <b>Halal Certification</b> |   |      |
| Certified                  | 7 | 43.3 |
| Not certified              | 9 | 56.2 |

Tabel 4. Regarding halal certification, (43.8%) of vendors had obtained halal certification, whereas (56.2%) had not yet received certification.

Table 5. Association between knowledge and vendors' behavior

| Variables        | Behavior |      | Total |
|------------------|----------|------|-------|
|                  | Good     | Poor |       |
| <b>Knowledge</b> |          |      |       |
| Aware            | 9        | 5    | 14    |
| Not Aware        | 0        | 2    | 2     |

Cross-tabulation analysis showed that among the 14 vendors who were aware of the prohibition of borax, 9 (64.3%) demonstrated good behavior, while 5 (35.7%) demonstrated poor behavior. In contrast, both vendors who lacked knowledge of the prohibition exhibited poor behavior. These findings suggest that better knowledge was associated with better compliance regarding the prohibition of borax use.

Table 6. Association between food safety education and vendors' behavior

| Variables                    | Behavior |      | Total |
|------------------------------|----------|------|-------|
|                              | Good     | Poor |       |
| <b>Food Safety Education</b> |          |      |       |
| Received                     | 1        | 0    | 1     |
| Never received               | 8        | 7    | 15    |

The only respondent who had received food safety education demonstrated good behavior. Among vendors who had never received food safety education, 8 exhibited good behavior and 7 exhibited poor behavior. Although the number of respondents who received education was limited, these findings indicate the potential importance of educational interventions in improving food safety practice

Table 7. Association between halal certification and vendors' behavior

| Variables                  | Behavior |      | Total |
|----------------------------|----------|------|-------|
|                            | Good     | Poor |       |
| <b>Halal Certification</b> |          |      |       |
| Certified                  | 7        | 0    | 7     |
| Not certified              | 2        | 7    | 9     |

Among vendors who possessed halal certification, all respondents (100%) demonstrated good behavior. Conversely, among those without halal certification, only 2 demonstrated good behavior, while 7 exhibited poor behavior. This finding suggests that halal certification may be associated with better compliance with food safety practices

#### Discussion

This study assessed the knowledge and behavior of traditional *cilok* vendors regarding the use of borax in the Surawisesa Kawali area using a socio-legal approach. Overall, the findings indicate that although most vendors were aware that the use of borax is prohibited, compliance with food safety regulations was still not optimal. Furthermore, exposure to food safety education was very limited, and only a minority of vendors had obtained halal certification. These findings suggest that knowledge alone may not be sufficient to ensure safe food production practices.

The present study found that 87.5% of respondents were aware that borax is prohibited as a food additive. This finding reflects a relatively high level of awareness among traditional food vendors. However, knowledge was not consistently translated into safe behavior, as five vendors who were aware of the prohibition still demonstrated poor compliance with food safety practices. This observation supports the concept proposed by Ajzen (1991) in the Theory of Planned Behavior, which explains that knowledge influences behavior through attitudes, subjective norms, and perceived behavioral control. Therefore, knowledge alone does not necessarily result in behavioral change without adequate motivation, supervision, and environmental support.

Similarly, a systematic review by Desye et al. (2023) reported that food safety knowledge among street food vendors does not always lead to appropriate food handling practices. Their meta-analysis demonstrated that vendors who received food safety training were significantly more likely to implement safe food practices than those who had never received training (Desye et al., 2023). These findings suggest that educational interventions should be continuous and supported by regular supervision to achieve sustainable behavioral changes.

One of the most important findings of this study is that 93.7% of respondents had never received food safety education from health authorities. This indicates a substantial gap in

public health promotion activities targeting traditional food vendors. Food safety education is recognized as one of the most effective interventions for reducing foodborne diseases because it improves vendors' understanding of hygienic food preparation, appropriate use of food additives, and compliance with food safety regulations. The World Health Organization recommends continuous education using the Five Keys to Safer Food approach as an effective strategy to improve hygiene and reduce foodborne illnesses among food handlers (WHO, 2022).

The relationship observed between knowledge and behavior in this study also deserves attention. All respondents who lacked knowledge regarding the prohibition of borax demonstrated poor behavior, whereas most knowledgeable vendors showed good compliance. Although no inferential statistical analysis was performed, these descriptive findings suggest that better knowledge may contribute to safer food handling practices. Similar findings have been reported in previous Indonesian studies, which found that knowledge is one of the major determinants of food safety behavior among street food vendors, although economic pressure and weak regulatory enforcement often reduce compliance with food safety standards (Lestari & Handayani, S. 2022).

Another notable finding concerns halal certification. All vendors who possessed halal certification demonstrated good food safety behavior, whereas the majority of vendors without certification exhibited poor behavior. Although halal certification primarily aims to ensure compliance with Islamic dietary requirements, the certification process also requires producers to implement good manufacturing practices, hygiene, sanitation, and proper documentation. Consequently, halal-certified vendors may be more likely to comply with broader food safety standards than uncertified vendors (Agrawal et al., 2025).

From a socio-legal perspective, the findings indicate that legal regulations prohibiting the use of borax alone are insufficient to ensure compliance. Effective implementation requires collaboration among government agencies, health professionals, food inspectors, and the community. Routine education, periodic inspections, and law enforcement should be integrated with community empowerment strategies to improve food safety awareness among traditional food vendors. These approaches are consistent with WHO recommendations emphasizing multisectoral collaboration in strengthening national food safety systems (WHO, 2022).

This study has several limitations. First, the number of respondents was relatively small because the study included all *cilok* vendors operating in one location. Second, the study employed a descriptive design with univariate and cross-tabulation analyses; therefore, causal relationships between variables could not be established. Third, the assessment of vendor behavior relied on self-reported responses rather than laboratory examination of food samples for borax contamination. Future studies should include larger sample sizes, laboratory testing of food products, and analytical statistical methods to identify factors independently associated with compliance with food safety regulations.

Despite these limitations, the present study provides valuable evidence regarding the knowledge and behavior of traditional *cilok* vendors concerning the prohibition of borax. The findings may support local governments, public health centers, and food safety authorities in

designing targeted educational programs, strengthening food safety monitoring, and encouraging vendors to adopt safer food production practices that protect consumer health.

### ***Restate the Key Findings***

This study assessed the knowledge and behavior of traditional *cilok* vendors regarding the use of borax in the Surawisesa Kawali area using a socio-legal approach. The findings showed that most respondents (87.5%) were aware that the use of borax as a food additive is prohibited. Nevertheless, this knowledge was not consistently reflected in practice, as several vendors who were aware of the prohibition still demonstrated poor compliance with food safety regulations. Furthermore, only one respondent had ever received food safety education, while most vendors had never participated in educational activities. More than half of the respondents had not obtained halal certification, whereas all certified vendors demonstrated good compliance with food safety practices. These findings indicate that improving food safety among traditional food vendors requires not only knowledge but also continuous education, regulatory supervision, and institutional support.

### ***Interpret the Results***

The high level of knowledge regarding the prohibition of borax suggests that information about hazardous food additives has reached most vendors. However, the discrepancy between knowledge and behavior indicates that awareness alone is insufficient to ensure compliance with food safety regulations. Several vendors who knew that borax is prohibited still showed poor compliance, suggesting that behavioral decisions may also be influenced by economic considerations, long-established production practices, convenience, or limited supervision from relevant authorities.

The findings also demonstrate that the majority of respondents produced *cilok* independently. Vendors who manufacture their own products have greater control over ingredient selection and food processing practices. Consequently, they also bear greater responsibility for ensuring that prohibited food additives are not used during production. On the other hand, vendors purchasing products from other manufacturers may have limited information regarding the ingredients used, emphasizing the importance of traceability and supplier accountability within the street food supply chain.

### ***Compare with Previous Studies***

The findings of this study are consistent with those reported by Desye et al. (2023), who found that street food vendors generally possess moderate to good food safety knowledge, but this knowledge is not always translated into safe food handling practices. Their systematic review concluded that food safety training significantly improves hygienic practices among street food vendors, emphasizing the importance of continuous education.

Similarly, WHO (2022) recommends implementing the Five Keys to Safer Food as an effective strategy to improve food hygiene among food handlers. The WHO framework emphasizes that education, sanitation, and routine supervision should be implemented simultaneously to reduce foodborne diseases. The very low proportion of vendors receiving

food safety education in the present study indicates that these recommendations have not yet been optimally implemented at the local level (Safitri et.al 2018)

The finding regarding halal certification is also noteworthy. All respondents with halal certification demonstrated good compliance with food safety practices. Although halal certification primarily ensures compliance with Islamic dietary requirements, the certification process also requires producers to implement hygienic production, documentation, and quality assurance systems. Consequently, halal certification may indirectly encourage better food safety practices. Similar observations have been reported in Indonesian studies showing that certified food businesses generally demonstrate better compliance with hygiene and sanitation standards than uncertified businesses.

However, unlike several previous studies that reported statistically significant associations between knowledge and food safety practices, the present study employed descriptive analysis only. Therefore, the findings should be interpreted as observed tendencies rather than evidence of causal relationships.

### ***Highlight the Implications***

The findings of this study have several practical implications for food safety programs. First, local health authorities should expand food safety education targeting traditional food vendors through regular training sessions focusing on the dangers of borax, hygienic food preparation, and compliance with food safety regulations. Second, periodic inspections should be strengthened to ensure that vendors comply with national regulations regarding prohibited food additives.

In addition, collaboration between local governments, public health centers, BPOM, and community organizations is necessary to establish sustainable food safety monitoring systems. Encouraging halal certification among traditional food vendors may also improve both food safety compliance and consumer confidence because the certification process promotes good manufacturing practices and hygiene standards. These integrated interventions could contribute to reducing foodborne diseases and protecting public health, particularly among children who frequently consume street foods.

### ***Discuss the Limitations***

Several limitations should be acknowledged. First, the study involved only 16 respondents from one geographical area, limiting the generalizability of the findings to other regions. Second, the study employed a descriptive cross-sectional design; therefore, causal relationships between knowledge, education, halal certification, and behavior could not be established. Third, behavioral assessment was based on questionnaire responses and was not supported by direct observation or laboratory examination of food samples for borax contamination. Consequently, the actual prevalence of borax use among vendors could not be confirmed.

In addition, inferential statistical analyses such as Fisher's Exact Test or Chi-square analysis were not performed because the study focused primarily on descriptive findings. Future analytical studies would provide stronger evidence regarding factors associated with compliance with food safety regulations.

### **Suggest Future Research**

Future studies should involve larger and more diverse samples from different districts or provinces to improve the generalizability of findings. Laboratory analysis of food samples should also be incorporated to objectively identify borax contamination rather than relying solely on self-reported information from vendors. Furthermore, analytical study designs using multivariate statistical methods are recommended to identify independent predictors of food safety behavior.

Intervention studies evaluating the effectiveness of food safety education, routine inspections, and halal certification programs would also provide valuable evidence for policymakers. Such studies may assist local governments and public health authorities in developing evidence-based strategies to improve compliance with food safety regulations among traditional food vendors and ultimately reduce the burden of foodborne diseases.

### **Conclusion**

This study demonstrated that most traditional *cilok* vendors in the Surawisesa Kawali area were aware that the use of borax as a food additive is prohibited. However, this knowledge was not consistently reflected in vendors' behavior, as several respondents who were aware of the regulation still demonstrated poor compliance with food safety practices. The findings also revealed that almost all vendors had never received food safety education and that more than half had not obtained halal certification. Vendors who possessed halal certification tended to demonstrate better compliance with food safety practices than those without certification. These findings suggest that improving knowledge alone is insufficient to ensure safe food production; continuous education, regular monitoring, and stronger regulatory enforcement are also required.

Health authorities should strengthen food safety education programs targeting traditional food vendors, while local governments should enhance routine supervision and encourage halal certification as part of efforts to improve food safety. Future studies should include larger sample sizes, laboratory examination of food samples for borax contamination, and analytical statistical methods to identify factors influencing compliance with food safety regulations.

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### **Conflict of Interest**

The authors declare that there is no conflict of interest regarding the publication of this study.

## Ethical Clearance

This study was conducted after obtaining permission from the relevant authorities and informed consent from all respondents. Ethical approval was not required according to the institutional policy applicable at the time of the study.

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