



Sanitation Knowledge and Hygiene Practices: An Evaluation of Indonesian Online Food SMEs Based on National Food Safety Guidelines

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Abstract: In Indonesia, the surge in online food Small and Medium Enterprises (SMEs) has underscored the critical need for stringent sanitation and hygiene practices. Utilizing a cross-sectional approach, the research assessed knowledge levels through a questionnaire, complemented by an evaluative tool aligned with guidelines from the Indonesian food and drug regulatory authority. From a sample of 132 SMEs spanning various Indonesian cities and regencies, it was observed that 57.6% had an adequate grasp of sanitation principles. Furthermore, a significant correlation between knowledge and its practical application emerged. Notably, there was a discernible difference in practice scores between participants with limited knowledge compared to those with a deeper understanding, evidenced by a mean difference of 10.62 ± 3.77 . This highlights a substantial inconsistency in translating knowledge into practice. Despite a reasonable level of awareness, the practical execution of sanitation and hygiene standards remains uneven among these enterprises. This gap indicates a need for focused interventions to enhance the consistent application of sanitation practices in the Indonesian online food SME industry, ensuring better compliance with established hygiene standards.

Keywords: Online food service; small and middle scale enterprise; sanitation standard; hygiene practice; Food safety

Introduction

The COVID-19 pandemic has dramatically reshaped the dynamics of food preparation, delivery, and consumption. In Indonesia, the response of Small and Medium-scale Enterprises (SMEs), particularly in the culinary sector, has been pivotal in stabilizing the economy during these challenging times. These SMEs have shown resilience, reflecting the essential nature of food and food-related services during such unprecedented times (Suminah, Suwanto, Sugihardjo, Anantanyu, & Padmaningrum, 2022). Concurrently, there has been a marked shift towards digital platforms for food procurement, with third-party online food delivery services witnessing a global market growth of 10.3% between 2020 and 2021 (Rha, Nam, Yoon, & Lee, 2023; Rinaldi, D'Aguiar, & Egan, 2022).

Recent studies have highlighted substantial changes in consumer behavior and food safety practices during the pandemic. Soon et al. (2022) revealed that the pandemic prompted notable shifts in online food delivery and hygiene practices, with significant gender differences and correlations with perceptions of the virus's severity (Soon et al., 2022). Additionally, Arfaoui et al. (2021) observed similar trends, noting changes in food purchasing habits and handling practices, particularly among Saudi women. Their research indicated a trend towards indoor meal preparation and an increased reliance on online grocery and food delivery services (Arfaoui & Alghafari, 2021).

This shift, however, has raised significant concerns about food safety. A study reported a nationwide outbreak traced back to sandwiches from an online vendor, raising alarms about online food safety

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protocols (Wei et al., 2014). The World Health Organization further corroborates the significance of this concern, noting a substantial number of illnesses and deaths due to contaminated food. A challenge arises when we consider SMEs, especially those operating from home. The lack of consistent regulation compared to larger establishments exacerbates the potential risks (Osaili, Al-Nabulsi, & Al-Jaberi, 2022).

Furthermore, the risks associated with inadequate food handling have been highlighted by several studies. Lu et al. (2020) traced a norovirus outbreak back to food delivery practices, emphasizing the need for stricter monitoring of food handlers (Lu et al., 2020). Similarly, Hamed et al. (2020) investigated the knowledge, attitudes, and practices of food handlers in Egypt, revealing significant gaps in food safety compliance (Hamed & Mohammed, 2020). These studies collectively point to a global concern regarding the safety practices in food handling and delivery, which is particularly relevant to the growing online food market in Indonesia.

In response to these challenges, the Indonesian food and drug authority, BPOM, has outlined a clear emphasis on food quality and safety through their "good food production practice" guideline (BPOM, 2012). While these guidelines are well-established, there is a prevailing uncertainty about the depth of understanding and compliance among SMEs. For instance, a study focused on East Jakarta highlighted inconsistencies in the knowledge of sanitation practices among online food vendors (Ridawati & Alsuhendra, 2022a). Further, another examination pointed to significant non-compliance among SMEs in crucial food production elements, raising concerns regarding their adherence to the BPOM guidelines (Ridawati & Alsuhendra, 2022b).

This study aims to examine the relationship between sanitation knowledge and its practical application among Indonesian online food SMEs. It seeks to assess the extent to which these SMEs understand and apply BPOM guidelines in their operations, utilizing a tailored scoring framework. The goal is to identify knowledge gaps and implementation inconsistencies, providing insights that could inform SME operations and influence policy reforms. Ultimately, this research endeavors to enhance food safety standards within the Indonesian online food sector, contributing to public health and consumer trust.

Method

Study Design

The research adopted a cross-sectional study design implemented via survey conducted in 2021.

Target Population and Sampling

The primary focus of the study was on the food sector's Small and Medium Scale Enterprises (SMEs) distributed across Indonesia. The criteria for categorizing businesses into SMEs was based on the "Peraturan Perundang-Undangan No. 20 Tahun 2008 Republik Indonesia" (UU RI, 2008). For this study, convenient sampling was employed, selecting subjects based on the location of the enumerators to ensure ease of data collection.

The sample size was computed, targeting a 95% confidence level. Given an expected medium effect size ($f = 0.25$) and a power of 0.80, the resultant minimum sample size was determined to be 128.

Research Flow

Enumerators were initially trained to proficiently use the research instruments. Data collection was conducted across various food SMEs. Upon obtaining informed consent, owners or managers of the SMEs were interviewed. Direct observations of the food production practices were also carried out. Collected data were then uploaded to an online database, where they were validated and prepared for analysis.

Sanitation and Hygiene Knowledge Instrument

The study used a structured questionnaire, drawing from the work of Ridawati et al., (2022a), to ascertain the participants' proficiency in sanitation and hygiene. Responses, evaluated on a 100-point scale, were subsequently segmented into three tiers: good, adequate, and insufficient, to delineate the knowledge spectrum.

Food Production Practice Assessment

Practical adherence to sanitation and hygiene principles among SMEs was appraised using an assessment framework modeled after the BPOM's "good food production practice for household industry" guidelines (BPOM, 2012). To facilitate clarity in assessment, results were transformed into a scale of 100. Scores were inversely proportional to non-compliance levels, rendering a lucid interpretation of practice standards.

Analysis

All collected data, including demographic details and survey results, were systematically described. A one-way ANOVA was performed to delve into the potential impacts of knowledge on the adherence to good food production practices. This analysis aimed to discern if, and to what extent, a deeper understanding of sanitation and hygiene influenced the practical implementation of these principles among the surveyed SMEs.

Result and Discussion

Geographical and Educational Backgrounds

The study encompassed a total of 132 participants from 18 distinct cities and regencies across seven provinces in Indonesia. Figure 1 provides a graphical representation of the geographical distribution of the participants. Predominantly, Jakarta emerged as a significant contributor, with East Jakarta registering the highest participation at 33 respondents. This was followed by Bekasi with 25 participants and South Jakarta accounting for 13. Additional regions such as South Tangerang, Depok, and Tangerang also marked a notable presence with 9, 9, and 8 participants respectively.

Delving into the educational backgrounds, as depicted in Table 1, it was observed that the majority, or 54.5%, had completed their high school education. Those holding undergraduate degrees represented 22% of the total respondents. The smallest segment, at 0.8%, comprised individuals with elementary school education. This distribution underscores the varied educational attainments of individuals engaged in the online food SMEs sector, highlighting a considerable skew towards high school and undergraduate education. This skew towards high school and undergraduate education is consistent with previous findings who noted that the online business sector, especially the online food industry, has become an attractive avenue for high school graduates (Ridawati et al., 2022a). This suggests that the digital transformation in the food sector is offering opportunities for those with varying educational backgrounds to harness their competencies in the entrepreneurial domain.

Assessment of Knowledge Levels

The study found an average participant knowledge score of 82.98 (± 15.83). Using the established criteria, 57.6% of participants achieved a "good" knowledge rating (score $>80\%$), 37.1% an "adequate" rating (score between 60-80%), and 5.3% were categorized as "insufficient" (score $<60\%$) as seen in Table 2. Detailed numbers regarding incorrect answers across various topics can be seen in Figure 2. When comparing our findings with Ridawati et al. (2022a), both consistencies and variations emerge. Both studies identified a pronounced knowledge deficit in "Use of tongs or picking tools." However, subjects like "Finished product handling" and "Protocols when ill" recorded higher incorrect rates in our research compared to the previous study. Such discrepancies highlight the variability of knowledge across different samples.

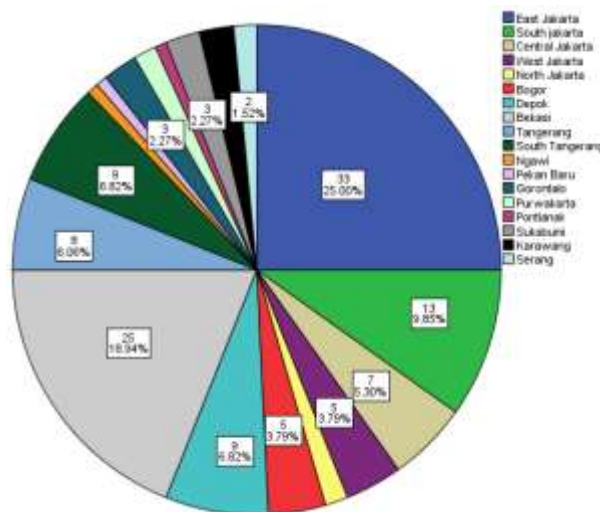


Figure 1. Distribution of participants' location

These findings are consistent with those of Uggioni et al. (2012), who observed that more than half of their respondents believed it was not safe to handle foods with an uncovered wound on the back of their hand. This level of awareness contrasts with other studies in different regions. Additionally, the Uggioni et al. study found that only a minority of females were aware that pathogen-contaminated food items might not be detectable by smell, taste, or appearance, and less than half knew it was unsafe to taste food with the same spoon used to stir it (Uggioni & Salay, 2012). Such knowledge and practice gaps in home-based online food businesses are concerning with regards to food safety.

Gong et al. (2016) reported similar findings in their national survey in Mainland China, where food handlers demonstrated poor knowledge of food safety and handling in households. Their study highlighted socio-demographic characteristics, such as gender, place of residence, and income, as significant factors influencing knowledge levels (Gong, Wang, Yang, & Bai, 2016).

Furthermore, Langiano et al. (2011) in their survey study in Italy, observed a general lack of correct adherence to food hygiene in the home setting, primarily due to errors during food preparation and storage. They stressed the need for consumer education on food safety procedures, especially in households with vulnerable groups such as children, older persons, and pregnant women (Langiano et al., 2012).

The importance of this knowledge gap becomes evident when considering the rise in infectious disorders such as diarrhea, Environmental Enteric Dysfunction (EED), and intestinal worms, which are partly attributed to poor environmental sanitation. Factors contributing to these conditions include limited access to clean water, improper latrine use, and poor handwashing hygiene behavior (Raharini & Yuniarti, 2023). These findings underline the critical need for effective sanitation and

hygiene practices in the SME sector to mitigate these health risks.

Table 1. General characteristics of subjects

	Characteristic	N	%
Education	Elementary school	1	0.80
	Middle school	12	9.10
	High school	72	54.50
	Vocational high school	5	3.80
	Diploma	13	9.80
	Undergraduate	29	22.00

Building upon this point about knowledge discrepancies, it's important to underscore the practical implications of such gaps. Contamination by food workers has been recognized as a crucial factor in foodborne illness investigations. The importance of physical barriers, including food shields, specific work clothing, and utensils such as spoons and tongs, cannot be overstated, as they mitigate the direct transfer of contaminants from hands to food (Todd et al., 2010).

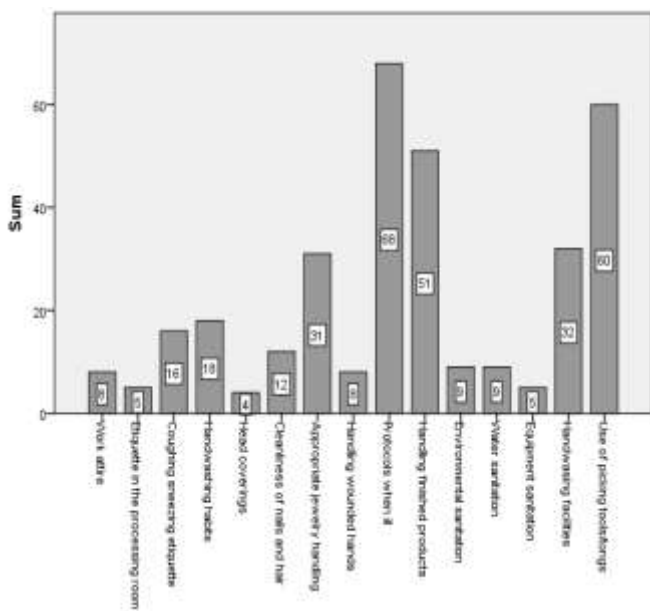


Figure 2. The number of respondents who answered incorrectly of each question

Furthermore, beyond these physical barriers, the behavior and practices of the food handlers themselves play a pivotal role. The practice of good hygiene, especially among institutional food handlers, is essential. Proper handwashing practices have been associated with a reduction in the incidence of diarrheal diseases. However, it's noteworthy that even with self-reported hand hygiene, some studies have detected contaminants like coagulase-positive staphylococci on food handlers' hands. As a result, it's recommended to couple hand washing with the use of gloves and other

hygiene practices to further reduce contamination risks during food handling (Akabanda et al., 2017).

Sanitation and Hygiene Practice Assessment

The good food production practice framework delineates the comprehensive criteria required for robust food production practices within household industries. This framework stipulates mandates across the entire spectrum of food production, from the procurement of raw materials to the final product's delivery. Key considerations detailed within this framework include production location and its environmental context, the architecture and features of the production facilities, the equipment used, the sources and provisions of water, sanitation and hygiene facilities and protocols, the health and hygiene of personnel, programs for maintaining and enhancing hygiene, storage methodologies, process oversight, food labeling standards, supervisory responsibilities, procedures for product recalls, methodologies for record-keeping and documentation, and requisite training for staff (BPOM, 2012).

Table 2. Knowledge score criteria for sanitation and hygiene and corresponding scores sanitation and hygiene practice.

Knowledge score criteria	N	%	Sanitation and hygiene practice score (mean±SD)
Good	76	57.60	81.76±8.90 ^a
Adequate	49	37.10	79.96±10.67 ^a
Insufficient	7	5.30	71.14±7.58 ^b

*SD: Standard deviation

*Means in the column within a particular parameter with different superscript are significantly different at (P < 0.05)

In our study, we adapted this comprehensive framework to develop an evaluative instrument specifically tailored to assess the sanitation and hygiene practices of SMEs. We instituted a scoring mechanism to gauge compliance, wherein non-adherence was penalized based on its severity: critical lapses resulted in a deduction of 4 points, serious ones 3 points, major ones 2 points, and minor infractions led to a 1-point reduction. SMEs in full compliance with the stipulated practices were awarded a perfect score of 100.

Upon evaluating the sanitation and hygiene practices using this instrument, we determined that the subjects had an overall mean score of 80.53, with a standard deviation of 9.767. Of the 132 subjects analyzed, a significant 97.7% (129 subjects) demonstrated critical non-compliance in several hygiene and sanitation domains. Most notably, 49.2% lacked comprehensive handwashing facilities, which is especially concerning given the rise in infectious disorders linked to poor hygiene practices (Raharini & Yuniarti, 2023). An

equivalent percentage either didn't adhere to appropriate work attire regulations or wore jewelry during food production. Furthermore, 70.5% were without a designated individual overseeing employee hygiene. Labeling inadequacies were prevalent, with 67.4% omitting essential product details and 57.6% making potentially unverified health or nutritional claims. Additionally, a concerning 76.5% were without a certified Food Safety Counseling Certificate (PKP) holder, and 68.2% lacked a structured food safety training program for their workforce.

The inadequacy in handwashing facilities among SMEs is a significant concern, especially when considered in the context of the Community-Based Total Sanitation (STBM) program. The STBM program stresses the importance of hygiene and sanitary behavior, including the crucial practice of washing hands with soap (Rany, Dewi, & Herniwanti, 2022). This is further underscored by Herniwanti et al.'s study during the COVID-19 pandemic, which highlights the necessity of an adequate clean water supply to support effective handwashing as part of both the STBM and the 3M program (wearing masks, keeping distance, and washing hands with soap) (Herniwanti, Sudarto, Zaman, dewi, & Rany, 2022). Our findings align with these insights, revealing that a significant portion of SMEs lack comprehensive handwashing facilities, a key factor in disease prevention, including hepatitis. This gap in basic sanitation infrastructure and practices among SMEs underlines the urgent need for improvements in compliance with sanitation and hygiene standards.

Before delving into deeper statistical analysis, we verified the homogeneity of our data through the Levene test, which confirmed a consistent variance across the dataset. Employing a one-way ANOVA, we sought to identify potential disparities in practice scores relative to different knowledge criteria. The results were indeed significant, underlining pronounced variations in sanitation and hygiene practice scores based on knowledge levels. Further analysis via a post hoc Tukey HSD test revealed a marked score increase between 'insufficient' and 'good' knowledge categories, amounting to a mean difference of 10.62 ± 3.77 .

Akabanda et al. (2017) observed that a significant proportion, 88.1%, of institutional food handlers did not utilize gloves when distributing unpackaged foods, and many showed lapses in using aprons, masks, and sanitizers (Akabanda et al., 2017). Likewise, Osaili et al. highlighted a deficit in food safety knowledge, attitudes, and practices among female food handlers during the COVID-19 pandemic (Osaili et al., 2022). Limon also accentuated the gap between knowledge and its implementation, noting subpar adherence to food safety

guidelines among home-based food handlers (Limon, 2021).

Evidently, while knowledge of good hygiene and sanitation practices can be prevalent, its consistent application remains challenging. Aligning with the observations of Izyan et al., who noted potential cross-contamination risks even among those with excellent food safety knowledge, it becomes clear that knowledge doesn't always equate to proper practice (Izyan, Zuraini, Lovelyna, Maimunah, & Afzan, 2019). Ensuring robust adherence to these practices in SMEs mandates a combination of continual education, consistent reinforcement, and, where necessary, regulatory oversight.

Good hygiene and sanitation practices are essential not only within the production sector but also among consumers. A study emphasizes that while substantial efforts have been directed towards hazard control in food production, there has been a lack of equal focus on educating consumers about safe food handling and preparation. Educating the public about proper nutritional practices, recognizing hazardous food handling techniques, and understanding the microbiological causes of foodborne diseases are vital components of overall food safety. Therefore, implementing an effective risk communication strategy is imperative. Such a strategy would serve to inform consumers about potential health risks associated with improper food handling and encourage the adoption of safer food handling practices at home. This approach is not just beneficial but crucial in ensuring food safety extends all the way to the consumer end of the food chain (Jevšnik et al., 2008).

Implications of the SMEs

The outcomes of this study have multifaceted implications for various stakeholders. For SME owners, understanding these results is pivotal for business success. By addressing the identified knowledge gaps and enhancing sanitation practices, they not only ensure food safety but also bolster consumer trust, which can lead to increased customer loyalty and market share. From a governmental perspective, these findings can serve as a foundation to design targeted interventions, including training programs, workshops, and awareness campaigns. This approach aligns with the insights from Suryani et al. (2023), emphasizing the need for collective awareness and action in improving hand hygiene, a critical public health measure. It underscores the need for stronger regulatory oversight, consistent monitoring, and perhaps even incentives for SMEs that demonstrate full compliance with hygiene and sanitation standards (Suryani et al., 2023). Finally, for academics, this research offers a rich dataset and framework to further probe the

dynamics of food safety within the SME sector. It underscores the importance of continuous studies in this domain, promoting a culture of knowledge-sharing between researchers, industry practitioners, and regulatory bodies. Future studies can also delve into the reasons behind non-compliance, enabling the design of more effective interventions tailored to specific challenges SMEs face in maintaining hygiene and sanitation standards.

Limitations of the Study

While this research provides valuable insights into sanitation and hygiene practices among SMEs, there are some limitations to be acknowledged. Firstly, the study did not employ a random sampling design, which might limit the generalizability of the findings to the broader SME population. The sample might not be representative of all SMEs, especially those from regions not included or underrepresented in this study. The uneven distribution of participants from different geographical areas, with certain regions like Jakarta having a disproportionately larger representation, may introduce regional biases. Such over-representation can influence the overall trends and outcomes of the study. Furthermore, inherent in self-reported data is the potential for response bias, where respondents may either consciously or unconsciously provide inaccurate responses. Future research should aim to employ a more balanced, random sampling approach and might consider employing observational or mixed-methods to mitigate some of these limitations.

Conclusion

The study reveals a significant gap between sanitation and hygiene knowledge and its application within Indonesian SMEs. While there is considerable awareness among participants, the practical implementation of this knowledge is notably deficient. This disparity between understanding and execution in the food sector poses serious risks to consumer health and the credibility of SMEs. The findings highlight the critical need for interventions that not only educate but also ensure the consistent application of sanitation and hygiene standards. Effectively bridging this knowledge-practice gap is essential for protecting public health and enhancing the reputation of SMEs in the food industry.

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Author Contributions

A.A. and R.R. were responsible for the conceptualization of the study; R.R. developed the methodology; A.A. conducted the validation; M.I.R. undertook the formal analysis; A.A. and R.R. led the investigation; R.R. managed resources; R.R. and M.I.R. were involved in data curation; M.I.R. and R.R. prepared the original draft; A.A. contributed to the review and editing of the manuscript; M.I.R. took charge of visualization. All authors have read and consented to the final version of the manuscript.

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Conflicts of Interest

The authors declare no conflicts of interest in relation to this research.

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