

## **Analysis of the Implementation of the Integrated Halal-Toyyib Supply Chain Program for the MBG Scheme to Prevent Microbial Contamination and Mass Food Poisoning**

**Wynd Rizaldy<sup>1</sup>, Lies Lesmini<sup>2</sup>**

<sup>1,2</sup>Institut Transportasi dan Logistik Trisakti, Jakarta, Indonesia  
**Corresponding email: wyndrizaldydgman@gmail.com**

**Received: January 01, 2026 | Revised: January 10, 2026 | Accepted: January 15, 2026**

**Abstract** The Free Nutritious Meal Program is a national strategic initiative aimed at improving the health quality of future generations. However, its implementation has encountered serious challenges, marked by incidents of mass food poisoning affecting thousands of students from late 2025 to early 2026. The primary issue underlying this phenomenon is weak supply chain supervision, which leads to the deterioration of food safety and nutritional quality prior to consumption. This study aims to evaluate the implementation of the halal and toyyib supply chain in food distribution to prevent microbial contamination and food poisoning incidents. This research employed a descriptive qualitative approach through field observations and in-depth interviews with nutrition service units in affected areas, complemented by an analysis of standard operating procedure documents. The findings indicate that the food poisoning incidents were primarily caused by the lack of integration between halal standards and hygiene-health practices during storage and transportation processes. In particular, inadequate temperature control and cross-contamination of distribution equipment were identified as critical contributing factors. The study concludes that the implementation of a supply chain that not only emphasizes the halal status of raw materials but also comprehensively addresses health quality aspects is essential in large-scale food distribution programs. Strengthening regulations and enforcing strict monitoring at every distribution point are therefore necessary to ensure food safety for beneficiaries and to mitigate future public health risks.

**Keywords:** Halal Supply Chain; Food Safety; Free Nutritious Meal Program; Food Poisoning; Public Health

### **INTRODUCTION**

The Free Nutritious Meals Program (Program Makan Bergizi Gratis – MBG) is a national strategic pillar aimed at realizing the Indonesia Emas 2045 vision through the improvement of nutritional status and the mitigation of stunting (Rahayu, 2024). However, in its implementation up to early 2026, the program has faced serious food safety challenges, marked by a significant number of mass food poisoning incidents (Sudarmaji, 2025). Fundamentally, the integration of Halal-Toyyiban principles within the supply chain is imperative, where halal compliance should not be viewed merely in ritualistic terms but must also encompass health, safety, and hygiene standards (Aziz, 2023). Failure to maintain the integrity of the halal supply chain poses a substantial risk to public trust in national programs (Ali et al., 2021). . Therefore, stringent halal supply chain management is required to safeguard product quality from upstream to downstream activities (Ab Rashid & Bojei, 2020). As a policy with a massive distribution scale, the program involves thousands of Nutrition Fulfilment Service Units (Satuan Pelayanan Pemenuhan Gizi – SPPG) and catering vendors across the country. Nevertheless, entering early 2026, the program's implementation has been overshadowed by an alarming food safety crisis. Data indicate that by the end of October 2025 alone, more than 16.109 students had fallen victim to food poisoning incidents across multiple regions, ranging from West Java to West Kalimantan.

The most recent incidents in December 2025 in Madiun and Ngawi, along with the temporary suspension of food distribution in early January 2026, underscore the existence of critical gaps in the national food monitoring and distribution system. Figure 1 illustrates a sharp upward trend in MBG food poisoning cases, with the number of victims increasing significantly from August to October 2025, reaching a cumulative total of 16,109 cases.

**Figure 1.** Trend of MBG Food Poisoning Cases up to October 2025



Source: Indonesian Education Monitoring Network (JPPI), reported by (Tempo.co, 2025)

The urgency of this issue stems from the high risk of microbial contamination inherent in large-scale food service operations (Dewanti-Hariyadi, 2021). Numerous food poisoning cases in schools indicate that critical vulnerabilities frequently lie in the poor hygienic practices of food handlers (Prasetyo & Widjayanti, 2024). Furthermore, inadequate risk mitigation within catering supply chains renders food highly susceptible to pathogenic bacteria (Septiani et al., 2023; Syarifuddin et al., 2022). Food safety standards within halal logistics must be consistently maintained, even under emergency conditions or during mass distribution scenarios (Olaimat, 2020). The global halal industry increasingly demands rigorous surveillance and strict monitoring across all elements of production and distribution (Nurrachmi, 2020). Without a comprehensive evaluation of logistics systems, the risk of foodborne poisoning will continue to persist (Zulfakar et al., 2020).

Logistical factors, particularly transportation delays, have been shown to significantly contribute to microbial growth in ready-to-eat foods (Tan & Lim, 2022). Therefore, the implementation of Hazard Analysis and Critical Control Points (HACCP) within nutrition service units constitutes an urgent necessity (Fadhilla, 2025). The optimization of the cold chain represents a critical solution for preventing food spoilage in mass feeding schemes (Widianto, 2026). Beyond physical infrastructure, the adoption of technologies such as blockchain and digital traceability systems is required to ensure transparency and real-time product tracking (Nuryani, 2023; Rejeb, 2021). Risk management must be conducted in a systematic manner, for instance through the House of Risk method, to identify and map critical vulnerability points within distribution processes (Handayani, 2021).

The successful implementation of a halal supply chain is also highly dependent on critical success factors, such as management commitment and clear regulatory frameworks (Haleem, 2022). From a legal perspective, ensuring food safety constitutes a form of consumer rights protection guaranteed by the state (Lestari, 2020). The structuring of halal logistics cluster management can assist in optimizing the distribution performance of nutritious food (Tieman, 2021). By holistically integrating halal assurance systems with public health standards, the MBG program is expected to achieve its objectives without compromising student safety. Accordingly, this study aims to analyze the implementation of

the Halal-Toyyib Supply Chain in order to develop an integrated food distribution model that is secure against the risks of microbial contamination.

This phenomenon of mass food poisoning indicates that halal product assurance, which has so far been the primary focus, has not yet been fully integrated with the toyyib dimension (quality and health). From an Islamic perspective, the concept of Halal-Toyyib constitutes an inseparable unity; a product must not only be free from haram substances but must also be pure, safe, and non-harmful to consumer health. Failures in maintaining appropriate food temperatures during transportation, cross-contamination of equipment, and poor sanitation of kitchen environments represent violations of the toyyib principle and can result in severe public health consequences.

The main research problems addressed in this study are as follows:

1. Regulatory gaps, reflected in the limited availability of halal certification and expiration date labeling on distributed food packages;
2. Production capacity constraints, where extremely large-scale production (thousands of meal packages per day) often exceeds the quality control capabilities of conventional catering kitchens; and
3. Logistics infrastructure deficiencies, particularly the lack of adequate cold storage facilities (cold chain) or transportation that fails to meet health standards, thereby enabling bacterial proliferation.

Regarding the research contribution, this study is expected to serve as a reference for the National Nutrition Agency in refining Standard Operating Procedures (SOPs) for food distribution, in order to support the achievement of the “Indonesia Emas 2045” vision without exposing the younger generation to serious health risks.

## **METHOD**

This study employs a descriptive qualitative research design to examine the phenomenon of supply chain failure within the Free Nutritious Meals Program (Program Makan Bergizi Gratis – MBG). A qualitative approach is considered appropriate as it allows for an in-depth exploration of complex policy implementation processes and operational practices, particularly in identifying critical control points along the logistics flow that may contribute to microbial contamination (Creswell & Poth, 2018).

The research was conducted in West Java and East Java, selected purposively due to their status as regions with the highest incidence of MBG-related food poisoning cases based on national surveillance data for 2025. Focusing on high-risk regions enables a contextual understanding of systemic vulnerabilities within large-scale food distribution programs (Yin, 2018).

Data were collected from both primary and secondary sources. Primary data were obtained through in-depth, semi-structured interviews with key informants selected using purposive sampling, including managers of Nutrition Fulfilment Service Units (Satuan Pelayanan Pemenuhan Gizi – SPPG), food handlers, and regional health authorities. In addition, non-participant field observations were conducted to assess hygienic practices, kitchen sanitation conditions, food packaging procedures, and transportation processes to schools. Such triangulated data collection techniques are essential for capturing operational risks within food supply chains (Miles, Michael Huberman, et al., 2014).

Secondary data were derived from official investigation reports issued by the National Nutrition Agency, medical records of food poisoning cases, and existing Standard Operating Procedure (SOP) documents regulating food preparation and distribution within the MBG

program. The research instruments consisted of interview guides and observation checklists, developed based on Halal-Toyyib Supply Chain principles and the Hazard Analysis and Critical Control Point (HACCP) framework. Data analysis followed qualitative analytical stages of data reduction, data display, and conclusion drawing, as proposed (Miles, Huberman, et al., 2014). To ensure data trustworthiness, this study applied source triangulation and methodological triangulation, whereby interview findings were cross-validated with observational evidence and laboratory medical results. This approach strengthens the credibility of causal interpretations related to contamination risks within the supply chain (Lincoln & Guba, 1985).

Through this analytical framework, the study aims to produce a comprehensive logistics risk mapping that can inform evidence-based improvements and enhance the long-term sustainability of the MBG program.

## RESULTS AND DISCUSSION

Based on field investigations and document analysis conducted at Nutrition Fulfilment Service Units (Satuan Pelayanan Pemenuhan Gizi – SPPG) in the affected regions, the findings identify three major issues within the supply chain of the Free Nutritious Meals Program (Program Makan Bergizi Gratis – MBG).

First, mapping of critical contamination points within the logistics flow. The findings indicate that microbial contamination predominantly occurred during the post-production phase. Laboratory tests on food remnants from poisoning cases in West Java and East Java revealed the presence of *Staphylococcus aureus* and *Escherichia coli*. These bacteria emerged due to food packaging conducted while the temperature remained excessively high (above 60°C) inside sealed containers, triggering condensation and accelerating microbial growth during the distribution waiting period.

Second, non-compliance with transportation and storage standards. The data show that more than 60% of transportation vehicles used by vendors lacked temperature control facilities, such as cold chain systems or insulated containers. In several locations, the time lag between food preparation and consumption by students exceeded the four-hour safety threshold, reaching 5–6 hours, due to traffic congestion and the long distance between schools and nutrition service centers.

Third, gaps in the implementation of Halal-Toyyib certification. Although the majority of raw materials (meat and poultry) had obtained administrative halal certification, the toyyib dimension, particularly hygiene and food safety within logistics processes, was largely neglected. Most of the evaluated SPPG lacked a “Safe Consumption Time” labeling system on food packaging, resulting in students consuming meals that were biologically unsafe despite appearing acceptable.

In response to the first finding, namely the absence of Critical Contamination Point Mapping within the logistics flow, which resulted in mass food poisoning incidents caused by the failure to integrate the Halal and Toyiyb concepts in logistics, this study emphasizes that the poisoning cases in the MBG program constitute clear empirical evidence of a dichotomy between the “Halal” and “Toyyib” dimensions. To date, supervision has predominantly focused on the ritual or substance-based halal status of raw materials, while neglecting the quality (toyyib) aspect within halal supply chain management.

From a theoretical perspective, halal logistics is required to ensure product integrity from upstream stages to the final consumer without any degradation in quality. Failure to maintain appropriate temperature control and hygiene during transportation represents a

violation of the principles of Maqasid Shariah, particularly the protection of life (Hifz al-Nafs). The poisoning incidents within the MBG program thus stem from the separation between administrative halal compliance and the practical implementation of toyyiban principles in the field. The integration of Halal-Toyyiban principles must therefore be regarded as an indivisible whole within supply chain management to ensure product integrity (Aziz, 2023).

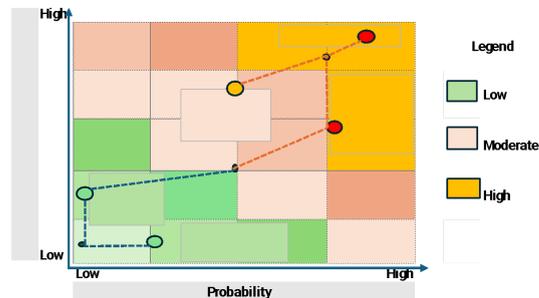
The inability to safeguard the health quality of food products, despite the halal certification of raw materials, reflects weak halal supply chain integrity (Ali et al., 2021). This finding aligns with prior studies indicating that halal traceability systems alone are insufficient to guarantee food safety unless accompanied by a strong commitment to hygiene and sanitation standards (Ab Rashid & Bojei, 2020). Consequently, oversight within large-scale catering industries must simultaneously encompass all elements of halal assurance and public health protection (Syarifuddin et al., 2022). Current developments in the global halal industry demand stricter standardization at every distribution point to mitigate the risk of reputational damage to national programs (Nurrachmi, 2020).

Regarding the second issue, namely the non-compliance with transportation and storage standards, it is necessary to conduct a cross-contamination risk analysis and time-management assessment. The repeated use of distribution equipment without standardized sanitation procedures constitutes a significant source of cross-contamination. From a public health perspective, the temperature “danger zone” between 5°C and 60°C represents the range in which bacteria proliferate rapidly. This study found that pressure to meet massive production volumes compelled Nutrition Fulfilment Service Units (SPPG) to neglect adequate cooling time prior to packaging. This condition indicates that the expansion of MBG production capacity has not been accompanied by corresponding improvements in logistics infrastructure, thereby creating systemic health risks.

The detection of *Staphylococcus aureus* and *Escherichia coli* in food samples confirms the substantial challenges associated with large-scale school meal provision (Dewanti-Hariyadi, 2021). Mass food poisoning incidents in school settings are frequently rooted in failures of risk management across catering supply chains (Septiani et al., 2023). Inadequate food handler behavior that fails to meet hygiene and sanitation standards constitutes a primary entry point for pathogenic microorganisms (Prasetyo & Widjayanti, 2024). These conditions are further exacerbated by logistical challenges during mass distribution, where safety standards are often compromised in pursuit of volume targets (Olaimat, 2020). Logistics analyses demonstrate that transportation delays exhibit a linear correlation with increased microbial colony growth in ready-to-eat foods (Tan & Lim, 2022). Without quality-oriented halal logistics management, product integrity remains persistently at risk (Zulfakar et al., 2020).

With regard to the implementation gap in Halal-Toyyib certification, these findings underscore the urgency of traceability systems and digital labeling. To prevent recurrence of similar incidents, a traceability system integrating halal status with health indicators is required. This discussion proposes the use of QR codes on every MBG food package, containing information on cooking time and safe consumption deadlines. The temporary suspension of distribution in early January 2026 should serve as a critical evaluation moment, during which logistics reforms must prioritize the standardization of distribution vehicles in accordance with HACCP (Hazard Analysis and Critical Control Point) criteria, alongside mandatory competency certification for food handlers across all nutrition service units.

**Figure 2.** Risk Matrix Mapping Vulnerable Points for Preventive Action in the Food Supply Chain



Source : Authors' own work

To address these challenges, the implementation of HACCP systems within nutrition service units constitutes a non-negotiable mitigation measure (Fadhilla, 2025). The adoption of temperature monitoring technologies and cold chain logistics is essential for preventing food spoilage (Widiyanto, 2026). In the digital era, the utilization of blockchain and digital traceability systems can provide enhanced transparency assurances for consumers (Nuryani, 2023; Rejeb, 2021). Risk management must be conducted using structured methods, such as the House of Risk, to identify and address risk events at distribution points (Handayani, 2021). The success of these strategies is highly contingent upon the identification of critical success factors, including inter-agency coordination and catering operator compliance (Haleem, 2022).

## CONCLUSION

This study concludes that the series of mass food poisoning incidents within the Free Nutritious Meals Program (Program Makan Bergizi Gratis – MBG) during the period 2025 to early 2026 represents a direct consequence of the insufficient integration of the toyib dimension into halal supply chain management. Although administrative compliance with halal requirements for raw materials has largely met established standards, critical failures occurred at post-production control points, particularly during packaging and distribution processes. Pathogenic microbial contamination, notably *Staphylococcus aureus* and *Escherichia coli*, was identified as a result of neglected temperature control procedures and distribution durations exceeding the four-hour safety threshold. Accordingly, the success of this national program depends not only on nutritional adequacy and ritual halal compliance, but is fundamentally determined by the resilience of logistics systems in preserving the biological integrity of food products until they reach consumers.

Based on these findings, this study formulates several strategic recommendations for policymakers. First, the National Nutrition Agency should integrate Hazard Analysis and Critical Control Point (HACCP) standards into all certification schemes for Nutrition Fulfilment Service Units, as a primary instrument for mitigating food poisoning risks. Second, mandatory competency certification is required for food handlers, encompassing technical knowledge of food hygiene and sanitation. Third, relevant authorities should promote the adoption of smart packaging technologies equipped with time-temperature indicators, providing visual food safety assurance for beneficiaries. Finally, routine supervision should shift from document-based audits toward periodic laboratory testing of

food samples at final distribution points, in order to verify the effectiveness of implemented food safety systems.

From a managerial perspective, the findings provide guidance for program operators in restructuring large-scale food distribution operations. Managers of nutrition service units are required to invest in cold chain infrastructure or utilize thermal insulation containers to ensure temperature stability during transportation. In addition, management should adopt digital-based tracking systems that enable real-time monitoring of food movement from kitchens to schools. These measures must be accompanied by tighter synchronization of production schedules to prevent food waiting times from entering bacterial growth danger zones. Such implications demand stronger cross-sectoral collaboration among logistics service providers, health authorities, and halal assurance institutions to establish a unified operational standard that ensures sustainable national food safety.

From a regulatory standpoint, food safety is not merely a technical issue but a manifestation of consumer rights protection guaranteed by law (Lestari, 2020). Evaluations of similar programs in various countries demonstrate that rigid national standardization of health-related aspects is a key determinant of nutrition program sustainability (Rahayu, 2024). The management of halal logistics clusters may serve as a viable model for optimizing distribution performance and minimizing social costs arising from mass food poisoning incidents (Tieman, 2021). Lastly, environmental and public health risk management within national nutrition programs must be integrated into central policymaking to establish a resilient food ecosystem (Sudarmaji, 2025). In this way, the MBG program can function as a safe, reliable, and credible instrument for human capital development.

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