

Perceptions of Consumers on Food Safety Practices of Motorcycles Food Delivery Services

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Abstract

The study examined consumers' perceptions of the food safety practices of motorcycle-based food delivery services. The objectives were to assess the consumer perception of safety on motorcycle-based food delivery services and measures implemented in handling, transporting, and delivering food to consumers in Takoradi. The study employed a quantitative research approach. The study targeted three sets of respondents: food sellers, delivery riders, and consumers. The sample size for the study was 200 individuals, consisting of 15 sellers, 25 delivery riders, and 160 consumers. Questionnaires were used to gather the primary data. The research findings indicate consumers exhibit a moderate level of trust in motorcycle-based food delivery services, particularly concerning food safety over delivery speed. The study recommended that health departments, educational institutions, and food safety organisations should develop and implement targeted programs to enhance consumer, seller and food delivery personnel's knowledge of food safety principles.

Keywords

Perceptions, Consumers, Motorcycles, Food Delivery

1. Introduction

Contemporary food delivery services, particularly motorcycle-based ones, face unique challenges in maintaining food quality and safety due to factors such as transportation time and conditions (Lee & Han, 2024; Shroff et al., 2022). Historically, food delivery began with local vendors and evolved significantly with technological advancements. Technological advancements, particularly the rise of smartphones and mobile applications have revolutionized food delivery services. In Takoradi, Western Region of Ghana, these platforms enable customers to order

food conveniently and have it delivered swiftly by motorcycle-based services.

However, as the food delivery sector expands, concerns about food safety have emerged, especially regarding the handling of food by delivery personnel. Studies reveal that some customers have expressed dissatisfaction with the hygiene practices of delivery riders (Adi et al., 2024; Qian et al., 2024). Perceptions of food safety can vary widely between individuals due to personal preferences and expectations (Kasmani et al., 2018; Melián-González, 2022). The increasing reliance on online meal delivery services reflects a shift driven by urbanization and technological advancements.

There are issues with online meal delivery that leave clients unsatisfied with the product. Hygiene concerns raised by clients have been considered and responded to in the modern food delivery system (Fakfare, 2021; Leach et al., 2001; Redmond & Griffith, 2005). The delivery staff has the power to oversee and control the level of cleanliness and sanitation of the food they transport by double-checking everything they take from the restaurants. It is possible that increasing complaints about sanitation difficulties and cleanliness might affect the online food market, leading to lower patronage among intended consumers if the meal delivery system cannot manage and maintain the food quality (Adi et al., 2024; Qian et al., 2024; Shroff et al., 2022).

It is also important to recognize that the current food distribution system is in its infancy and suffers from a number of flaws inherent to its immaturity. Examples of these flaws include late deliveries, wrong deliveries, failed deliveries, improper food handling, and the disappearance of food items and may affect food delivery. This study's overarching goal, therefore, is to learn what kind of impressions consumers in Takoradi, Western Region, Ghana has of the safety and hygiene of food delivery services. Unfortunately, in Ghana researchers have paid much attention to food safety knowledge and related issues among street food vendors, traditional caterers and chopbars with little attention on food safety in restaurants.

The lack of comprehensive research on these aspects highlights a pressing need to enhance their understanding of the food safety dynamics in motorcycle-based food delivery, ensuring the well-being of both consumers and the industry at large.

The main aim of this study is to assess the consumer perception of motor cycle food delivery service, and investigate the factors influencing consumers' trust in the safety practices of motorcycle-based food delivery. The significance of consumers' perceptions in motorcycle-based food delivery services is paramount for various stakeholders within the food industry. Firstly, restaurants and food establishments rely on delivery services to extend their reach and cater to a broader customer base so understanding the intricacies of food safety practices in delivery operations ensures that restaurants maintain the integrity and mitigating potential risks of foodborne illnesses. Secondly, consumers' perceptions of food safety in motorcycle-based food delivery services directly influence their trust and loyalty towards both the delivery service providers and the restaurants they order from.

2. Review of Related Literature

2.1. Factors Influencing the Perception of Food Delivery Safety

Insufficient funding for the food control system, limited understanding of food safety concerns, inadequate collaboration and cooperation among federal ministries, state and local government entities, ineffective execution of the National Food Safety System, political challenges resulting in discontinuity of initiatives and programs supporting food safety practices, a lack of transparency in monitoring and evaluation systems, particularly at the local level, inadequate or non-existent databases, and outdated infrastructure facilities and laboratories are interconnected factors contributing to the current state of affairs. Factors such as population growth, income inequality, long food supply chains, changing demographics, limited access to education, dietary habits, inadequate food safety regulations, and other issues commonly found in economically underdeveloped areas have been identified in previous studies (Kasmani et al., 2018; Leach et al., 2001; Shroff et al., 2022).

The aforementioned assertions demonstrate that the issue of food safety remains a prominent concern in Ghana. The prevailing circumstances in Ghana are exacerbated by a general lack of awareness among the public, insufficient training on food safety across the entire food delivery process, inadequate coordination within the food control system, a dearth of technical expertise, limited availability of analytical laboratories, inadequate enforcement of food safety regulations by regulatory bodies, and the infiltration of contaminated food into the food supply chain due to an insufficient inspection and surveillance system (Adi et al., 2024; Lee & Han, 2024; Qian et al., 2024).

Implementing targeted educational programs that emphasize the importance of safe food handling practices during delivery, as well as providing information on recognizing and reporting potential hazards, can empower consumers to make informed choices. Research by (Fakfare, 2021; Leach et al., 2001; Melián-González, 2022) highlights the positive impact of education on improving food safety knowledge and practices among consumers. Furthermore, the role of regulatory frameworks and enforcement mechanisms cannot be overstated. Strengthening and strictly enforcing food safety regulations specific to the food delivery sector is crucial for ensuring the safety of consumers. Studied underscores the importance of robust regulatory frameworks in minimizing foodborne illnesses. Adequate funding and resources allocated to regulatory bodies will enhance their capacity to monitor and enforce compliance, fostering a safer food delivery environment.

Implementing traceability technologies, such as blockchain, can provide consumers with real-time information about the origin, handling, and transportation of their food orders. This transparency can contribute to building trust among consumers and assuaging concerns about the safety of delivered food. Researchers have emphasized the potential of blockchain technology in enhancing food traceability and safety (Kasmani et al., 2018; Melián-González, 2022). Platforms that actively seek and respond to customer feedback regarding food safety concerns

demonstrate a commitment to addressing consumer apprehensions. The study of (Leach et al., 2001); Uggioni and Salay (2014) highlights the importance of customer feedback mechanisms in maintaining and improving food safety practices in the food delivery industry.

Again, collaborative efforts among stakeholders, including government bodies, food delivery platforms, and consumer advocacy groups are instrumental in addressing the complex challenges associated with food safety in motorcycle-based food delivery services. Shroff et al. (2022) emphasizes the effectiveness of collaborative approaches in achieving sustainable improvements in food safety practices.

In Takoradi's dynamic market, industries benefiting from the surge in online meal delivery include technology, transportation, and food services. Companies such as XYZ Tech Solutions, ABC Delivery Services, and Fresh Flavors, among others are at the forefront of this transformation. The transportation of food items in the online meal delivery sector is often facilitated by riders, referred to as partners, affiliated with food aggregator applications or third-party delivery services. Similar to the Indonesian context, it is a common practice for delivery personnel in Takoradi to utilize motorcycles for transporting goods. These goods, predominantly food items, are securely fastened in plastic or paper bags to the front section of the motorcycle.

The food safety law in Ghana is included under the Food and Drugs ACT, 1992 (PNDCL 305B), which is categorised as standards legislation, food and medicines legislation, and legislation pertaining to the environment. As a result, it is mandated by legislation that individuals involved in food handling must maintain a hygienic working environment, safeguard food from contamination, and adhere to proper personal hygiene practises. These measures have been identified as the most efficient methods for preventing the transmission of microorganisms and the contamination of food (Kasmani et al., 2018; Qian et al., 2024).

2.2. Food Safety Practices of Motorcycle-Based Food Delivery Services

Effective food safety practices are integral to ensuring the safety and quality of food delivered via motorcycle-based food delivery services. The relationship between key food safety practices such as food handling training programs, temperature maintenance, hygiene inspections, and record-keeping and the overall safety of delivered food is critical for understanding and enhancing the performance of these services. Food handling training programs are foundational to the safe delivery of food. Well-trained delivery personnel are equipped with the knowledge and skills necessary to handle food in a manner that minimizes contamination risks. Studies have demonstrated that comprehensive training programs significantly contribute to the proper handling of food during the delivery process (Melián-González, 2022; Shroff et al., 2022). Consequently, the implementation of such programs positively influences the overall safety of delivered food.

Maintaining appropriate temperatures during transportation is essential for

preventing bacterial growth and preserving the quality of perishable items. Research indicates that effective temperature control measures significantly reduce the risk of foodborne illnesses associated with temperature-sensitive food items (Fakfare, 2021; Kasmani et al., 2018; SayedMohammed et al., 2025). Temperature maintenance practices directly impact the safety and integrity of the delivered food.

Hygiene inspections, both of delivery personnel and vehicles, are crucial components of food safety practices. Routine inspections ensure compliance with sanitation standards and identify potential sources of contamination. Hygiene inspections contribute to the overall safety of delivered food by mitigating risks associated with poor hygiene practices during the delivery process (Adi et al., 2024; Qian et al., 2024).

Record-keeping plays a vital role in maintaining transparency and accountability throughout the food delivery chain. Comprehensive records of food handling and delivery processes provide a traceable history that aids in identifying potential sources of contamination. Proper record-keeping is essential for monitoring and improving food safety measures over time, contributing to the overall safety of delivered food (Leach et al., 2001; SayedMohammed et al., 2025; Uggioni & Salay, 2014). The impact of these food safety practices extends to various aspects of food safety in motorcycle-based food delivery services. Delivery. Time is influenced by efficient food handling practices, ensuring timely transportation and reducing the risk of spoilage for perishable items. Packaging integrity is maintained through proper temperature control, hygiene practices, and record-keeping, safeguarding food from contamination during transportation. Vehicle inspection ensures the reliability of the delivery vehicles, reducing the risk of cross-contamination and other safety concerns. Cross-contamination prevention, achieved through meticulous handling and hygiene practices, directly contributes to the overall safety and quality of the delivered food.

2.3. Consumers' Perceptions on Food Safety Practices in Motorcycle-Based Food Delivery Services

Consumers' perceptions, shaped by customer surveys, online reviews and ratings, complaints, and incidents, provide valuable insights into the safety aspects of food delivery, particularly concerning delivery time, packaging integrity, vehicle inspection, and cross-contamination prevention. Customer surveys serve as a direct channel for gathering consumers' opinions and preferences regarding the safety of food delivery services. These surveys often include questions related to the timeliness of deliveries, the condition of packaging upon arrival, and overall satisfaction with the safety measures implemented during transportation. (SayedMohammed et al., 2025) demonstrated the importance of customer feedback in shaping trust and confidence in food delivery services, indicating that positive perceptions are closely linked to efficient and safe delivery practices.

Online reviews and ratings have become powerful indicators of consumer sat-

isfaction and safety perceptions in the digital age. Consumers often share their experiences, both positive and negative, on online platforms, contributing to the collective perception of a food delivery service. In the context of food safety in motorcycle-based food delivery services, consumers' perceptions directly influence key elements such as delivery time. Consumer feedback regarding timely deliveries contributes to the evaluation of service efficiency and the prevention of food spoilage due to prolonged transportation times (Kasmani et al., 2018; Shroff et al., 2022). Packaging integrity is another critical aspect shaped by consumer perceptions. Online reviews often highlight the condition in which food items arrive, influencing perceptions of the effectiveness of packaging materials in maintaining food safety during transit (Leach et al., 2001; Melián-González, 2022). Positive perceptions of packaging integrity contribute to consumer confidence in the overall safety of delivered food. Vehicle inspection is indirectly assessed by consumers through the perceived reliability and cleanliness of delivery vehicles. Complaints or concerns related to the condition of delivery vehicles may signal potential issues with the safety of the delivery process. Resolving such concerns is crucial for maintaining a positive image and trust among consumers (Redmond & Griffith, 2005; Uggioni & Salay, 2014). Cross-contamination prevention is a perception-driven aspect influenced by consumers' confidence in the hygienic handling of food. Customer surveys and online reviews often include comments on the perceived adherence to proper hygiene practices, influencing overall perceptions of food safety in motorcycle-based food delivery services (Adi et al., 2024; Ergönül, 2013; Qian et al., 2024).

2.4. Conceptual Framework (Figure 1)

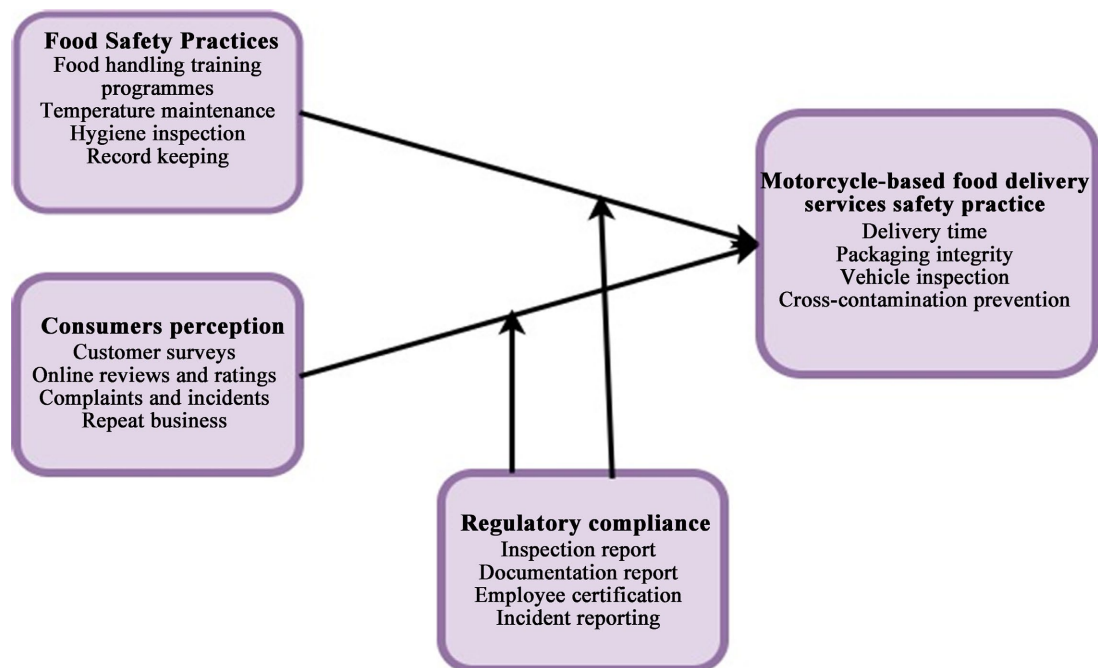


Figure 1. Conceptual framework.

This framework seeks to comprehensively analyze the dynamics of food safety in motorcycle-based food delivery services by examining key independent variables, including food safety practices and consumers' perceptions. Food safety practices encompass training programs, temperature maintenance, hygiene inspections, and record-keeping, reflecting the procedural aspects of ensuring food safety. Consumers' perceptions delve into the attitudes and beliefs of customers towards food delivery services, examining factors like perceived food quality, trust in the delivery process, and overall satisfaction. The dependent variable, food safety in motorcycle-based food delivery services, measures the overall safety level, considering factors like delivery time, packaging integrity, cross-contamination prevention, and vehicle inspection.

The moderating variable, regulatory compliance, plays a crucial role in influencing the relationship between food safety practices, consumers' perceptions, and the overall level of food safety within motorcycle-based food delivery services. As underscored in a report by the World Health Organization, regulatory compliance is pivotal for ensuring the safety of food throughout the supply chain in the food delivery sector. Operationalized through various measures, inspection reports involve a thorough review of official reports from relevant health and safety regulatory bodies to assess the extent to which services align with established standards. Documentation compliance ensures that the food delivery service and associated restaurants adhere to documentation requirements mandated by regulatory authorities, emphasizing the importance of maintaining comprehensive records. Employee certification verifies that all personnel engaged in food handling possess the necessary certifications in line with regulatory standards, ensuring a qualified workforce. Incident reporting involves the continuous monitoring and assessment of the accuracy and timeliness of incident reporting related to food safety issues, as mandated by regulations. This moderating variable provides a regulatory context, offering insights into how adherence to established standards influences the dynamics between food safety practices, consumer perceptions, and the overall safety of food in motorcycle-based food delivery services.

Drawing on relevant studies such as those by (Piasna & Zwysen, 2025; SayedMohammed et al., 2025), this framework aims to provide a holistic understanding of the intricate interplay between key variables influencing food safety in the motorcycle-based food delivery sector.

3. Methodology

This study employs a quantitative research approach, which allows for a nuanced exploration of consumer perceptions on adherence to food safety practices in the context of motorcycle-based food delivery services. A survey was employed, utilizing a mix of closed-ended and Likert-scale questions. Sampling techniques was applied to ensure the selection of a representative sample from the target population of 400 individuals. Convenience sampling was used in the quantitative approach research to identify participants. According to (Piasna & Zwysen, 2025;

Westland, 2010) the sample size is to determined using a convenience sample drawn from the entire population of 400, which improved the viability of the mixed-methods research design.

The formula for Cochran's sample size determination is as follows:

$$n = \frac{N}{1 + Ne^2}$$

n = sample size
 N = population
 e = margin of error

$$n = \frac{400}{1 + 400 \times 0.05^2}$$

$$n = \frac{400}{1 + 400 \times 0.0025}$$

$$n = \frac{400}{2}$$

$$n = 200$$

Hence, population size was 400, and it was aim for a 5% margin of error, it would need a sample size of approximately 200 to ensure the survey results are statistically meaningful.

Table 1. Sample size distribution for motorcycle-based food delivery services survey.

Sellers	15
Delivery riders	25
Consumers	160
Total	200

The data for this research, encompassing a sample size of 200 individuals consisting of 15 sellers, 25 delivery riders, and 160 consumers, was obtained through a database maintained by the business under study (**Table 1**). The company graciously provided access to their comprehensive dataset, which facilitated the selection of participants for the survey. This database allowed for a targeted and diverse representation of the key stakeholders involved in the business, ensuring a well-rounded understanding of perspectives from sellers, delivery riders, and consumers.

The data was obtained via the use of a meticulously designed survey questionnaire administered to consumers of Taadi way delivery service, Hubtel delivery service, Speedaf delivery service. The survey was designed to gather information on consumers' perceptions of food safety in the delivery system, specifically addressing all the research questions outlined in the study. The survey questionnaire included socioeconomic and demographic variables, including factors such as household attributes, age, educational attainment, and income.

4. Results and Discussion

4.1. Demographic Characteristics of Respondents

The main objective of this section was to detail the participants in this study, and these are food sellers, consumers, and delivery riders, each contributing unique perspectives to the research.

Table 2. Demographic characteristics of respondents.

Variables	Food Sellers		Consumers		Delivery Riders	
	Freq = 15	Percent	Freq = 160	Percent	Freq = 25	Percent
Gender						
Male	4	26.7	66	41.3	25	100.0
Female	11	73.3	94	58.8	0	0
Age						
18 - 25	1	6.7	25	15.6	16	64.0
26 - 33	10	66.7	70	43.8	8	32.0
34 - 41	4	26.7	65	40.6	1	4.0
42 and above	0	0	0	0	0	0
Marital status						
Single	8	53.3	44	27.5	19	76.0
Married	3	20.0	56	35.0	6	24.0
Widow	3	20.0	18	11.3	0	0
Divorce	1	6.7	22	13.8	0	0
Separated	0	0	20	12.5	0	0
Educational level						
No formal education	2	13.2	16	10.0	1	4.0
JHS/MSLC	3	20.0	30	18.8	4	16.0
SHS	6	40.0	36	22.5	17	68.0
Tertiary	2	13.4	70	48.0	0	0
Others	2	13.4	8	0.8	3	12.0

Table 2 presents, among the sellers (N = 15), the majority were female, accounting for 73.3%, while males represented 26.7%. The predominant age group for food sellers were 26 - 33 years, comprising 66.7%, followed by those aged 34 - 41 at 26.7%, and a small proportion (6.7%) aged 18 - 25. No food sellers were aged 42 and above. Regarding marital status, 53.3% of sellers were single, 20.0% were married, 20.0% were widows, and 6.7% were divorced, with none being separated. In terms of educational level, 40.0% of food sellers had completed senior high school (SHS), 26.7% had other forms of education, 20.0% had junior high school

(JHS)/middle school leaving certificate (MSLC) education, 13.4% of the sellers had tertiary education, and 13.3% had no formal education.

For consumers (N = 160), 58.8% were female and 41.3% were male. The largest age group among consumers was 26 - 33 years, representing 43.8%, followed by 34 - 41 years at 40.6%, and 15.6% aged 18 - 25. None of the consumers were aged 42 and above. Marital status among consumers showed that 35.0% were married, 27.5% were single, 13.8% were divorced, 12.5% were separated, and 11.3% were widows. In terms of educational attainment, 48.0% of consumers had tertiary education, 22.5% had SHS education, 18.8% had JHS/MSLC education, and 10.0% had no formal education, with less than 1% having other forms of education.

Among the delivery riders (N = 25), all were male. The age distribution showed that 64.0% were aged 18 - 25, 32.0% were aged 26 - 33, and 4.0% were aged 34 - 41, with no riders aged 42 and above. Regarding marital status, 76.0% were single and 24.0% were married, with no widows, divorced, or separated riders. Educational levels among delivery riders indicated that 68.0% had completed SHS, 16.0% had JHS/MSLC education, 12.0% had other forms of education, and 4.0% had no formal education, with none having tertiary education.

4.2. Consumer's Knowledge Perception

The outcome of consumer's knowledge perception on hygiene practices of safety-based food delivery services using the following variables. Strongly disagree, disagree, neutral, agree, strongly agree as shown in **Table 3**.

Table 3. Table consumer's knowledge perception.

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
Understanding of food safety principles	15.0	14.4	11.3	41.3	18.1	3.33
Proper food handling practices	7.5	5.6	19.4	38.8	28.8	3.76
What consumers look for before ordering food	3.8	10.6	12.5	50.4	28.1	3.83
Delivery service should prioritize food safety in their operations.	8.1	6.9	10.0	41.3	33.8	3.86
Concerned about the potential health risks associated with consuming food delivered by motorcycles.	6.3	5.6	6.3	50.0	31.9	3.96
Active participation of consumers in ensuring safety of food delivery services.	16.3	13.1	14.4	28.8	27.5	3.38

Table 3 illustrates that consumers have a considerable understanding of food safety principles, which aligns with the findings of (Adi et al., 2024; Qian et al.,

2024), who highlighted the need for educational programs to enhance food safety knowledge. This suggests that a similar approach could benefit consumers, increasing their confidence and reinforcing their knowledge about food safety. Others such as (Fakfare, 2021; Kasmani et al., 2018; Melián-González, 2022; SayedMohammed et al., 2025) also affirm the importance of consumer awareness in shaping perceptions of food safety, further underscoring the role of education in influencing consumer behavior.

The study confirms that proper food handling practices are deemed essential by consumers, as indicated by a mean score of 3.76, with a significant portion of respondents agreeing or strongly agreeing with the need for these practices. This indicates the aftermath of eating contaminated food through unsafe food handling is very serious, hence consumers are gradually upgrading their knowledge level regarding what enters the body. This finding is consistent with (Ergönül, 2013; Redmond & Griffith, 2005), who emphasized the positive effect of consumer education on food safety behaviors, suggesting that awareness of these practices contributes to better food safety standards.

The trust consumers place in motorcycle-based food delivery services to prioritize food safety, with a mean score of 3.86, aligns with the research by (Leach et al., 2001; SayedMohammed et al., 2025; Uggioni & Salay, 2014). Both studies affirm that trust is crucial for the success of these services, as it further supports the notion that positive consumer perceptions directly impact the reputation and success of food delivery platforms.

Lastly, the concern about potential health risks during transportation, such as exposure to contaminants or improper handling, resonates with the findings of (Farrar & Guzewich, 2014; SayedMohammed et al., 2025) and (Fakfare, 2021). These studies confirm the critical role of delivery personnel in maintaining food safety, highlighting the importance of handling practices during the delivery process. This study's findings reaffirm these concerns, suggesting that safety during transportation remains a priority for consumers thus, revealing consumers have a solid understanding of food safety principles, reflecting the positive impact of educational programs in shaping safe food practices. Consumers emphasize the importance of proper food handling and express trust in motorcycle-based delivery services to prioritize food safety. However, concerns about transportation-related risks, such as exposure to contaminants and improper handling, remain prevalent.

4.3. Knowledge of Food Safety Practices

When respondents were asked to evaluate their confidence in their knowledge of food safety using three variables very confident, confident, and neutral, the results indicated a strong positive trend. Most respondents expressed that they were very confident in their understanding of food safety practices.

The results presented in **Figure 2** indicated that the majority of respondents were highly confident in their knowledge of food safety practices when handling

and delivering food orders. Specifically, 64% of the respondents reported feeling very confident, while 28% described themselves as confident. Only a small portion, 8%, expressed a neutral stance on their confidence levels. This distribution showed that nearly all participants (92%) were at least confident in their food safety knowledge, highlighting a generally strong self-assurance in this area among the surveyed group. This study confirms that individuals with food safety training are more likely to feel confident in their practices, which attests to the findings of **Table 3**.

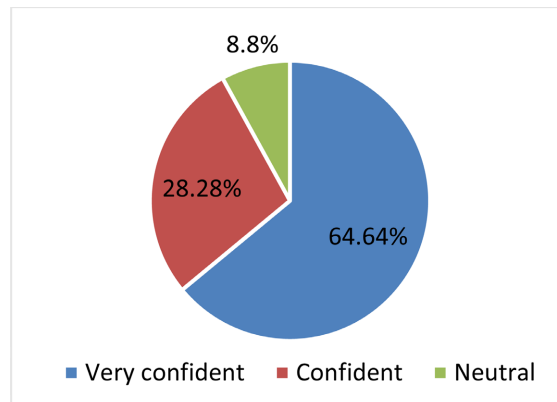


Figure 2. Knowledge of food safety practices.

4.4. Inquiring about Specific Food Safety Practices

The study explores the proactive inquiry into specific food safety practices, highlighting the importance of understanding and implementing effective food safety measures across, the variables used are always, often, occasionally and never.

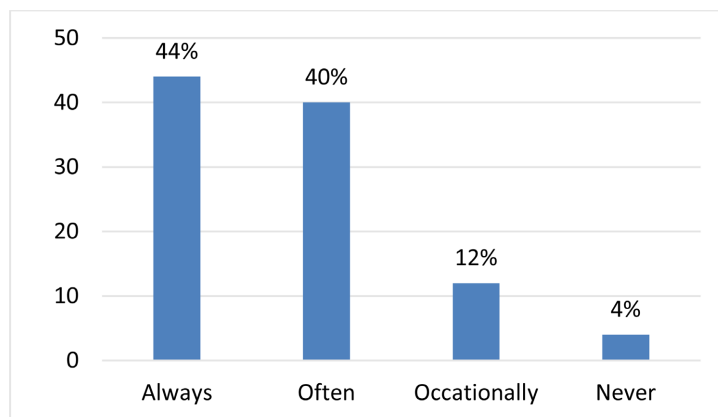


Figure 3. Specific food safety practices.

The results in **Figure 3** indicated the frequency with which individuals proactively inquired about specific food safety practices, such as hygiene standards, proper food handling techniques, temperature control measures, and allergen management protocols, when collecting orders from restaurants. Overall, a significant majority, 84%, either always or often took the initiative to ensure that

food safety practices were being followed, demonstrating a high level of concern for food safety among the respondents.

4.5. Food Safety Measures for Delivery Riders

The purpose of this section is to gather opinions on the most essential food safety measures that delivery riders should adhere to during transportation from respondents, based on the search results, several variables such as ensuring proper temperature, confirming food packaging integrity, implementing hygienic handling practices and all the above were used. These variables highlight the essential aspects of food safety that are essential for maintaining the quality and safety of food during delivery.

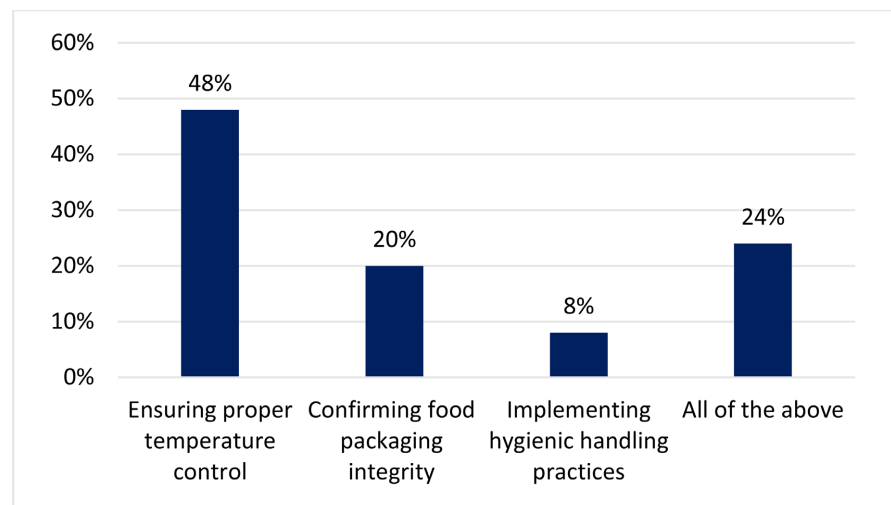


Figure 4. Food safety measures for delivery riders.

The findings from **Figure 4**, which highlight that 48% of respondents prioritize temperature control during food transportation, align with current literature emphasizing the importance of maintaining proper temperatures to prevent bacterial growth and preserve food quality. Studies, such as those by (Fakfare, 2021; Kasmani et al., 2018; Melián-González, 2022), underscore temperature control as a critical factor in preventing foodborne illnesses, particularly with perishable goods. Furthermore, the 20% of respondents emphasizing food packaging integrity resonates with research by (Adi et al., 2024; Qian et al., 2024), which points to the role of secure packaging in minimizing contamination risks and maintaining food safety throughout the supply chain. The 8% who prioritized hygienic handling practices reflect the importance of minimizing cross-contamination, as supported by the work of (Farrar & Guzewich, 2014; SayedMohammed et al., 2025; Uggioni & Salay, 2014), who advocate for strict hygiene protocols during food transportation. Finally, the 24% of respondents who considered all measures equally critical reflect a holistic view found in literature that stresses a multi-faceted approach to food safety, with each measure playing a pivotal role in ensuring safe delivery (Aung & Chang, 2014; Panghal et al., 2018).

The food delivery riders are aware they are the final connection in the line of food distribution, and recognize their role in preventing spoilage, allergen exposure, or physical hazards (e.g., spills). Furthermore to this, they ensure positive reviews and repeat orders, thereby doing their best by observing safe handling practices to prevent contamination, illness, or tampering.

Table 4. Customers perspective of hygiene and safety measures handling food by motorcycle-based food delivery services.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
Delivery personnel use safety protective gear while handling food.	18.1	8.8	20.6	23.8	28.8	3.33
Food packaging influences my perception of the overall hygiene standards of the delivery service.	1.3	14.4	5.6	51.3	27.5	3.76
Hygiene practices of delivery personnel.	8.8	26.3	5.0	48.8	11.3	3.83
Temperature control during food is crucial	4.4	2.5	19.4	56.9	16.9	3.86
Cleanliness of the motorcycle or delivery vehicle used by the food delivery service.	11.9	5.0	13.8	29.4	40.0	3.96
The presence of food safety certifications or endorsements	14.4	7.5	11.9	25.6	40.6	3.38

The results from **Table 4** revealed several insights into customers' perspectives on the hygiene and safety measures implemented by motorcycle-based food delivery services. A significant portion of customers, 28.8%, strongly agreed that delivery personnel used protective gear such as gloves and masks while handling food, resulting in a mean score of 3.33. The study is consistent with the findings of (Adi et al., 2024; Kasmani et al., 2018; Qian et al., 2024), who emphasize that customers are reassured when delivery personnel adhere to safety protocols such as using protective gear. The mean score of 3.33, reflecting customers' agreement that delivery personnel wore gloves and masks, affirms the importance of visible hygiene practices in food handling.

Additionally, the role of packaging cleanliness in shaping perceptions of hygiene is confirmed by (Fakfare, 2021; Melián-González, 2022), who highlighted that consumers' awareness of food safety regulations significantly influences their perceptions. The mean score of 3.76 for packaging cleanliness in this study aligns with these findings, suggesting that clean packaging plays a pivotal role in enhancing customers' confidence in food safety standards.

The expectation for transparency regarding hygiene practices, as indicated by a mean score of 3.83, confirms the literature's emphasis on the importance of clear

communication between food delivery services and their customers. This expectation is supported by previous studies which suggest that when customers are well-informed about hygiene protocols, they are more likely to trust the service.

Temperature control during delivery, with a mean score of 3.86, affirms (SayedMohammed et al., 2025; Uggioni & Salay, 2014), who both underscore the critical role of maintaining appropriate temperatures to prevent bacterial growth. The findings from this study further affirm the necessity of temperature regulation as a fundamental aspect of food safety, aligning with concerns over the risks of improper temperature maintenance highlighted in existing research.

Moreover, the high mean score of 3.96 for the cleanliness of delivery vehicles is consistent with (Panghal et al., 2018; Uggioni & Salay, 2014), who stressed the importance of routine hygiene inspections to mitigate contamination risks. This confirms the study's conclusion that vehicle cleanliness is crucial for customer satisfaction and trust in food delivery services.

Finally, the influence of food safety certifications, reflected in a mean score of 3.38, is consistent with the findings of (Aung & Chang, 2014; Uggioni & Salay, 2014), who affirm that regulatory compliance and certifications are key factors in customer assurance. This study aligns with the literature, underscoring the role of certifications as an official endorsement of adherence to food safety standards. The presence of the regulatory bodies also positively influences the activities of the riders as they must adhere to strict hygiene regulations (like temperature control and sealed packaging) to avoid violations, fines, or suspension from delivery apps. Protecting public health is a non-negotiable policy and riders know negligence could harm vulnerable groups (children, elderly, immunocompromised).

4.6. Ways of Obtaining Feedback

The feedback is essential for organizations to enhance their communication strategies and improve overall service quality. The variables used are face to face, online, and phone call. It should be noted that most common method was online feedback, which accounted for 44% of the responses. Face-to-face and phone call feedback were equally utilized, each representing 28% of the total. Overall, the results indicated that online feedback was the preferred method among respondents, followed by face-to-face and phone call methods, each contributing equally to the remaining feedback methods used.

The study further enquired about the kinds of feedback and this is depicted in **Figure 5**. Feedback is essential for evaluating customer experiences and perceptions regarding food safety, service quality, and overall satisfaction within the food delivery context.

The results displayed in **Figure 5** show that most feedback centered around temperature, with 44.0% of respondents reporting that food arrived cold. Feedback on the delivery time was the second most common, accounting for 32.0%, indicating that the food was still quite hot upon arrival. Handling of food at the

restaurant, particularly regarding temperature, made up 20.0% of the responses, while other feedback types represented just 4.0%. Overall, the majority of responses were related to temperature issues, either directly or indirectly, making up a substantial portion of the total feedback. Studies such as those by (Fakfare, 2021; Hakim et al., 2022; Melián-González, 2022) point out that temperature issues, particularly food arriving cold, significantly impact customers' perceived value and satisfaction. Consumers expect food to retain the same quality as in-restaurant dining, and temperature is key to meeting this expectation. As suggested by (Kasmani et al., 2018; Melián-González, 2022), poor handling practices, such as inadequate packaging or improper storage, can compromise the temperature and quality of food, contributing to negative feedback.

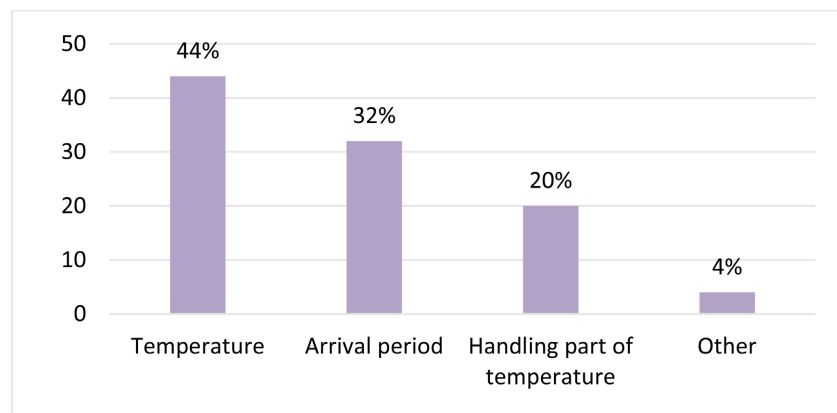


Figure 5. The kind of feedback.

4.7. Factors Influencing Consumers' Trust

Table 5 examined the factors that influence consumers' trust in the safety practices of motorcycle-based food delivery and their perceived reliability of the delivery process.

Table 5 depicts the factors influencing consumers' trust in the safety practices of motorcycle-based food delivery, and the perceived reliability of the delivery process. Consumers had a moderate level of trust that these services prioritized food safety over the speed of delivery, with a mean score of 3.53. Consumers' primary concern revolves around delivery-related issues, particularly the adherence to safety and sanitary standards (Hoyos Vallejo & Chinelato, 2025; Saad, 2021). The moderate level of trust reflects the ongoing need for delivery services to emphasize food safety over speed, which aligns with the assertion by (Hakim et al., 2022; SayedMohammed et al., 2025) that understanding customers' perspectives on food safety is crucial for developing effective policies. Reliability in delivering food orders within the estimated time significantly impacted their perception of the service's professionalism and safety standards, as indicated by a higher mean score of 3.84. The significance of reliable delivery times is echoed in the literature by (Saad, 2021), who emphasizes the role of timely deliveries in shaping consumer trust. Moreover, (Hong et al., 2021; Jagtap et al., 2021) highlights that efficient

delivery practices are essential for maintaining food safety. Transparent tracking of orders from the kitchen to the doorstep of the consumer was also an important factor, with a mean score of 3.74, showing that consumers valued this feature for trust-building. (Melián-González, 2022; Saad, 2021) discuss the potential of block-chain technology to enhance food traceability and safety.

Table 5. Factors that influence consumers' trust in motorcycle-based food delivery.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
Prioritize the safety of food over speed of delivery.	8.8	11.9	20.0	36.9	22.5	3.53
Delivering food orders within the estimated time	13.1	5.0	8.1	31.9	41.9	3.84
Transparent tracking of orders from kitchen to doorstep.	5.6	11.3	13.1	43.1	26.9	3.74
Consistency in adhering to safety protocols.	3.8	21.9	8.1	38.8	27.5	3.64
Clear channels for feedback and addressing customer concerns about food safety.	5.0	5.6	21.3	36.9	31.3	3.84
The reputation of the restaurant.	13.1	8.1	5.0	49.4	24.4	3.64

Consistency in adhering to safety protocols, even during peak delivery times, was considered crucial, as reflected by a mean score of 3.64. Additionally, providing clear channels for feedback and addressing customer concerns about food safety increased consumer trust, with a mean score of 3.84. The importance of consistent adherence to safety protocols is highlighted by (Hakim et al., 2022; Kasmani et al., 2018; Melián-González, 2022), who stress that food safety is contingent on the actions of delivery personnel and adherence to protocols, regardless of delivery volume. The role of consumer feedback mechanisms is underscored by (Hong et al., 2021; Hoyos Vallejo & Chinelato, 2025; SayedMohammed et al., 2025), who highlight the importance of addressing customer concerns in maintaining food safety practices. Effective communication channels can significantly enhance consumer trust.

Finally, the reputation of the restaurant from which the order was placed played a significant role in affecting consumers' trust in the safety practices of the delivery service, also with a mean score of 3.64. The reputation of the restaurant plays a significant role in consumer trust, as noted by (Hong et al., 2021; Jagtap et al., 2021; Saad, 2021), who discuss the importance of professional training and sanitary practices in ensuring safe food delivery. The reputation of the food source adds an additional layer of trust. These findings underscored the importance of various factors in building consumer trust in motorcycle-based food delivery services.

4.8. Relationship between Food Safety Knowledge and Practices (Consumers)

Table 6 aims to analyze the consumer's perspective on relationship between food safety knowledge and the practices of food handlers in restaurants. Understanding this relationship helps assess how knowledge influences the implementation of safe food handling practices.

Table 6. Consumer's perspective on food safety knowledge and practices.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
Food delivery services that prioritize safety and hygiene.	10.0	15.6	18.1	33.1	23.1	3.44
Affordability of food delivery influences my decision to prioritize safety standards over cost.	10.0	10.6	6.9	43.1	29.4	3.71
Discounts and promotions offered by food delivery services affect my perception of their commitment to safety	3.8	8.8	6.3	42.5	38.8	4.04
Safety measures by food delivery services justify slightly higher service fees.	5.6	16.3	19.4	16.9	41.9	3.73
Offering better safety standards, even if it means paying slightly more for delivery.	4.4	10.0	18.8	15.0	51.9	4.00
Motorcycle-based food delivery justifies any additional cost associated with ensuring food safety.	13.1	6.9	7.5	21.9	50.6	3.90

Table 6 talks about consumer's perspective on food safety knowledge and practices of food handlers in restaurants. The majority of respondents were willing to pay a premium for food delivery services that prioritized safety and hygiene, with a mean score of 3.44, indicating a general agreement. This research finding was in line with (Dai et al., 2022; Hoyos Vallejo & Chinelato, 2025), which highlighted consumers' concerns about the adherence of food delivery services to safety and sanitary standards. Consumers' willingness to pay more for assured safety reflects the value they place on hygienic practices, corroborating the significance of maintaining high safety standards in food delivery. Affordability significantly influenced consumers' decisions to prioritize safety standards over cost, with a mean score of 3.71. Discounts and promotions had a notable impact on consumers' perceptions of a service's commitment to safety, as reflected by a high mean score of 4.04.

Moreover, a considerable number of consumers believed that investing in safety

measures justified slightly higher service fees, as indicated by a mean score of 3.73. There was also a strong inclination to switch to competitors offering better safety standards, even at a higher cost, with a mean score of 4.00. This finding aligns with research by (Dai et al., 2022; Hakim et al., 2022; Hoyos Vallejo & Chinelato, 2025), who noted consumers' concerns about the nutritional quality and safety of food from takeout and online delivery services. The emphasis on affordability suggests that while consumers value safety, they also weigh the cost implications, underscoring the need for food delivery services to balance quality and cost. Lastly, the convenience of motorcycle-based food delivery was perceived to justify any additional cost associated with ensuring food safety, with a mean score of 3.90. These findings underscored the importance of safety and hygiene in shaping consumer behavior and preferences in the context of food delivery services. This is in line with findings, which indicate that consumer trust in food safety can be influenced by marketing strategies that highlight safety measures. The findings of (Kasmani et al., 2018; Melián-González, 2022), who noted that delivery-related issues, such as delays and temperature fluctuations, affect food quality. Consumers are willing to bear additional costs for the convenience of timely and safe delivery, emphasizing the importance of efficient and hygienic delivery practices.

4.9. Food Safety Challenges during Delivery

As the food delivery services continue to expand, several key challenges have emerged that impact food safety throughout the delivery process. Thus, **Figure 6** used variables such as very satisfied, satisfied and neutral to assess.

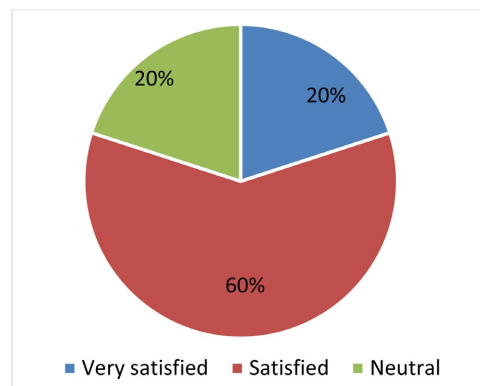


Figure 6. Food safety challenges during delivery.

Figure 6 showed that respondents' satisfaction with the support and resources provided by motorcycle-based food delivery services to address food safety challenges during delivery varied. Of the respondents, 20% were very satisfied with the support and resources provided. A majority, 60%, were satisfied, while 20% remained neutral regarding their satisfaction levels. Overall, all respondents expressed varying degrees of satisfaction, with a cumulative 80% indicating either satisfaction or strong satisfaction with the food safety measures in place during delivery. The findings confirm that a majority of respondents are either satisfied

or very satisfied, which affirms the conclusions drawn by (Dai et al., 2022; Hong et al., 2021; Qian et al., 2024; Shroff et al., 2022) on the importance of reliable food safety protocols during delivery services. This is particularly crucial in high-demand markets, where food handling and delivery speed are important for customer satisfaction. Again (Hakim et al., 2022; Jagtap et al., 2021; Kasmani et al., 2018), found that while food safety measures are generally well-received, there are segments of the population with moderate levels of concern.

4.10. Delivery Riders in Promoting and Ensuring Food Safety Practices

By evaluating these perceptions, food sellers can gain a clearer understanding of the crucial role that delivery riders play in the food safety environment and identify potential opportunities for improvement and this is depicted in **Table 7**.

Table 7. Delivery riders promoting and ensuring food safety practices.

	Frequency	Percent
Extremely important	6	24.0
Very important	12	48.0
Important	6	24.0
Slightly important	1	4.0
Total	25	100.0

Table 7 illustrates motorcycle-based food delivery services. According to the data, 24% of respondents deemed this role to be extremely important, while 48% considered it very important. Additionally, 24% of respondents believed it was important, and a small fraction, 4%, regarded it as slightly important. Overall, the majority of respondents, 96%, viewed the role of delivery riders in food safety as either important, very important, or extremely important.

4.11. Further Analysis

In this analysis, correlation and regression analysis was employed to describe the strength of the association between the dependent variable (food safety practices) and the independent variables (regulatory compliance, personal hygiene practice and cleanliness of delivery equipment). This can be seen in **Table 8**.

Regulatory compliance shows a strong positive correlation with food safety practices ($r = 0.75$, $p < 0.05$), indicating that adherence to regulations significantly enhances food safety. Personal hygiene practices also exhibit a substantial positive correlation with food safety practices ($r = 0.70$, $p < 0.05$), emphasizing the importance of hygiene among delivery personnel. Food handling procedures have the highest positive correlation with food safety practices ($r = 0.77$, $p < 0.05$), underscoring their critical role in ensuring food safety. Additionally, the cleanliness of delivery equipment is strongly correlated with food safety practices ($r = 0.78$, p

< 0.05), highlighting that maintaining clean delivery equipment is essential for safe food delivery. These results suggest that regulatory compliance, personal hygiene, proper food handling, and cleanliness of equipment are all vital components that collectively contribute to improving food safety practices in motorcycle-based food delivery services.

Table 8. Correlation analysis.

Variable	Regulatory compliance	Personal hygiene practices	Food handling procedures	Cleanliness of delivery equipment	Food safety practices
Regulatory compliance	1.00				
Personal hygiene practices	0.23	1.00			
Food handling procedures	0.45	0.38	1.00		
Cleanliness of delivery equipment	0.18	0.33	0.24	1.00	
Food safety practices	0.75**	0.70**	0.77**	0.78**	1.00

4.12. Regression Model

The regression model examines the effect of regulatory compliance, personal hygiene practices, and the cleanliness of delivery equipment on food safety practices in motorcycle-based food delivery services. The analysis aims to quantify the influence of each factor on overall food safety. Results suggest that regulatory compliance, personal hygiene, and equipment cleanliness significantly impact the effectiveness of food safety practices, with each variable contributing to safer food handling and delivery.

Table 9. Regression model.

Dependent Variable: Food Safety Practices			B	Standard Error	t	Sig.
(Intercept)			1.234	0.421	2.931	0.004**
Regulatory compliance			0.540	0.081	6.667	0.000**
Personal hygiene practices			0.320	0.093	3.441	0.001**
Cleanliness of delivery equipment			0.276	0.087	3.172	0.002**
R	R Square	Adjusted R Square	Standard Error of the Estimate			
0.782	0.611	0.595	0.312			

$$\text{Regression model; } y = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + \epsilon$$

where y = Food safety practices;

X_1 = Regulatory compliance;

X_2 = Personal hygiene practices;

X_3 = Cleanliness of delivery equipment;

ϵ = Error term.

Saturated model

$$y = 1.234 + 0.540X_1 + 0.320X_2 + 0.276X_3 \quad \text{model 1}$$

The regression analysis results presented in **Table 9** demonstrate the effect of regulatory compliance, personal hygiene practices, and the cleanliness of delivery equipment on food safety practices in motorcycle-based food delivery services. The model shows a significant relationship between these variables and food safety practices, with an intercept value of 1.234 ($p = 0.004$), indicating the base-line level of food safety practices when all predictor variables are zero.

Regulatory compliance has a positive and significant effect on food safety practices ($B = 0.540$, $p < 0.001$), suggesting that increased adherence to regulations is associated with better food safety practices. Personal hygiene practices also positively influence food safety practices ($B = 0.320$, $p = 0.001$), indicating that better hygiene practices among delivery personnel contribute significantly to food safety. Similarly, the cleanliness of delivery equipment is positively related to food safety practices ($B = 0.276$, $p = 0.002$), implying that maintaining clean delivery equipment is crucial for ensuring food safety.

The model explains a substantial portion of the variance in food safety practices, with an R-squared value of 0.611, indicating that 61.1% of the variability in food safety practices can be accounted for by the predictors included in the model. The adjusted R-squared value of 0.595 further confirms the model's robustness. The standard error of the estimate is 0.312, reflecting the average distance that the observed values fall from the regression line.

Overall, the regression model ($y = 1.234 + 0.540X_1 + 0.320X_2 + 0.276X_3$) provides strong evidence that regulatory compliance, personal hygiene practices, and the cleanliness of delivery equipment are significant predictors of food safety practices in motorcycle-based food delivery services.

Table 10. ANOVA.

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	12.318	3	4.106	42.140	0.000**
Residual	7.832	80	0.098		
Total	20.150	83			

The ANOVA results in **Table 10** indicate that the regression model significantly predicts food safety practices in motorcycle-based food delivery services $F(3, 80) = 42.140$, $p < 0.001$). The model explains a substantial portion of the variance (regression sum of squares = 12.318) compared to the residual variance (residual sum of squares = 7.832). This confirms that regulatory compliance, personal hygiene practices, and cleanliness of delivery equipment are significant predictors of food safety practices.

5. Conclusion and Recommendations

Based on the objectives and the corresponding findings, the following conclusions were made from the study. The study concluded that respondents exhibit a high level of awareness and understanding of food safety principles, highlighting the need for targeted educational programs to further enhance this knowledge. Consumers recognize the critical importance of proper food handling practices in motorcycle-based food delivery services and actively seek information on food safety, demonstrating a proactive attitude. Trust in these services is relatively high, although concerns about potential health risks, such as exposure to contaminants and inadequate temperature control, remain. Key factors influencing customer perceptions of hygiene include the use of protective gear by delivery personnel, cleanliness of food packaging, transparency about hygiene practices, temperature control, and vehicle cleanliness.

The study also concludes that food safety certifications significantly impact consumer confidence. Consumers show a moderate level of trust that food delivery services prioritize safety over speed and value reliable delivery times, transparent order tracking, and consistent adherence to safety protocols. The study also indicated that most respondents are willing to pay a premium for services that prioritize safety and hygiene, with affordability, discounts, and promotions influencing their decisions.

The study established that consumers exhibit a moderate level of trust in motorcycle-based food delivery services, particularly concerning food safety over delivery speed. This trust is influenced by key factors, including reliable delivery times, transparent tracking systems, consistent adherence to safety protocols, effective feedback mechanisms, and the reputation of the restaurant. While consumers appreciate timely deliveries, food safety remains a top concern, emphasizing the need for services to prioritize safety standards consistently, as supported. Enhancing transparency, maintaining reliable practices, and addressing consumer concerns are critical for building and sustaining trust in food delivery services.

Based on the study's findings, it is recommended that below.

Health departments, educational institutions, and food safety organizations should develop and implement targeted programs to enhance consumer and food delivery personnel's knowledge of food safety principles.

Food delivery companies and quality assurance teams should increase transparency about hygiene practices, ensure proper use of protective gear, maintain clean packaging, control food temperature during delivery, and ensure vehicle cleanliness to address health risk concerns.

Training departments of food delivery companies should emphasize personal hygiene practices and cleanliness of delivery equipment through regular training and inspections.

Logistics teams should prioritize safety protocols over speed, ensuring reliable delivery times, transparent order tracking, and consistent adherence to safety measures without compromising service quality.

Marketing and customer relations teams should effectively communicate food safety measures, while offering competitive pricing and promotions to maintain market position.

Quality control teams and health inspectors should conduct regular audits and inspections on food sellers and delivery riders to ensure ongoing compliance with food safety practices, implementing improvements based on consumer feedback and regulatory updates.

Food delivery companies should have delivery bikes and rent out to boys and staffs etc. with the company's motor cycle, some level of monitoring can be achieved.

Food delivery companies should get tracking device to check temperature etc.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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