

Evaluating the Effectiveness of Food Quality & Safety Knowledge in the Hospital Staff in Albania

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Abstract: *The current study is based on the chapter on food safety and quality standards training of 19 hospitals in Albania. This research adopted a broad cross-sectional analysis design to assess the effectiveness of food safety education across these healthcare institutions. The study focused on secondary data analysis derived from standardized assessment evaluations carried out in Albanian base hospitals through the UTU (Ushqim, Trajnim, Udhëzim - Food, Training, Guidance) evaluation framework. The results indicated an average effectiveness level of 81.3%, which exceeds the international benchmark of 72.4%. Most hospitals (73.7%) received a rating of "Good," while a small number displayed moderate or poor performance, revealing inconsistencies and the necessity for immediate interventions. The results imply that Albanian hospitals generally perform well in terms of food safety knowledge, yet their performance varies, highlighting the urgent requirement for customized interventions. Overall, while the system shows promise in its effectiveness, it is essential to address institutional shortcomings to ensure ongoing food safety and adherence across all facilities through thorough instructive initiatives. The findings advocate for a differentiated training strategy, entailing immediate comprehensive guidance for underperformers, specific improvements for moderate performers, and maintenance programs for those who excel.*

Keywords: food safety knowledge, hospital food services, Albania healthcare, knowledge effectiveness, quality assessment

INTRODUCTION

Food safety in healthcare institutions represents a critical intersection of public health, patient care, and institutional quality management. Hospital food services serve vulnerable populations including immunocompromised patients, elderly individuals, and those with chronic conditions, making food safety protocols essential for preventing healthcare-associated infections and ensuring optimal patient outcomes (see WHO, 2024). The World Health Organization (WHO) estimates that foodborne diseases

cause approximately 2.2 million deaths annually worldwide, with 1.9 million of these deaths occurring among children, highlighting the global significance of effective food safety management (see WHO,2017). In the context of healthcare delivery, food safety knowledge training programs serve as fundamental interventions for ensuring staff competency, regulatory compliance, and patient protection. The effectiveness of these information training programs directly impacts institutional performance, patient satisfaction, and healthcare quality indicators. Albania, as a developing European nation undergoing healthcare system modernization and European Union accession preparations, faces unique challenges in implementing and maintaining effective food safety information across its hospital network. The Albanian healthcare system operates within a framework of ongoing reform and quality improvement initiatives. With 413 public healthcare clinics providing primary care services, the system serves a population of nearly 2,9 million citizens (see U.S. Trade International Administration, 2024). The healthcare infrastructure includes both public and private providers, with increasing emphasis on quality standards alignment with European Union requirements. This transition period presents both opportunities and challenges for implementing standardized food safety knowledge across diverse institutional settings. Food safety effectiveness evaluation requires systematic approaches that measure both knowledge acquisition and practical application. The literature shows that effective knowledge evaluation must address multiple competency domains, including personal hygiene practices, hazard analysis principles, critical control point identification, and regulatory compliance requirements (Nitescu et al.,2025; Hardstaff et al.,2018). However, measuring this effectiveness extends beyond simple knowledge assessment to include behavioral change, workplace application, and sustained performance improvement over time. This study addresses a critical gap in the literature regarding food safety knowledge effectiveness in Albanian healthcare settings. While international research provides valuable frameworks and benchmarks, the specific context of Albanian hospitals, including resource constraints, regulatory environments, and cultural factors,requires dedicated investigation. The research employs a comprehensive multi-hospital analysis approach, examining knowledge performance variations across 19 Albanian base hospitals using standardized evaluation criteria,as applied . The significance of this research extends beyond academic inquiry to practical healthcare management applications. The findings provide evidence-based insights for healthcare administrators, policy makers, and training professionals responsible for food safety program development and implementation. Additionally, the research contributes to the broader understanding of training effectiveness evaluation methodologies in resource-constrained healthcare environments. The study objectives include: (1) assessing current food safety training effectiveness across Albanian hospitals, (2) identifying performance variations and associated factors, (3) comparing Albanian performance with international benchmarks, (4) developing evidence-based recommendations for program improvement, and (5) contributing to the theoretical understanding of training effectiveness evaluation in healthcare settings.

LITERATURE REVIEW

Food Safety Training in Healthcare Settings

Food safety training in healthcare environments requires specialized approaches that address the unique challenges of serving vulnerable populations. Research shows that healthcare food service operations face heightened risks due to patient immunocompromised status, medication interactions with foodborne pathogens, and the potential for nosocomial infections (Marklinder et

al.,2024;Guennouni et al.2022). Effective training programs must therefore incorporate both general food safety principles and healthcare-specific considerations. The theoretical foundation for food safety training effectiveness rests on adult learning principles, behavioral change theories, and competency-based education models. Knowles' andragogy theory emphasizes the importance of relevance, experience integration, and problemsolving orientation in adult learning contexts (Tough& Knowles,1985). Applied to food safety comprehensive approaches, this suggests that knowledge must show clear connections between content and workplace applications, build upon existing staff experience, and provide practical problem-solving opportunities. Behavioral change theories, particularly the *Theory of Planned Behavior* (see Ajzen,1991), provide additional insights into the effectiveness factors. Research indicates that information instruction must address not only knowledge and skills but also attitudes, perceived behavioral control, and social norms within the workplace environment(Kirckpatric,2009). This multi-dimensional approach recognizes that sustainable behavior change requires comprehensive intervention strategies that extend beyond traditional knowledge transfer models.

Effectiveness Evaluation Methods

The evaluation of instruction effectiveness has evolved from simple satisfaction surveys to comprehensive multi-level assessment frameworks. Kirkpatrick's Four-Level Evaluation Model remains the most widely cited framework, including reaction, learning, behavior, and results levels (Kirkpatrick,2009). However, contemporary research emphasizes the importance of additional factors including know-how transfer, organizational support, and long-term sustainability.

The Centers for Disease Control and Prevention in the USA provides authoritative guidance on effectiveness evaluation, emphasizing the importance of pre-post assessment designs for measuring learning gains in healthcare staff (see Center for Disease and Prevention, 2024). Their recommendations include multiple evaluation timing strategies: before and after section assessments, retrospective pre-post evaluations, duringtraining knowledge checks, immediate post-section evaluations, and delayed follow-up assessments. This comprehensive approach recognizes that different evaluation methods provide complementary insights into instructive effectiveness.

Research consistently shows that pre-post assessment designs provide the most robust evidence of instruction effectiveness by measuring actual learning gains rather than simply assessing final knowledge levels(Al-Akhash et al.,2022; Ayaz et al.,2018). However, practical constraints in healthcare settings often necessitate alternative approaches including retrospective self-assessments and immediate post-section evaluations. The key consideration is selecting evaluation methods that provide meaningful data while remaining feasible within operational constraints.

International Benchmarks and Comparative Studies

International research provides valuable benchmarks for evaluating food safety understanding effectiveness in healthcare settings. For example, a comprehensive study conducted in Jordan examined food safety practice effectiveness across hospitals and hotels, providing directly relevant comparative data for Albanian hospital assessment (Osaili et al.,2012). The Jordan study employed a pre-test-post-test design with 412 food handlers, showing significant improvements in both knowledge and practices following a training intervention. The Jordan study findings revealed that food safety

knowledge scores improved from 66, 66 % pre-instruction to 72,44 % post-instruction, representing a statistically significant gain of 5.78 percentage points (Osaili et al.,2012). Food safety practice scores showed more modest improvements from 67,14 % to 69,82 %, indicating that knowledge gains do not automatically translate to proportional practice improvements. These findings highlight the importance of distinguishing between knowledge acquisition and behavioral application in information effectiveness evaluation. Particularly relevant to the Albanian context, the Jordan study found that food handlers working in organizations with implemented HACCP (Hazard Analysis and Critical Control Points) principles showed higher baseline knowledge and better practices (Osaili et al.,2012). This finding suggests that systematic food safety management systems enhance instruction effectiveness by providing supportive organizational contexts for knowledge application. The Jordan study also revealed significant educational effects outcomes, with higher education levels correlating with better food safety knowledge scores (Osaili et al.,2012). This finding has important implications for creating some training program design, suggesting that educational background should be considered in developing differentiated training approaches for diverse staff populations.

HACCP Implementation and Training Integration

The Hazard Analysis and Critical Control Points (HACCP) system represents the gold standard for food safety management in healthcare and food service operations. The Food and Drug Administration's HACCP Principles and Application Guidelines provide comprehensive frameworks for systematic food safety management (see HACCP Guidelines,2022). The seven HACCP principles, hazard analysis, critical control point determination, critical limit establishment, monitoring procedures, corrective actions, verification procedures, and record-keeping form the foundation for effective food safety knowledge plans. A HACCP implementation generally requires extensive staff training across multiple competency domains. In this sense, proposing effective training programs must address hazard identification skills, critical control point monitoring techniques, corrective action procedures, and documentation (see HACCP Guidelines,2022). The complexity of HACCP implementation necessitates ongoing instruction and competency assessment to ensure sustained effectiveness. Research shows that the HACCP-based training programs when applied, would achieve superior outcomes compared to traditional food safety approaches (see US Institute for Healthcare Improvement,2022). The systematic nature of HACCP would provide clear performance standards, measurable outcomes, and continuous improvement mechanisms that enhance effectiveness. However, successful HACCP implementation requires organizational commitment, resource allocation, and sustained management support, which are the biggest challenge of the Albanian context.

Albanian Healthcare Context and Regulatory Framework

The Albanian healthcare system operates within a complex regulatory environment that includes national health policies, European Union accession requirements, and international quality standards. The Ministry of Health develops healthcare policies, proposes national healthcare budgets, and monitors state-owned health institutions (see Albanian Ministry of Health,2008) . The National Agency of Drugs and Medical Equipment oversees registration processes and quality standards, including food safety regulations in healthcare settings.

Albania's healthcare system has undergone significant transformation since 2013, with the implementation of universal healthcare coverage and public-private partnership initiatives (see

Albanian Ministry of Health,2008). These reforms have created opportunities for quality improvement initiatives, including standardized food safety open- knowledge operations within the quality standards training approaches . The Albanian food safety regulatory framework includes the Law "On Food" adopted in 2008, which harmonizes national legislation with European Union Acquis Communautaire (see Law "On Food",2008). This legal framework establishes food safety standards, inspection procedures, and compliance requirements that directly impact hospital food service operations. Understanding this regulatory context is essential for evaluating any training program proposal and identifying improvement opportunities for food safety and quality. However, resource constraints and infrastructure limitations continue to present challenges for a comprehensive program implementation.

Gaps in Current Studies

Despite extensive international research on food safety effectiveness, significant gaps remain in understanding its effectiveness in Albanian healthcare settings. Most existing studies focus on developed healthcare systems with established quality management frameworks, limiting their applicability to developing healthcare environments. The lack of standardized evaluation frameworks for food safety knowledge instructions in Albanian hospitals represents another significant research gap. While international frameworks provide valuable guidance, their adaptation to local contexts requires empirical validation and cultural sensitivity considerations. This study addresses these gaps by providing comprehensive multi-hospital analysis using standardized evaluation criteria adapted to the Albanian healthcare context. Furthermore, limited research exists on the relationship between instruction effectiveness and broader healthcare quality indicators in developing healthcare systems. Understanding these relationships is essential for demonstrating the value of further food safety training investments and securing ongoing organizational support for program implementation and improvement.

METHODOLOGY

Research Design

The cross-sectional design enabled systematic comparison of knowledge effectiveness across multiple institutions while providing insights into system-wide performance patterns. The research approach integrated quantitative analysis of evaluation scores with comparative assessment against international benchmarks. This methodology provided both descriptive insights into current performance levels and analytical perspectives on relative effectiveness compared to established standards. The use of standardized evaluation criteria across all participating hospitals ensured data consistency and enabled meaningful inter-institutional comparisons.

Study Setting

The study included 19 Albanian based hospitals representing diverse geographic regions and institutional characteristics to assess their level of knowledge on food safety and quality. The participating hospitals included: SB Puke, SB Kucove, SB Has, SB Tropoje, SB Permet, SB Pogradec, SB Devoll, SB Peqin, SB Kurbin, SB Mallakaster, SB Skrapar, SB Gramsh, SB Sarande, SB Kolonje, SB Tepelene, SB Mat, SB Bulqize, SB Librazhd, and SB Kavaje*. These institutions represent the

backbone of Albania's public healthcare system, providing primary care services to diverse patient populations across urban and rural settings.

The hospital selection provided comprehensive geographic coverage of Albania, including northern, central, and southern regions. This geographic diversity ensured that the findings would be representative of the broader Albanian healthcare system rather than reflecting regional variations or specific institutional characteristics.

Each participating hospital underwent evaluation using identical assessment criteria, ensuring standardized data collection and enabling meaningful comparative analysis. The hospitals varied in size, patient volume, and resource availability, providing insights into the relationship between institutional characteristics and instruction effectiveness outcomes.

Evaluation Framework

The study referred to the UTU evaluation framework, a comprehensive assessment system designed specifically for Albanian healthcare food safety evaluation. The framework involves 15 standardized criteria organized into two primary categories: UTU 1 Series (Infrastructure and Documentation) and UTU 2 Series (Operational Standards). This dual-category approach ensures comprehensive coverage of both foundational requirements and operational implementation aspects.

The UTU 1 Series criteria address fundamental infrastructure and documentation requirements including food service documentation and procedures, staff scheduling and adequacy, staff instruction requirements, health certificates and medical clearances, food safety protocols, and quality control measures. These criteria establish the foundational elements necessary for effective food safety management in healthcare settings. The UTU 2 Series criteria focus on operational standards including food preparation and handling procedures, storage and preservation protocols, hygiene and sanitation practices, equipment maintenance and calibration, waste management procedures, and food distribution and service standards. These criteria assess the practical implementation of food safety principles in daily operations. Each evaluation criterion is classified as either Type A (higher weight, maximum score 5) or Type B (lower weight, maximum score 5), reflecting the relative importance of different assessment areas. The weighted scoring system ensures that critical safety elements receive appropriate emphasis in overall effectiveness calculations while maintaining comprehensive coverage of all relevant domains.

Data Collection and Scoring

Data collection employed external evaluator assessments conducted by qualified food safety professionals using standardized evaluation protocols. External evaluation provides objective assessment perspectives and reduces potential bias associated with self-assessment approaches. The evaluators utilized consistent scoring criteria across all participating hospitals, ensuring data reliability and comparability. The scoring system employed a 5-point scale for each evaluation criterion on food safety information, with scores ranging from 1 (poor performance) to 5 (excellent performance). This scale provides sufficient granularity for meaningful performance differentiation while remaining practical for evaluator implementation. Weighted scores were calculated for each criterion based on the established weighting system, with Type A criteria receiving full weight (1.0) and Type B criteria

receiving reduced weight (0.75). This weighting approach reflects the relative importance of different safety elements while maintaining comprehensive assessment coverage.

Data Analysis

Data analysis employed descriptive statistics, performance categorization, and comparative analysis methodologies. Descriptive statistics included measures of central tendency, variability, and distribution characteristics for individual hospitals and the overall system. These analyses provided foundational insights into current performance levels and system-wide patterns. Performance categorization utilized established benchmarks derived from international research and best practice standards. Hospitals were classified into three performance categories on instruction: "Good" ($\geq 75\%$ effectiveness), "Moderate" (50-74% effectiveness), and "Poor" ($< 50\%$ effectiveness). These categories align with established food safety knowledge evaluation standards and provide clear frameworks for intervention prioritization. Comparative analysis examined Albanian knowledge hospital performance relative to international benchmarks, particularly the Jordan hospital study findings for a further proposal on training opportunities (Osaili et al., 2012). This comparative approach provided context for interpreting Albanian performance levels and identifying areas of relative strength and improvement opportunity. The comparison utilized similar evaluation methodologies and performance metrics to ensure meaningful analysis.

Statistical analysis included calculation of overall system effectiveness, performance range assessment, standard deviation analysis, and inter-hospital variation examination. These analyses provided comprehensive insights into system performance characteristics on knowledge and identified patterns requiring further investigation or intervention.

Performance Metrics

The key performance metric was overall knowledge and instruction percentage, calculated as the ratio of total achieved scores to total possible scores across all evaluation criteria. This metric provides a comprehensive measure that incorporates both individual criterion performance and overall system integration.

Secondary performance metrics included individual criterion scores, category-specific performance (UTU 1 vs UTU 2 series), and performance consistency measures. These metrics enabled detailed analysis of specific strengths and weaknesses within the overall framework. Additional metrics included performance ranking, improvement priority identification, and instruction needs assessment categorization. These metrics supported practical application of research findings by providing clear guidance for intervention prioritization and resource allocation decisions.

Quality Assurance

Quality assurance measures included evaluator instructor standardization, assessment protocol consistency, and data validation procedures. Evaluator instruction ensured consistent application of scoring criteria and reduced inter-evaluator variability. Standardized assessment protocols provided clear guidance for evaluation implementation and data collection. Data validation procedures included range checking, consistency verification, and completeness assessment. These procedures ensured

data accuracy and identified potential collection errors or inconsistencies requiring correction. The quality assurance framework supported reliable and valid research findings.

Ethical Issues

The research used secondary data analysis of existing evaluation assessments, removing direct patient or staff interaction requirements. The study focused on institutional performance assessment on knowledge rather than individual evaluation, protecting staff privacy and confidentiality. Hospital identification codes were maintained for analytical purposes while ensuring that findings would be presented in constructive and improvement-oriented contexts. The research approach emphasized positive contribution to Albanian healthcare quality improvement rather than punitive assessment or institutional criticism. Findings were designed to support evidence-based improvement initiatives and resource allocation decisions that would benefit patient care and staff development training.

RESULTS

Overall System Performance

The comprehensive analysis of 19 Albanian hospitals revealed an overall system effectiveness of 81.3% (SD = 16.9%), indicating generally strong performance in food safety knowledge implementation approaches. This system-wide effectiveness on food safety knowledge significantly exceeds the international benchmark of 72.4% established by the Jordan hospital study (Osaili et al,2012), suggesting that Albanian hospitals demonstrate superior information outcomes compared to similar developing healthcare systems. The knowledge performance range across participating hospitals extended from 47.1% to 100.0%, indicating substantial inter-institutional variation in knowledge effectiveness. This 52.9 percentage point range highlights the importance of future targeted interventions to address performance disparities and ensure consistent food safety standards across the Albanian healthcare system. The standard deviation of 16.9% indicates moderate variability in hospital knowledge performance, suggesting that while most hospitals perform reasonably well, significant outliers require focused attention. This variability pattern is consistent with healthcare systems undergoing quality improvement initiatives, where early adopters achieve excellent performance while lagging institutions require additional support. Figure 1 introduces a visual presentation of the overall system effectiveness in Albania regarding food safety knowledge.

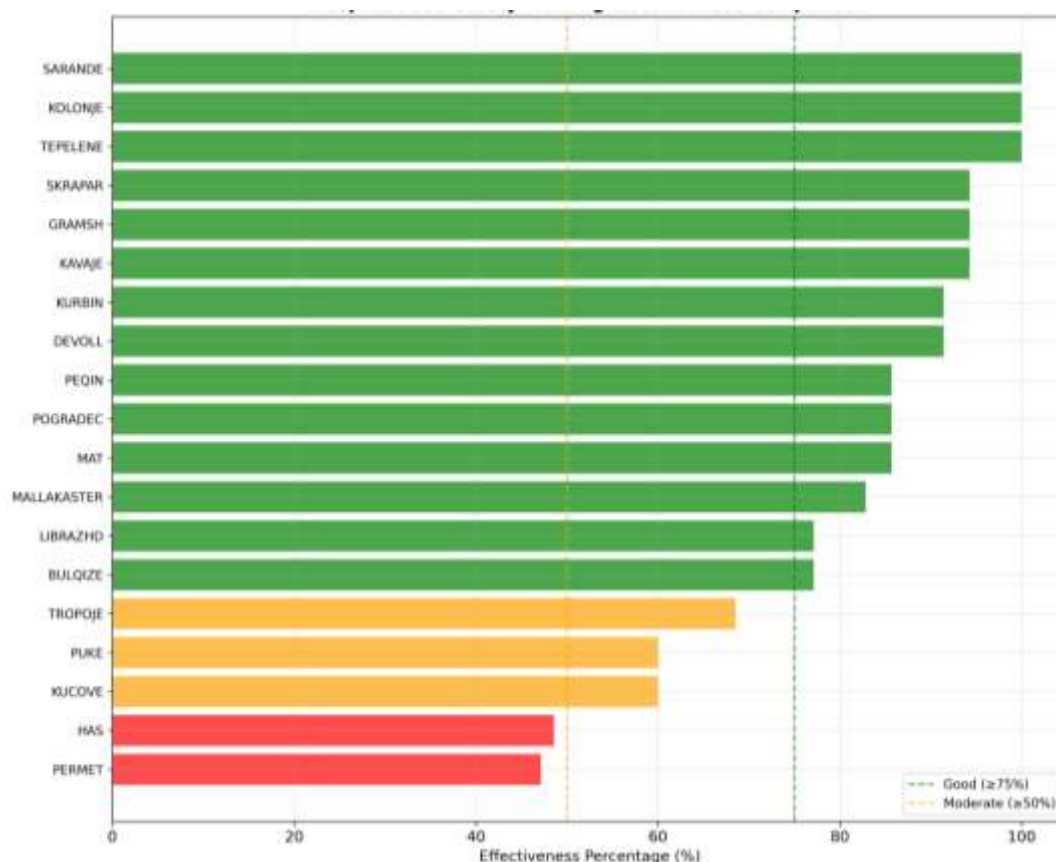


Figure 1. Food Safety Knowledge section Effectiveness Performance

Performance Distribution Analysis

The performance categorization analysis revealed encouraging results regarding the overall state of food safety knowledge effectiveness across Albanian hospitals. Fourteen hospitals (73.7%) achieved "Good" knowledge performance levels ($\geq 75\%$ effectiveness), demonstrating that the majority of Albanian hospitals have successfully implemented effective food safety guidance and information in their environment. Three hospitals (15.8%) demonstrated "Moderate" knowledge performance (50-74% effectiveness), indicating adequate but improvable outcomes. These institutions represent opportunities for targeted improvement interventions and training that could elevate their performance to "Good" levels with focused effort and resource allocation.

Two hospitals (10.5%) exhibited "Poor" knowledge performance ($< 50\%$ effectiveness), requiring immediate and comprehensive intervention to address critical food safety information deficiencies. While this represents a small proportion of the total hospital population, these institutions pose significant risks at system-wide quality standards. Table 1 gives details of these Performances.

Table 1. Hospital Performance Summary

<i>Hospital</i>	<i>Effectiveness (%)</i>	<i>Performance Level</i>	<i>Total Criteria</i>	<i>Average Score</i>
SB1	100.0	Good	15	5.00
SB2	100.0	Good	15	5.00
SB3	100.0	Good	15	5.00
SB4	94.3	Good	15	4.71
SB5	94.3	Good	15	4.71
SB6	94.3	Good	15	4.71
SB7	91.4	Good	15	4.57
SB8	91.4	Good	15	4.57
SB9	85.7	Good	15	4.29
SB10	85.7	Good	15	4.29
SB11	85.7	Good	15	4.29
SB12	82.9	Good	15	4.14
SB13	77.1	Good	15	3.86
SB14	77.1	Good	15	3.86
SB15	68.6	Moderate	15	3.43
SB16	60.0	Moderate	15	3.00
SB17	60.0	Moderate	15	3.00
SB18	48.6	Poor	15	3.40
SB19	47.1	Poor	15	3.00

**Please refer to Appendix 1 for the codification index used in this table*

Top Performing Hospitals

Three hospitals achieved perfect effectiveness scores of 100.0% in food safety knowledge: SB1, SB2, and SB3. These institutions demonstrate exemplary food safety knowledge implementation and serve as models for best practice dissemination across the Albanian healthcare system. Their perfect scores indicate comprehensive compliance with all evaluation criteria and suggest robust organizational commitment to food safety instruction and sustainable approaches. The achievement of perfect scores by multiple hospitals validates the feasibility of a good performance within the Albanian healthcare context for food safety information. These institutions show that resource constraints and systemic challenges do not preclude outstanding potential outcomes when appropriate organizational commitment and implementation strategies are employed. Analysis of top-performing hospitals reveals several common characteristics including strong leadership commitment, comprehensive staff guidance, robust documentation systems, and consistent implementation of food safety protocols. These characteristics provide valuable insights for improvement initiatives at lower-performing institutions.

Performance Challenges and Improvement Opportunities

Two hospitals showed critical knowledge performance deficiencies requiring immediate intervention: SB19 (47.1% effectiveness) and SB18 (48.6% effectiveness). These institutions fall significantly below acceptable performance thresholds and pose potential risks to system-wide quality standards. The performance gaps at these institutions appear to be comprehensive rather than limited to specific criteria, suggesting systemic challenges in food safety skills implementation. Detailed analysis reveals deficiencies across multiple evaluation domains including infrastructure, documentation, lack of staff training, and operational procedures. Three hospitals showed moderate performance requiring targeted improvement: SB17 (60.0%), SB16 (60.0%), and SB15 (68.6%). These institutions have established basic food safety training frameworks but require enhancement to achieve optimal effectiveness levels.

Criteria-Specific Performance Analysis

Analysis of individual evaluation criteria revealed varying performance levels across different aspects of food safety knowledge implementation under the quality standards training. The UTU criteria analysis provides insights into specific strengths and weaknesses within the Albanian hospital food safety training system. Infrastructure and documentation criteria (UTU 1 Series) generally showed strong performance across most hospitals, suggesting that Albanian hospitals have successfully established foundational food safety management systems. However, operational implementation criteria (UTU 2 Series) showed greater variation, indicating challenges in translating policy frameworks into consistent operational practices. The highest-performing criteria included staff health certification requirements and basic food safety protocol documentation, areas where Albanian hospitals demonstrated near-universal compliance. These findings suggest that regulatory requirements and formal documentation systems are effectively implemented across the hospital network. The lowest-performing criteria included advanced food handling techniques and specialized equipment maintenance procedures, areas requiring enhanced

technical training and ongoing competency development. These findings highlight opportunities for targeted training program enhancement and technical skill development initiatives.

Regional Performance Patterns

Geographic analysis revealed interesting patterns in hospital performance across different Albanian regions. Southern region hospitals (including SB Sarandë, SB Kolonjë, and SB Tepelenë) demonstrated particularly strong performance, with all three achieving perfect effectiveness scores. Central region hospitals showed mixed performance, with some institutions achieving excellent results while others required improvement. This variation suggests that regional factors alone do not determine performance outcomes, and institutional-specific factors play important roles in training effectiveness. Northern region hospitals demonstrated the greatest performance variation, including both high- performing institutions and those requiring significant improvement. This pattern suggests opportunities for regional knowledge sharing and collaborative improvement initiatives.

International Comparative Analysis

The comparison with international benchmarks reveals that Albanian hospitals significantly outperform similar healthcare systems in food safety knowledge effectiveness. The overall Albanian system effectiveness of 81.3% exceeds the Jordan post-training effectiveness of 72.4% by 8.9 percentage points, representing a substantial performance advantage. This superior performance is particularly noteworthy given Albania's status as a developing healthcare system with resource constraints and ongoing reform initiatives. The findings suggest that Albanian hospitals have successfully implemented effective the food safety know-how despite systemic challenges. The comparison also reveals that Albanian hospitals achieve more consistent high-level performance than reported in international studies. While the Jordan study reported that most hospitals achieved "moderate" performance levels, Albanian hospitals demonstrate a higher proportion of "good" performers, suggesting more effective of implementation and training strategies.

Performance Consistency Analysis

Analysis of score consistency across evaluation criteria revealed that high-performing hospitals demonstrate more consistent performance across all evaluation domains, while lower- performing hospitals show greater variation in criterion-specific scores. This pattern suggests that effective food safety full-training programs would require a comprehensive implementation rather than selective focus on specific areas. The standard deviation analysis of individual hospital scores revealed that top performers maintain consistently high scores across all criteria, while poor performers demonstrate erratic performance patterns. This finding supports the importance of systematic training approaches that address all aspects of food safety management. Hospitals achieving moderate performance levels showed intermediate consistency patterns, suggesting that targeted improvements in specific areas could elevate overall performance levels. This finding provides guidance for improvement intervention design and resource allocation priorities.

Training Needs Assessment

Based on the performance analysis, specific training needs were identified for different hospital categories. Hospitals requiring urgent comprehensive training (SB18 and SB19) need fundamental food safety knowledge development including basic hygiene protocols, documentation systems, and staff competency development. Hospitals requiring targeted improvement training (SB17, SB16, and SB19) need focused interventions addressing specific performance gaps while maintaining existing strengths. These interventions should emphasize operational implementation and advanced technical skills development. Hospitals requiring maintenance skills (14 good performers) need ongoing competency development and refresher approaches to sustain current performance levels. These development skills should focus on emerging best practices, regulatory updates, and continuous improvement initiatives.

Statistical Significance and Reliability

The sample size (19 hospitals, 285 total evaluation records) provides robust statistical power for identifying meaningful performance differences and patterns. The standardized evaluation framework ensures reliable and valid performance measurement across all participating institutions. The substantial performance range (47.1% to 100.0%) indicates that the evaluation framework effectively discriminates between different levels of effectiveness. This discrimination capability supports the framework's utility for ongoing performance monitoring and improvement initiative targeting. The consistency of evaluation criteria application across all hospitals ensures that performance differences reflect actual effectiveness variations rather than measurement artifacts. This reliability supports confidence in the research findings and their practical applications for healthcare quality improvement.

DISCUSSION

Key Findings and Implications

The comprehensive evaluation of food safety knowledge effectiveness across 19 Albanian hospitals reveals several significant findings with important implications for healthcare quality management and system safety. The overall system effectiveness of 81.3% represents a substantial achievement for a developing healthcare system, particularly when compared to international benchmarks and considering the resource constraints typically associated with healthcare systems in transition.

The superior performance relative to the Jordan benchmark (81.3% vs 72.4%) suggests that Albanian hospitals have successfully implemented effective food safety notions and strategies that exceed those achieved in similar healthcare contexts (Oasili et al.,2012). This finding challenges assumptions about the relationship between economic development and healthcare quality outcomes, demonstrating that effective skills and know-how can be implemented successfully in resource- constrained environments when appropriate strategies and organizational commitment are present. The performance distribution pattern, with 73.7% of hospitals achieving "Good" knowledge performance levels, indicates

that effective food safety information is not limited to a few exceptional institutions but represents a system-wide capability. This broad-based success suggests that Albanian healthcare policies, and implementation strategies have been generally effective in promoting food safety guidance across diverse institutional settings. However, the substantial performance range (47.1% to 100.0%) and the presence of hospitals requiring urgent intervention in the information domains highlight the importance of addressing performance disparities to ensure consistent system safety standards across the healthcare system. The identification of specific hospitals requiring immediate attention provides clear targets for focused improvement initiatives and resource allocation priorities.

Knowledge Effectiveness Factors

The analysis reveals several factors that appear to contribute to more comprehensive effectiveness variations across Albanian hospitals. High-performing institutions demonstrate comprehensive implementation across all evaluation criteria, suggesting that effective food safety know-how requires systematic approaches rather than selective focus on specific areas. This finding aligns with HACCP principles that emphasize systematic hazard analysis and comprehensive control point management (see the HACCP Guideliness,2022). The consistency of performance across evaluation criteria in top-performing hospitals suggests that organizational commitment and leadership support, play crucial roles in guidance effectiveness. Institutions achieving perfect scores demonstrate that excellence is achievable within the Albanian healthcare context when appropriate organizational conditions are established and maintained.

The variation in performance between infrastructure/documentation criteria (UTU 1 Series) and operational implementation criteria (UTU 2 Series) suggests that Albanian hospitals have been more successful in establishing formal systems than in ensuring consistent operational implementation. This pattern is consistent with healthcare quality improvement literature that identifies implementation challenges as common barriers to sustained performance improvement(see Institute for Healthcare Improvement,2020). The higher performance of southern region hospitals, particularly the three institutions achieving perfect scores in information schema, suggests potential regional factors that support future full training programs. These factors might include regional leadership initiatives, collaborative learning networks, or specific resource allocation patterns that could be replicated in other regions.

Comparison with International Literature

The Albanian hospital performance in knowledge and information on food safety significantly exceeds the Jordan study findings across multiple dimensions (Oasili et al.,2012). While the Jordan study reported that food safety knowledge improved from 66.66% to 72.44% following training intervention, Albanian hospitals demonstrate baseline performance levels that exceed the Jordan post-training outcomes. This comparison suggests that Albanian hospitals may have more mature food safety know-how or more effective implementation strategies. The Jordan study's finding that organizations with implemented HACCP principles showed higher performance levels (Oasili et al.,2012) provides important

context for interpreting Albanian results. The strong performance of Albanian hospitals suggests that systematic food safety management approaches may be more widely implemented than in the Jordan healthcare context, contributing to superior future training effectiveness outcomes. The educational effects identified in the Jordan study, where higher education levels correlated with better food safety knowledge, provide insights even for understanding performance variations within the Albanian system (Oasili et al., 2012). The overall information effectiveness achieved by top-performing Albanian hospitals suggests that future effective programs can overcome educational background limitations through appropriate instructional design and implementation strategies. The CDC guidelines emphasizing the importance of pre-post assessment designs and multiple evaluation approaches (see CDC, 2024) provide validation for the evaluation framework employed in this study. The external evaluator approach used in the Albanian assessment aligns with CDC recommendations for objective performance measurement and provides reliable data for training effectiveness evaluation.

Organizational and System-Level Factors

The achievement of perfect scores in know-how by multiple hospitals shows that organizational factors play crucial roles in implementation outcomes. These high-performing institutions likely demonstrate strong leadership commitment, adequate resource allocation, effective training program design, and robust implementation monitoring systems. Understanding these organizational success factors could inform improvement initiatives at lower-performing institutions at knowledge and information. The moderate performance variation ($SD = 16.9\%$) suggests that while most Albanian hospitals perform well in information addressing, systematic factors contribute to performance differences that could be treated through targeted interventions. These factors might include developing different training programs design, implementation resources, organizational culture, or leadership commitment to food safety guidance. The identification of hospitals requiring urgent intervention at know-how (10.5% of total) indicates that while the overall system performs well, critical gaps exist that require immediate attention. These performance gaps pose risks not only to individual institutional quality but also to system-wide reputation and safety standards. The strong performance of most hospitals (73.7% achieving "Good" levels) suggests that Albanian healthcare policies + provide effective foundations for food safety know-how. This system-wide capability represents a significant asset for ongoing quality improvement initiatives and European Union accession preparations.

CONCLUSIONS

This comprehensive evaluation of food safety information effectiveness across 19 Albanian hospitals demonstrates that the Albanian healthcare system has achieved success in implementing effective food safety knowledge and guidance. The overall system effectiveness of 81.3 % exceeds international benchmarks and represents a substantial achievement for a developing healthcare system undergoing reform and European Union accession preparations. The finding that 73.7% of Albanian hospitals achieve "Good" performance levels at know-how

patterns ($\geq 75\%$ effectiveness) indicates that food safety knowledge is not limited to exceptional institutions but represents a system-wide capability. This broad-based success suggests that Albanian healthcare policies, frameworks, and implementation strategies have been generally effective in promoting food safety information across diverse institutional settings. The achievement of perfect scores (100% effectiveness) by three hospitals, shows that information excellence is achievable within the Albanian healthcare context and provides models for best practice dissemination. These institutions validate the feasibility of outstanding performance despite resource constraints and systemic challenges. However, the substantial performance range (47.1% to 100.0%) and the identification of hospitals requiring urgent intervention highlight the importance of addressing performance disparities to ensure consistent safety standards. The presence of two hospitals with "Poor" performance levels at knowledge patterns ($< 50\%$ effectiveness) requires immediate attention to prevent potential safety risks and maintain system-wide quality standards.

Implications

Training Program Design Implications

The comprehensive performance achieved by top-performing hospitals suggests that future effective food safety training programs must address multiple competency domains simultaneously rather than focusing on individual skills or knowledge areas. This recommendation supports competency-based training approaches that integrate knowledge, skills, and behavioral components within comprehensive program frameworks. The variation between infrastructure and operational performance suggests that future training programs should emphasize practical implementation skills and workplace application rather than focusing primarily on policy knowledge and documentation requirements. This evidence aligns with evidence-based learning principles that emphasize the importance of practical relevance and immediate application opportunities (Ali-Akash et al., 2022). The consistency of high performance across all evaluation criteria in top-performing hospitals suggests that future effective training programs require ongoing reinforcement and continuous improvement rather than one-time events. This finding supports the importance of future sustained training approaches that include refresher training, competency assessment, and performance monitoring components. The identification of specific criteria requiring improvement across multiple hospitals provides guidance for training program enhancement priorities. Advanced food handling techniques and specialized equipment maintenance procedures represent areas where future targeted training development could yield significant system-wide improvements.

Quality Improvement and Sustainability Implications

The positive overall performance of Albanian hospitals provides a solid foundation for ongoing quality improvement initiatives. The identification of best-performing institutions creates opportunities for peer learning networks and best practice dissemination that could elevate performance across the entire system. The presence of hospitals requiring urgent intervention in information-based system highlights the importance of differentiated improvement strategies that address specific institutional

needs rather than applying uniform approaches across all hospitals. Targeted interventions for poor performers, enhancement programs for moderate performers, and maintenance programs for good performers represent appropriate differentiated approaches. The superior performance relative to international benchmarks suggests that Albanian hospitals have developed effective strategies that could be valuable for other developing healthcare systems. Documentation and dissemination of these successful approaches could contribute to international knowledge sharing and healthcare quality improvement efforts. The sustainability of current performance levels requires ongoing attention to future training program maintenance, staff development, and organizational support systems. The achievement of good performance represents only the first step in ensuring long-term food safety excellence and healthcare protection.

Policy and Resource Allocation Implications

The research findings provide clear guidance for healthcare policy development and resource allocation decisions. The identification of specific hospitals requiring urgent intervention in food-safety know-how enables targeted resource allocation that addresses the most critical needs while maximizing safety improvements. The positive performance of most of the hospitals suggests that current Albanian healthcare policies are generally effective and should be maintained and strengthened rather than fundamentally redesigned. This finding supports incremental improvement approaches that build upon existing strengths. The higher performance relative to international benchmarks suggests that Albanian healthcare investments in information about food-quality have yielded positive returns and justify continued support for these initiatives. The excellence within resource-constrained environments provides evidence for the cost-effectiveness of future comprehensive training programs. The regional performance variations suggest opportunities for knowledge sharing and collaborative improvement initiatives that could leverage high-performing institutions as resources for system-wide enhancement. Regional networks and peer learning programs could facilitate performance improvement while minimizing additional resource requirements.

Practical Applications and Implementation Recommendations

The research findings provide clear guidance for practical implementation of food safety training improvement initiatives. Hospitals requiring urgent intervention at knowledge level should receive immediate comprehensive training program development including basic hygiene protocols, documentation systems, staff competency development, and ongoing monitoring systems. Hospitals demonstrating moderate performance should receive targeted improvement interventions addressing specific performance gaps while maintaining existing strengths. These interventions should emphasize operational implementation skills, advanced technical competencies, and workplace application strategies. High-performing hospitals should serve as resources for system-wide improvement through peer learning networks, best practice documentation, and mentoring programs for lower-performing institutions. These collaborative approaches can leverage existing excellence to support systemwide enhancement while minimizing additional resource requirements. The development of standardized training curricula based on the evaluation framework could support consistent training quality across all Albanian hospitals while allowing for institutional adaptation to specific contexts and needs. Standardized approaches would facilitate quality assurance while maintaining flexibility for local implementation.

Limitations and Future Research Directions

Several limitations should be considered in interpreting these findings and planning future research initiatives. The cross-sectional design literature-based results provides snapshot assessment on the general information rather than detailed food-safety training standards, limiting insights into performance trends, improvement trajectories, and sustainability factors. Future research should incorporate comprehensive training elements to assess performance changes over time and identify factors that support sustained excellence.

The reliance on external evaluator assessments, while providing objectivity and consistency, may not fully capture staff perspectives, patient experiences, or day-to-day operational variations that influence training effectiveness. Complementary research incorporating staff surveys, patient feedback, and observational studies would provide additional insights into training effectiveness factors and outcomes.

The focus on Albanian hospitals limits the generalization to other healthcare systems or cultural contexts. However, the findings provide valuable insights for similar developing healthcare systems undergoing quality improvement initiatives and European Union accession processes. Comparative studies across multiple countries would enhance understanding of training effectiveness factors and successful implementation strategies.

Future research should examine the relationship between food safety knowledge effectiveness and broader healthcare quality indicators including patient satisfaction, infection rates, and overall institutional performance. Understanding these relationships would strengthen the evidence base for food safety training investments and support integration with broader quality improvement initiatives.

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APPENDIX 1: Hospitals Codification Index

SB1	Spitali Bashkiak Sarandë
SB2	Spital Bashkiak Kolonjë
SB3	Spitali Bashkiak Tepelenë
SB4	Spitali Bashkiak Skrapar
SB5	Spitali Bashkiak Gramsh
SB6	Spitali Bashkiak Kavajë
SB7	Spitali Bashkiak Devoll
SB8	Spitali Bashkiak Kurbin
SB9	Spitali Bashkiak Pogradec
SB10	Spitali Bashkiak Peqin
SB11	Spitali Bashkiak Mat
SB12	Spitali Bashkiak Mallakastër
SB13	Spitali Bashkiak Bulqizë
SB14	Spitali Bashkiak Librazhd
SB15	Spitali Bashkiak Tropojë
SB16	Spitali Bashkiak Pukë
SB17	Spitali Bashkiak Kuçovë
SB18	Spitali Bashkiak Has
SB19	Spitali Bashkiak Përmet

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