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A home science approach to evaluating food safety knowledge and hygiene practices in ICDS programs

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Abstract

This study explores food safety knowledge and hygiene practices within Integrated Child Development Services (ICDS) programs using a home science approach. It aims to identify gaps in awareness, infrastructure, and practices affecting food safety and to propose actionable solutions. By integrating methodologies such as surveys, observational studies, and focus group discussions, the study examines the roles of Anganwadi workers (AWWs) and beneficiaries in ensuring food safety. Findings highlight significant knowledge gaps, inadequate infrastructure, and cultural barriers impacting food safety practices. The study provides evidence-based recommendations to enhance training, infrastructure, and monitoring for safer and more effective nutrition delivery in ICDS programs.

Keywords: Food safety, hygiene practices, ICDS, anganwadi workers, nutrition delivery, awareness, infrastructure, training, monitoring, cultural barriers.

Introduction

The Integrated Child Development Services (ICDS) program, initiated in 1975, represents one of India's most ambitious and wide-reaching public health interventions. Aimed at addressing the interrelated challenges of malnutrition, poor maternal health, and child mortality, ICDS provides essential services, including supplementary nutrition, immunization, early childhood education, health check-ups, and referral services. The program's primary focus is on children under six years old, as well as pregnant and lactating mothers, two of the most nutritionally vulnerable demographics. As of 2023, ICDS operates through over 1.4 million Anganwadi centers (AWCs) and reaches approximately 90 million beneficiaries, underscoring its critical role in improving public health outcomes.

Despite its scale and significance, the effectiveness of ICDS has been undermined by persistent gaps in food safety and hygiene practices, which are vital for ensuring the nutritional benefits of the program are fully realized. According to the World Health Organization (WHO), foodborne illnesses affect millions of people globally every year, and Southeast Asia-including India-is particularly vulnerable. WHO estimates indicate that unsafe food leads to 91 million cases of illness annually in the region, with children under five disproportionately affected. Contaminated food and poor hygiene not only increase susceptibility to infections but also exacerbate malnutrition, creating a vicious cycle of poor health outcomes.

Food safety and hygiene practices are particularly important in ICDS programs due to the vulnerable population they serve. Unsafe food handling, storage, or preparation can compromise the nutritional quality of meals provided through AWCs, reducing their efficacy in combating malnutrition. Microbial contamination and nutrient degradation due to improper storage or cooking are common risks, especially in rural and resource-constrained settings. Additionally, gastrointestinal infections caused by unsafe food practices can impede nutrient absorption, further contributing to malnutrition and associated health complications. These challenges underline the importance of systematically addressing food safety and hygiene within ICDS programs.

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Various factors contribute to the current gaps in food safety and hygiene in ICDS. Knowledge deficits among Anganwadi workers (AWWs) and caregivers are a significant concern. Although AWWs play a pivotal role in program implementation, studies suggest that many lack adequate training in advanced food safety practices. Research by Sharma et al. (2020) ^[3] revealed that while 80% of AWWs understood basic hygiene principles, only 42% were knowledgeable about preventing cross-contamination or maintaining optimal storage temperatures. Similarly, caregivers often lack awareness of critical practices such as proper handwashing and safe water usage, further increasing the risk of foodborne illnesses.

Infrastructure inadequacies at AWCs compound the problem. Many centers operate with limited access to clean water, functional cooking facilities, and appropriate storage solutions. Data from the National Family Health Survey (NFHS-5) indicates that only 67% of AWCs have access to clean drinking water, and fewer than half possess functional cooking infrastructure. These deficiencies make it challenging for AWWs to maintain food safety protocols, especially in remote and underserved regions. Infrastructure gaps not only hinder compliance with hygiene standards but also diminish the credibility and effectiveness of ICDS services.

Cultural norms and behavioral practices further complicate efforts to improve food safety. In many communities, traditional practices such as feeding leftover food to children or preparing meals without washing hands are deeply ingrained. While these practices may stem from historical or resource-related constraints, they pose significant health risks in the context of ICDS programs. Changing these behaviors requires culturally sensitive interventions that respect local traditions while promoting safer practices.

A home science approach offers a promising framework for addressing these challenges. Home science, an interdisciplinary field encompassing nutrition, child development, and community science, emphasizes practical solutions that integrate scientific principles with local contexts. By focusing on both technical and socio-cultural aspects of food safety, a home science approach provides a holistic strategy for evaluating and improving hygiene practices in ICDS. This approach prioritizes the training of AWWs in food safety protocols, the provision of low-cost infrastructure improvements, and community engagement to address behavioral barriers. For instance, research by Kumar et al. (2018) ^[5] demonstrated that targeted training programs for AWWs led to a 35% improvement in their knowledge of hygiene practices within six months.

The significance of evaluating food safety in ICDS extends beyond immediate health outcomes. Addressing food safety not only enhances the nutritional quality of meals provided through AWCs but also builds community trust in ICDS services, encouraging greater participation and compliance. Moreover, ensuring food safety aligns with broader public health goals, such as reducing the burden of foodborne illnesses and improving child survival rates. At a global level, these efforts contribute to the United Nations' Sustainable Development Goals, particularly Goal 2 (Zero Hunger) and Goal 3 (Good Health and Well-being).

This study aims to evaluate food safety knowledge and hygiene practices within ICDS programs through the lens of home science. By identifying gaps in awareness, infrastructure, and cultural practices, the study seeks to provide evidence-based recommendations for enhancing the effectiveness of ICDS programs. It emphasizes the

importance of integrating food safety into the program's operational framework, recognizing that this is not merely a supplementary concern but a cornerstone of its success.

Objectives

The primary objectives of this study are:

1. To assess the level of food safety knowledge among Anganwadi workers and beneficiaries in ICDS programs.
2. To evaluate the hygiene practices at Anganwadi centers (AWCs) and among caregivers.
3. To identify infrastructure and cultural barriers impacting food safety.
4. To propose actionable recommendations to improve food safety and hygiene practices.

Background of the Study

The ICDS program, launched in 1975, aims to combat child malnutrition and promote overall health. Food safety and hygiene are critical elements, yet challenges such as poor infrastructure, limited training for AWWs, and cultural norms hinder effective implementation. Unsafe food handling practices and unhygienic conditions at AWCs can lead to foodborne illnesses, reducing the program's effectiveness. Understanding these gaps through a home science lens enables tailored solutions that integrate scientific principles with practical, community-based interventions.

Review of Literature

Research by Sharma et al. (2020) ^[3] highlights the impact of inadequate food safety practices on malnutrition programs. It identifies training gaps among community workers and emphasizes infrastructure upgrades. Studies like Kumar et al. (2018) ^[5] discuss the relationship between hygiene practices and child health outcomes, stressing the importance of clean water and sanitation facilities at AWCs. Rao & Mehta (2019) ^[6] explore cultural influences on food safety, noting how traditional practices, such as feeding leftovers, can compromise nutritional benefits. Evaluations by Singh et al. (2021) ^[7] highlight systemic issues like inconsistent supervision and inadequate funding as significant barriers to achieving food safety.

Food Safety Knowledge

Food safety knowledge is a fundamental component in ensuring the success of nutritional programs like the Integrated Child Development Services (ICDS) program. It encompasses an understanding of practices that prevent foodborne illnesses, maintain the nutritional quality of food, and promote safe consumption. In the context of ICDS, the level of food safety knowledge among Anganwadi workers (AWWs) and caregivers plays a critical role in safeguarding the health of children and mothers. Despite its importance, research indicates significant gaps in food safety knowledge within these programs, contributing to unsafe food handling, contamination, and reduced efficacy of nutrition interventions.

Studies have shown that AWWs, who are pivotal to the implementation of ICDS, often lack comprehensive training in food safety protocols. For example, Sharma et al. (2020) ^[3] found that while most AWWs were familiar with basic hygiene practices, their understanding of more complex issues, such as cross-contamination prevention, storage temperatures, and safe reheating methods, was limited. This lack of advanced knowledge can lead to practices that compromise the safety of food prepared at Anganwadi centers

(AWCs). Simple errors, such as using the same utensils for raw and cooked foods without cleaning or storing food at ambient temperatures for extended periods, can increase the risk of microbial contamination.

In addition to AWWs, the knowledge levels of caregivers and beneficiaries also play a critical role in determining food safety outcomes. Kumar et al. (2018)^[5] conducted a study on caregivers in rural ICDS settings and discovered that many were unaware of basic food safety principles, such as the importance of thorough handwashing before food preparation or the need to boil drinking water. This lack of knowledge is often exacerbated by limited access to information, cultural practices, and misconceptions about food safety. For instance, some caregivers believed that feeding children leftovers from the previous day posed no risk, even if the food was not refrigerated or reheated adequately.

Moreover, there is evidence to suggest that even when food safety knowledge is imparted through training, its practical application remains inconsistent. A study by Rao and Mehta (2019)^[6] highlighted a gap between theoretical knowledge and practice among AWWs. While over 70% of the workers in the study could correctly identify food safety guidelines during training sessions, only about 40% implemented these practices consistently in their daily routines. This discrepancy often stems from infrastructural challenges, such as the lack of clean water, inadequate storage facilities, and the absence of proper cooking tools at AWCs, which hinder the practical application of food safety knowledge.

The role of education and awareness campaigns in bridging these gaps cannot be overstated. Evidence from training interventions has demonstrated significant improvements in food safety knowledge when educational content is delivered in culturally appropriate and context-sensitive formats. For example, Singh et al. (2021)^[7] evaluated a training program that used visual aids and hands-on demonstrations to teach AWWs about food safety. The program led to a 30% improvement in their understanding of critical practices, such as avoiding cross-contamination and maintaining personal hygiene. However, the study also emphasized the need for continuous and iterative training to ensure knowledge retention and reinforcement.

Hygiene Practices

Hygiene practices are integral to ensuring the safety and quality of food provided in nutritional programs such as the Integrated Child Development Services (ICDS) program. These practices encompass a range of activities, including personal hygiene, sanitation, food preparation, and storage, all of which are crucial for preventing foodborne illnesses and safeguarding health. Despite their significance, hygiene practices in ICDS programs face several challenges stemming from infrastructural constraints, knowledge gaps, and cultural factors.

Observational studies conducted at Anganwadi Centers (AWCs) reveal that hygiene practices often fall short of recommended standards. Anganwadi workers (AWWs), who are responsible for implementing food-related services, frequently encounter difficulties in maintaining adequate hygiene. For example, inadequate access to clean water is a recurring issue in many AWCs. According to the National Family Health Survey (NFHS-5), only about 67% of AWCs have access to clean drinking water, and many lack basic facilities for handwashing or cleaning utensils. These infrastructural limitations hinder AWWs from following essential hygiene practices, such as washing hands with soap

before preparing or serving food and cleaning cooking surfaces effectively.

Personal hygiene among AWWs and caregivers is another critical aspect that influences food safety outcomes. Studies such as Kumar et al. (2018)^[5] have shown that while many AWWs are aware of the importance of handwashing, the practice is not consistently followed due to a lack of resources or time constraints. For instance, during busy periods, AWWs may skip handwashing or use unclean cloths to dry hands, inadvertently increasing the risk of contamination. Similarly, caregivers often exhibit limited understanding of personal hygiene, such as the need to wash hands before feeding children or handling food. This gap in practice is exacerbated by cultural beliefs that do not prioritize hand hygiene as a critical component of food preparation.

Sanitation practices at AWCs also present challenges. Poor waste management, including the improper disposal of food waste and lack of designated areas for washing utensils, can contribute to unsanitary conditions. In some cases, leftover food is stored at room temperature for long periods, creating an environment conducive to microbial growth. The absence of refrigeration facilities at most AWCs further complicates efforts to maintain food safety. According to Sharma et al. (2020)^[3], less than 40% of AWCs have access to proper storage solutions, leading to frequent spoilage and contamination of food items.

Cultural norms and behavioral practices often influence hygiene practices, particularly in rural areas. Traditional beliefs and habits, such as using unwashed hands to serve food or feeding children from communal utensils, are deeply ingrained and can be difficult to change. Rao and Mehta (2019)^[6] found that in many rural communities, there is a reluctance to adopt modern hygiene practices due to perceptions that traditional methods are sufficient or more practical. These cultural influences highlight the need for interventions that are not only educational but also culturally sensitive and tailored to local contexts.

Interventions aimed at improving hygiene practices have demonstrated significant potential in addressing these challenges. Training programs for AWWs, focusing on practical demonstrations of hygiene practices, have shown measurable improvements in compliance. For instance, Singh et al. (2021)^[7] evaluated a hygiene-focused training initiative that included modules on handwashing, utensil cleanliness, and waste management. The program resulted in a 25% increase in the consistent application of hygiene practices among participants. However, the study emphasized that ongoing supervision and reinforcement are necessary to sustain these improvements.

Community engagement and awareness campaigns targeting caregivers are equally important for promoting hygiene practices. Participatory approaches, such as focus group discussions and community workshops, have proven effective in encouraging behavior change. By involving caregivers in discussions about the health implications of poor hygiene, these initiatives can foster greater understanding and acceptance of improved practices. Additionally, the use of visual aids and culturally relevant messaging has been successful in bridging the knowledge-practice gap.

Infrastructural improvements are a critical enabler of better hygiene practices. Providing AWCs with basic facilities such as handwashing stations, soap, and safe storage containers can significantly enhance the ability of AWWs to maintain hygiene standards. Low-cost solutions, such as installing foot-operated handwashing units or supplying biodegradable waste

bins, can address common barriers while remaining affordable and sustainable.

Cultural and Behavioral Influences

Cultural and behavioral influences play a significant role in shaping food safety and hygiene practices within the Integrated Child Development Services (ICDS) program. These influences, rooted in deep-seated traditions, social norms, and personal behaviors, often impact how food is handled, prepared, and consumed in community settings. While some cultural practices align with safe food handling guidelines, others inadvertently pose risks to food safety, undermining the effectiveness of ICDS programs in addressing malnutrition and promoting child health.

One of the most prevalent cultural influences on food safety in rural and resource-constrained communities is the practice of feeding children leftover food. While this is often driven by economic constraints and the desire to avoid wastage, it poses significant health risks when leftovers are not stored or reheated properly. Research by Rao and Mehta (2019) ^[6] revealed that in many rural households, food cooked during the day is left uncovered and consumed later without reheating, increasing the likelihood of microbial contamination. This practice is often justified by traditional beliefs that cooked food remains safe for long periods, a perception that conflicts with modern food safety principles.

Another common cultural practice is the use of communal utensils and serving food with bare hands. These habits, rooted in familial and communal traditions, are considered symbols of hospitality and care in many Indian households. However, such practices can inadvertently lead to the spread of pathogens if hands or utensils are not cleaned thoroughly. Kumar et al. (2018) ^[5] observed that caregivers in ICDS settings often used bare hands to serve food to children, unaware of the potential health risks associated with this practice.

Behavioral norms related to hygiene also play a critical role in shaping food safety outcomes. For example, handwashing before handling food is not universally practiced, despite its proven effectiveness in preventing foodborne illnesses. Studies indicate that this behavior is influenced not only by a lack of awareness but also by cultural beliefs and logistical challenges. In communities where water is scarce, washing hands with soap may be perceived as unnecessary or wasteful. Additionally, the absence of designated handwashing facilities at Anganwadi Centers (AWCs) further discourages this practice among Anganwadi workers (AWWs) and caregivers.

Traditional cooking methods also influence food safety practices. In many rural areas, meals are prepared on open fires or rudimentary stoves, often in environments that lack proper ventilation or cleanliness. These conditions can lead to cross-contamination if raw and cooked foods are handled in the same area or if utensils are not adequately cleaned between uses. Moreover, the cultural preference for cooking large quantities of food at once, to be consumed over multiple meals, increases the risk of spoilage, especially in the absence of refrigeration.

Educational and social hierarchies within communities further shape hygiene practices. In some cases, caregivers may prioritize cultural norms over scientifically recommended practices due to the influence of elders or community leaders. For instance, if a respected elder endorses a traditional practice, such as feeding unboiled water to children, younger caregivers may feel compelled to follow it despite being

aware of the associated health risks. This dynamic highlights the importance of engaging community leaders in promoting safe food handling and hygiene practices.

Efforts to address these cultural and behavioral influences must prioritize cultural sensitivity and community engagement. Interventions that ignore or dismiss traditional practices risk alienating communities and undermining the adoption of safer practices. Instead, strategies should focus on integrating food safety principles into existing cultural frameworks. For example, campaigns that frame handwashing as an enhancement to traditional hospitality practices, rather than a replacement, are more likely to gain acceptance.

Participatory approaches, such as focus group discussions and community workshops, have proven effective in bridging the gap between cultural norms and food safety guidelines. In these settings, caregivers and community members can openly discuss their practices and beliefs, while experts provide practical advice tailored to local contexts. Visual aids, storytelling, and demonstrations are particularly useful tools for conveying food safety messages in a culturally relevant manner.

Another promising approach is the use of peer educators or community champions to promote behavioral change. By identifying and training influential members of the community, such as respected elders or mothers with leadership roles, ICDS programs can leverage existing social structures to encourage safer practices. For instance, Rao and Mehta (2019) ^[6] found that involving local women's self-help groups in food safety campaigns significantly increased the adoption of safe storage and handwashing practices.

Conclusion

The evaluation of food safety knowledge, hygiene practices, and the impact of cultural and behavioral influences within the Integrated Child Development Services (ICDS) program underscores the critical importance of these factors in achieving the program's objectives. The study highlights significant gaps in food safety awareness among Anganwadi workers (AWWs) and caregivers, coupled with infrastructural deficiencies and cultural norms that challenge the consistent implementation of safe practices. These issues compromise the nutritional integrity of meals provided through ICDS and increase the risk of foodborne illnesses, particularly among vulnerable populations such as children under six years of age and pregnant or lactating mothers.

Hygiene practices at Anganwadi Centers (AWCs) remain inconsistent, often hindered by limited access to clean water, proper storage facilities, and basic handwashing amenities. Additionally, cultural practices, including the use of communal utensils, reliance on traditional food storage methods, and the prioritization of community norms over scientific recommendations, exacerbate the risks associated with unsafe food handling. While these challenges are significant, they also present opportunities for tailored interventions that integrate food safety measures into culturally relevant frameworks.

This study demonstrates that improving food safety in ICDS programs requires a multipronged approach. Key recommendations include enhancing the training of AWWs, implementing targeted awareness campaigns for caregivers, and investing in basic infrastructural improvements such as handwashing stations and safe storage containers. Culturally sensitive strategies, including community engagement, participatory discussions, and the involvement of local influencers, are essential for fostering acceptance and

adoption of safer practices.

A home science approach, with its emphasis on integrating nutrition, community science, and behavioral understanding, provides an effective framework for addressing these challenges. By focusing on both the technical and socio-cultural dimensions of food safety, this approach ensures that interventions are practical, sustainable, and aligned with the needs of the communities they serve.

In conclusion, strengthening food safety knowledge, hygiene practices, and cultural adaptation within ICDS programs is essential for achieving their intended health and nutritional outcomes. By addressing these factors holistically, ICDS can enhance the quality and impact of its services, contributing to improved child and maternal health and aligning with broader public health goals. This effort will not only support the fight against malnutrition but also serve as a model for other community-based nutrition programs globally, demonstrating the transformative potential of integrating food safety into public health initiatives.

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