

Food Safety and Nutritional Resilience in Islamic Boarding Schools: Strengthening Adolescent Reproductive Health in Coastal Indonesia

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Abstract. Nutritional resilience and food safety are essential components of adolescent reproductive health, particularly within the socio-ecological setting of *pesantren* (Islamic boarding schools) in coastal regions like Jepara, Indonesia. Despite growing interest in *pesantren* health systems, the nexus between nutrition, food safety, and adolescent well-being remains insufficiently explored. This study investigates institutional food-related practices and adolescent adaptive behaviors in *pesantren* in coastal Jepara, with a focus on implications for reproductive health. A qualitative study was conducted involving in-depth interviews, focus group discussions, direct observation, and document review. Informants included *pesantren* administrators, food handlers, teachers, and female students. Thematic analysis was performed using NVivo software, grounded in public health and food systems theory. Key challenges identified include inconsistent hygiene practices, inadequate food safety knowledge, student reliance on processed foods, institutional constraints, and weak links to reproductive health education. Students reported fatigue, menstrual irregularities, and emotional instability, potentially linked to dietary inadequacies. Teachers recognized the relevance of nutrition to health but lacked training and curricular support. Addressing these challenges requires a multifaceted approach involving institutional reform, stakeholder engagement, nutrition education integration, and community-based food governance. A conceptual framework with four pillars nutritional resilience, food safety, reproductive health literacy, and institutional governance is proposed to strengthen adolescent health systems in *pesantren*.
Keywords: food safety, nutritional resilience, adolescent health, reproductive health, coastal public health.

1 Introduction

Pesantren serve not only as religious and educational institutions but also as residential environments where adolescents undergo critical physical, psychological, and social development. Particularly in rural and coastal areas of Indonesia, *pesantren* remain influential in shaping adolescent behavior, values, and well-being through communal and faith-based systems. However, *pesantren* often operate under infrastructural and policy limitations that adversely affect student health outcomes especially in areas of nutrition and food safety [1]. Adolescent girls in *pesantren* face unique health vulnerabilities. During puberty, increased nutritional demands are essential to support menstruation, hormonal changes, and cognitive development. When these needs are unmet, risks such as anemia, menstrual irregularities, fatigue, and reproductive dysfunction increase [2]. Unfortunately, structured nutritional interventions remain rare in *pesantren*, and the links between food quality and reproductive health are often stigmatized or overlooked in religious education contexts [3].

The coastal district of Jepara presents additional ecological stressors such as saltwater intrusion, flooding, and fluctuating water quality that undermine food safety and dietary adequacy. These environmental challenges reduce access to safe, nutritious food and impair storage and hygiene conditions in *pesantren* kitchens [4]. While the region is rich in marine food resources, *pesantren* often lack refrigeration, sanitary tools, and trained food handlers, resulting in the frequent use of repetitive, low-nutrient meals [5]. Government-led health programs like UKS (Usaha Kesehatan Sekolah) have attempted to integrate school-based nutrition and hygiene education, yet implementation within *pesantren* remains inconsistent. This is due in part to the structural autonomy of *pesantren* and the absence of health models that respect Islamic values while addressing institutional vulnerabilities [6]. Furthermore, research shows that in resource-constrained environments, food security efforts tend to neglect food safety, despite their synergistic relationship. Despite the growing body of literature on adolescent nutrition and school-based health interventions,

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there is a critical research gap in studies that holistically integrate food safety, dietary behaviors, and reproductive health particularly within faith-based Islamic boarding schools in coastal areas [7]. This omission is problematic, as it overlooks the compounded risks faced by adolescent girls in gender-segregated environments where health discourse is often shaped and limited by religious and cultural norms [3].

This study seeks to fill that gap by exploring how *pesantren* in coastal Jepara navigate the intersection of food safety, nutritional resilience, and adolescent reproductive health. It aims to uncover the institutional practices, dietary behaviors, and socio-cultural constraints that influence health outcomes. By doing so, the study proposes a comprehensive and culturally grounded framework for strengthening adolescent health services in Islamic boarding schools. This framework is expected to inform future interventions and contribute to achieving Sustainable Development Goals (SDGs) related to nutrition, gender equity, and adolescent well-being. Adolescence represents a critical developmental phase when nutritional needs increase significantly to support growth, hormonal regulation, and reproductive maturation. Inadequate nutrition during this stage often results in anemia, fatigue, menstrual irregularities, and long-term reproductive dysfunction. At the same time, food safety plays an equally important role, as unhygienic practices, contaminated water, and unsafe storage can reduce nutrient absorption and lead to chronic gastrointestinal problems, thereby worsening reproductive health risks. For adolescent girls, whose reproductive systems are still developing, these dual challenges of poor nutrition and unsafe food environments create compounded vulnerabilities that are rarely addressed holistically in school health programs[7].

Islamic boarding schools (*pesantren*) represent unique living and learning environments where adolescents spend extended periods of time in communal settings. Daily meals provided by *pesantren* become the primary determinant of students' dietary quality. However, institutional constraints such as limited budgets, outdated infrastructure, and the absence of trained food handlers frequently result in repetitive, low-nutrient meals and inconsistent hygiene practices[5]. These conditions not only undermine students' general health but also exacerbate reproductive health problems, particularly among female students who report fatigue, irregular menstruation, and emotional instability linked to dietary inadequacies[3]. The coastal context of Jepara adds another layer of complexity. Ecological stressors such as saltwater intrusion, flooding, and fluctuating water quality compromise both food diversity and safety in *pesantren* kitchens[1]. Limited access to refrigeration and safe water further restricts the ability to maintain food hygiene and provide balanced meals. Although national health programs such as UKS aim to promote nutrition and hygiene, their implementation in *pesantren* remains inconsistent due to the structural autonomy of these institutions and the absence of culturally grounded health models[6].

Moreover, reproductive health discourse in *pesantren* is often stigmatized or overlooked, while nutrition and food safety are rarely integrated into curricula. This silence leaves adolescents without adequate knowledge or support to understand the links between diet, food quality, and reproductive well-being[3]. Existing studies on adolescent nutrition in Indonesia typically address food security or reproductive health in isolation, without exploring their interdependence in faith-based residential settings. For these reasons, examining nutrition and food safety in relation to reproductive health within coastal *pesantren* is both timely and urgent. By uncovering how institutional practices, environmental vulnerabilities, and socio-cultural norms intersect to shape adolescent well-being, this study seeks to fill a critical gap in research and policy. Ultimately, strengthening food systems and nutritional resilience in *pesantren* can serve as a pathway to improving reproductive health outcomes, promoting gender equity, and advancing the broader goals of adolescent health and sustainable development[7].

2 Methods

Study Design and Rationale

This study adopted a qualitative descriptive design to explore the institutional dynamics, food-related practices, and adolescent reproductive health concerns within Islamic boarding schools (*pesantren*) in coastal Jepara, Central Java. Qualitative methods are particularly suitable for unpacking the cultural, organizational, and behavioral complexities that shape health outcomes in faith-based residential settings [8,9]. This approach allows researchers to engage directly with stakeholders and capture lived experiences, tacit knowledge, and contextual factors that are often invisible in quantitative data.

Study Setting

The research was conducted in three *pesantren* located in flood-prone and ecologically vulnerable areas of coastal Jepara. These *pesantren* were purposively selected based on four criteria: (1) geographic exposure to coastal hazards, (2) moderate to large student populations (≥ 150 students), (3) a majority of students residing within the *pesantren* environment, and (4) willingness of school leadership to engage in a health-focused institutional review. The inclusion of residential students was essential, as daily living and eating within *pesantren* facilities directly influence dietary practices, food safety exposure, and reproductive health outcomes. This selection ensured representativeness in terms of environmental risk, institutional scale, student residency, and religious-cultural context [8,9].

Participants and Sampling

A purposive sampling strategy was used to identify a diverse range of informants, reflecting the multi-level ecosystem of *pesantren* food systems and adolescent health. A total of 21 participants were recruited, including:

1. Three *pesantren* administrators (kyai or deputy leaders responsible for institutional management and student welfare),
2. Three female teachers (ustadzah involved in daily student supervision, guidance, and health-related mentoring),
3. Three food handlers (kitchen staff directly involved in meal preparation and food safety practices), and
4. Twelve female students aged 13–18 years, residing in the *pesantren* dormitories.

This sampling frame enabled triangulation across institutional, operational, and experiential domains, consistent with qualitative research standards for public health studies [6,7].

Data Collection Procedures

Data collection occurred over a three-month period (October–December 2024) using four complementary methods:

1. In-depth Interviews (IDIs): Conducted with administrators, food handlers, and teachers to elicit institutional narratives, food safety perceptions, and resource challenges.
2. Focus Group Discussions (FGDs): Two FGDs were held with groups of female students (6 participants per group) to examine shared experiences, dietary preferences, and reproductive health concerns.
3. Direct Observation: Structured observation protocols were used to assess kitchen infrastructure, hygiene practices, food storage methods, and water access. Observations were documented using standardized checklists adapted from WHO food hygiene guidelines.
4. Document Review: Institutional records were reviewed, including daily meal plans, procurement logs, kitchen expense reports, health incident logs, and any relevant internal policies.

All interviews and discussions were conducted in Bahasa Indonesia, audio-recorded with consent, transcribed verbatim, and translated into English for analysis.

Data Analysis

Thematic analysis was employed following Braun and Clarke's six-phase framework [8], supported by NVivo 12 software for systematic data management and coding. The analysis proceeded through the following steps:

1. Familiarization with the data: All transcripts from in-depth interviews, FGDs, and observation notes were read multiple times by the research team. Initial reflections and memos were recorded to capture early impressions.
2. Generating initial codes: Using a combination of deductive codes (derived from existing food systems and reproductive health literature, e.g., hygiene, food safety, menstrual health) and inductive codes (emerging from the data itself), researchers systematically coded the transcripts in NVivo.
3. Searching for themes: Coded data were then clustered into broader patterns, such as “institutional constraints,” “student dietary practices,” and “links to reproductive health.”
4. Reviewing themes: The emerging themes were compared across data sources (administrators, teachers, food handlers, students) to ensure coherence and consistency. Divergent cases were discussed to refine theme boundaries.
5. Defining and naming themes: Each theme was clearly defined, with subthemes developed where necessary (e.g., “student dietary practices” included processed food reliance, hidden snacking, and meal rejection).
6. Producing the report: The final themes were written up with supporting verbatim quotations to illustrate participants' perspectives and ensure transparency.

To enhance analytical rigor, three strategies were applied:

1. Triangulation of data sources (interviews, FGDs, observation, documents) and participant groups.

2. Peer debriefing within the research team to challenge interpretations and minimize bias.
3. Member checking with selected participants (teachers and students) to validate whether the interpretations reflected their experiences accurately.

These strategies align with best practices for enhancing the credibility and transferability of qualitative findings in health systems research [9,3].

3 Results and Discussion

The findings of this study are organized into five major themes, drawn from interviews and focus group discussions with food handlers, administrators, teachers, and female students. Each theme is supported by multiple quotations to illuminate the depth and variety of perspectives.

Theme 1: Inconsistent Hygiene Practices

Many food handlers reported inconsistent hygiene practices in food preparation due to limited resources and lack of supervision.

“Sometimes we wash vegetables with clean water, sometimes not, depending on water availability. There’s no soap or sanitizer used regularly.” (P2, food handler)

“We reuse cooking oil many times. It becomes dark and smells, but we can’t throw it out until it’s completely finished.” (P3, food handler)

“The cutting boards are never disinfected. We only rinse them with water, and sometimes use the same board for vegetables and meat.” (P1, food handler)

“No one checks the kitchen regularly. We do everything based on our own judgment.” (P2, food handler)

“Students often help in the kitchen without any gloves or head covers.” (P4, teacher)

Theme 2: Lack of Food Safety Knowledge

Food handlers and kitchen assistants expressed limited understanding of proper food safety protocols and expressed interest in learning more.

“We only learn from seniors. There is no official training. I just cook based on what I know from home.” (P1, food handler)

“I’ve never heard of foodborne bacteria. We just make sure the food is cooked and looks fine.” (P2, food handler)

“Nobody ever taught us about food expiration dates or storage temperature. We don’t even have a thermometer.” (P3, food handler)

“I want training. If there is a health officer who can come and teach us, we’ll gladly attend.” (P1, food handler)

Theme 3: Student Dietary Preferences

Students revealed a strong preference for processed and instant food, often citing taste, convenience, and distrust in pesantren meals.

“I like instant noodles. It’s easy and tasty. We eat it a lot in the dorm, especially when the pesantren food doesn’t look good.” (P8, student)

“Even when we’re sick, we eat spicy chips or sweet drinks. We just avoid the kitchen food.” (P12, student)

“Most of us buy snacks from the small kiosk outside the pesantren. It’s all packaged food.” (P6, student)

“We hide ramen and cook it secretly in the dorm. It’s more delicious than the food we’re served.” (P9, student)

“The vegetables they cook are always overcooked and mushy. Sometimes it has weird smell.” (P5, student)

Theme 4: Institutional Constraints

Administrators and teachers described systemic constraints such as limited budgeting, outdated infrastructure, and lack of policy support.

“We have a tight food budget. We can’t afford fresh vegetables or meat every day.” (P3, administrator)

“The facilities are old. We don’t have a refrigerator or proper storage for perishables.” (P1, administrator)

“Our budget per student per day is very minimal. It’s not enough to provide nutritious meals consistently.” (P2, administrator)

“We once received a donation for kitchen renovation, but it wasn’t enough to improve everything.” (P4, administrator)

“There is no dedicated staff for nutrition. Everyone here multitasks.” (P3, administrator)

Theme 5: Links to Reproductive Health

Teachers and students linked poor diet and food insecurity with common reproductive health issues among female students, including fatigue, irregular menstruation, and mood swings.

“Some students get sick frequently gastric issues, fatigue, irregular periods. I believe it’s linked to food, but we don’t have health education programs.” (P3, teacher)

“Good food is important for girls, especially during menstruation. But this is not part of the pesantren curriculum.” (P2, teacher)

“Some students faint after morning prayers because they skip breakfast or don’t eat enough.” (P1, teacher)

“During menstruation, some girls avoid the dining hall completely and rely on snacks. They say the kitchen food makes their cramps worse.” (P10, student)

“We don’t talk about reproductive health openly. We are shy, and also no teacher really teaches us.” (P7, student)

Table 1. Summary of Thematic Findings from Interviews and FGDs

Theme	Sub-themes	Key Findings / Description	Representative Quotes
1. Inconsistent Hygiene Practices	- Irregular washing methods- Poor sanitation tools- Lack of supervision	Hygiene practices in the kitchen are inconsistent and largely depend on personal initiative; sanitization is rarely applied.	“Sometimes we wash vegetables with clean water, sometimes not...” (P2)“We reuse cooking oil many times...” (P3)
2. Lack of Food Safety Knowledge	- No formal training- Limited awareness of contamination- Interest in training	Food handlers lack basic knowledge about food safety standards and express willingness to receive structured education.	“We only learn from seniors. There is no official training.” (P1)“I want training...” (P1)
3. Student Dietary Preferences	- Preference for instant food- Rejection of institutional meals- Hidden snacking behavior	Students rely on processed foods for convenience and taste, often avoiding <i>pesantren</i> meals perceived as unappetizing or unhealthy.	“I like instant noodles...especially when the <i>pesantren</i> food doesn't look good.” (P8)“We hide ramen...” (P9)
4. Institutional Constraints	- Limited budget- Poor kitchen infrastructure- Staffing shortages	Budget constraints limit food quality; infrastructure is outdated; there's no dedicated staff for nutrition or food hygiene.	“We can't afford fresh vegetables or meat every day.” (P3)“No refrigerator or proper storage.” (P1)
5. Links to Reproductive Health	- Menstrual health issues- Lack of nutrition education- Emotional and physical fatigue	Students experience fatigue, irregular menstruation, and mood swings potentially linked to poor diet; lack of health literacy persists.	“Some students get sick frequently... I believe it's linked to food.” (P3)“We don't talk about reproductive health...” (P7)

3.1 Nutritional Resilience as Institutional Practice

Nutritional resilience refers to an institution's ability to ensure sustained access to adequate, diverse, and safe food even under conditions of stress or change. In *pesantren*, this resilience is compromised due to chronic budget limitations, limited food procurement options, and aging infrastructure. The lack of cold storage, inadequate food diversity, and reliance on repetitive, starchy meals point to structural fragility. This is consistent that adolescent nutritional outcomes are shaped not only by individual behaviors but also by institutional and environmental systems. Recent studies in Indonesia also highlight that institutional food systems, particularly in boarding schools, directly influence adolescent anemia, stunting, and reproductive health risks [10]. A resilient *pesantren* must therefore integrate nutrition-sensitive planning across food procurement, meal preparation, and policy frameworks to ensure long-term student well-being [11].

3.2 Food Safety: The Neglected Component

The absence of basic food safety measures in *pesantren* kitchens such as proper sanitation, hygiene tools, and structured training presents serious public health risks. Foodborne diseases are likely underreported in these settings due to the normalization of mild illnesses such as diarrhea or gastric discomfort[12].. Similar findings have been noted in other resource-constrained environments, where food security efforts often overshadow food safety despite their interdependence. This imbalance is problematic, as nutritious food that is prepared or stored under unsafe conditions loses its health benefits and may even exacerbate health vulnerabilities [10].. In the *pesantren* context, food safety therefore requires explicit institutional recognition, dedicated budget allocations, and routine monitoring mechanisms to prevent long-term negative impacts on adolescent well-being[13].

3.3 Student Agency and Dietary Behavior

Female adolescents in *pesantren* demonstrate dietary agency through their conscious rejection of institutional meals and preference for instant noodles, packaged snacks, and sugary beverages. This behavior functions both as a coping strategy and as an assertion of autonomy within a restrictive environment. Emotional eating patterns often associated with stress, homesickness, and peer influence were also frequently observed. These findings align with Shankland

[13]., who describe emotional eating as a mediating factor between food intake and psychosocial resilience. Similar evidence from global studies shows that adolescents' dietary choices are strongly shaped by psychosocial stressors and the food environment available to them [14]. Without adequate health education and improved access to nutritious options, students are likely to continue gravitating toward high-calorie, low-nutrient foods that compromise both general and reproductive health.

3.4 Religious Culture and Health Discourse

Despite *pesantren* being centers of moral and religious development, discussions around reproductive health and nutrition remain limited or even taboo. Religious authority is often prioritized, but this emphasis can unintentionally exclude biomedical or holistic health perspectives. Evidence from similar faith-based school contexts shows that religious norms may restrict open discourse on menstruation, body development, and diet, which are critical for adolescent health [15]. This silence contributes to misinformation, stigmatization, and unhealthy coping strategies among students. Global education research further highlights that when reproductive health and nutrition are not integrated into culturally appropriate school curricula, adolescents are more vulnerable to health risks and knowledge gaps. A more integrative approach that respects Islamic values while embedding health literacy into *pesantren* education is therefore essential to promote adolescent well-being.

3.5 Environmental Vulnerability in Coastal Context

The geographic setting of *pesantren* in coastal Jepara introduces unique vulnerabilities, including seasonal floods, high humidity, salinity intrusion, and unreliable access to fresh produce. These environmental stressors compromise both food safety through contamination and nutritional quality through restricted food availability. Research on coastal food systems highlights that resilience requires integrating environmental risk management into planning[10]. In Jepara specifically, ecological challenges such as nutrient fluctuations, saltwater intrusion, and estuarine dynamics have been shown to affect food supply chains and dietary adequacy[11]. For *pesantren*, this implies the need for adaptive infrastructure, diversified sourcing (e.g., partnerships with local fisheries or farmers), and climate-resilient food storage to ensure safe and nutritious meals for students.

3.6 The Role of Teachers as Health Advocates

Teachers in the study expressed awareness of nutritional and reproductive challenges among students but lacked training, curricular guidelines, and institutional support to act as health educators. In many *pesantren*, religious teachers (*ustadzah*) serve as the primary adult figures for female students, positioning them as crucial actors in health messaging and support. However, without systematic capacity building, this potential remains largely unrealized. Global education research highlights that when teachers are integrated into school health promotion frameworks, they can significantly improve adolescent outcomes particularly when they act as trusted mentors and first responders to students' needs. Similar findings suggest that empowering teachers with nutrition and reproductive health knowledge can bridge institutional gaps and foster more resilient adolescent health systems [12].

3.7 Conceptual Framework for Intervention



Fig. 1. Conceptual Framework for Intervention

Based on the findings, we propose a Conceptual Framework that aligns four pillars:

- 1) Nutritional Resilience: Ensuring food variety, frequency, and adequacy.
- 2) Food Safety: Promoting hygiene practices, training, and monitoring.
- 3) Reproductive Health: Providing accessible, stigma-free health education.
- 4) Institutional Governance: Strengthening leadership, budgeting, and policy design.

This integrated model reflects a systems-thinking approach, recognizing the interplay between food environments, institutional behavior, and adolescent well-being.

3.8 The Hidden Cost of Poor Nutrition

The effects of malnutrition and unsafe food are not always visible through immediate physical symptoms. Instead, they often manifest as chronic fatigue, emotional instability, low academic performance, absenteeism, and in some cases, menstrual irregularities. These “invisible” costs are rarely documented in *pesantren* evaluations but have significant implications for long-term developmental trajectories. As highlighted by Kumar [13], failing to address adolescent nutrition perpetuates cycles of poor reproductive health and intergenerational poverty. Similarly, [14], emphasize that adolescent nutritional status must be understood in a holistic framework, as even moderate deficiencies can impair reproductive health outcomes. Evidence also shows that diet quality is directly associated with psychological resilience, further underscoring the hidden burden of inadequate nutrition in adolescent populations[15].

3.9 Towards a Resilient Food Governance Model

Governance is a critical determinant of sustainable improvements in nutrition and food safety. A participatory model that actively involves *pesantren* leaders, local health departments, student representatives, and community stakeholders can create accountability and long-term sustainability. This approach aligns with the FAO’s call for “community-owned food systems” in vulnerable settings, which emphasize collective responsibility and shared decision-making[10]. In the context of coastal Jepara, such governance could translate into joint planning of menus, transparent budgeting, and collaborative kitchen management. Strengthening governance structures by granting *pesantren* greater food policy autonomy, while ensuring district-level technical assistance, can help bridge gaps in implementation and improve resilience. This is consistent with evidence that institutional and household-level governance directly influence nutrition outcomes in Indonesian coastal communities. and that resilience-oriented food systems require integration of ecological, institutional, and social dimensions[11].

3.10 Policy Recommendations

To translate these insights into action, we recommend:

- 1) Training for Food Handlers: Standardized food safety and hygiene modules delivered by local health officers.
- 2) Health Curriculum Integration: Embedding nutrition and reproductive health into *pesantren* religious curricula in a culturally sensitive manner.

- 3) Infrastructure Improvement: Government or NGO-supported investments in clean water access, refrigeration, and waste management systems.
- 4) Cross-sector Collaboration: Active partnerships between *pesantren*, local health clinics, public nutrition programs, and women's health organizations to ensure continuum of care.

These recommendations align with the Indonesian Ministry of Health's "Healthy School Movement" and can be tailored to the specific needs of *pesantren* environments in coastal and rural contexts.

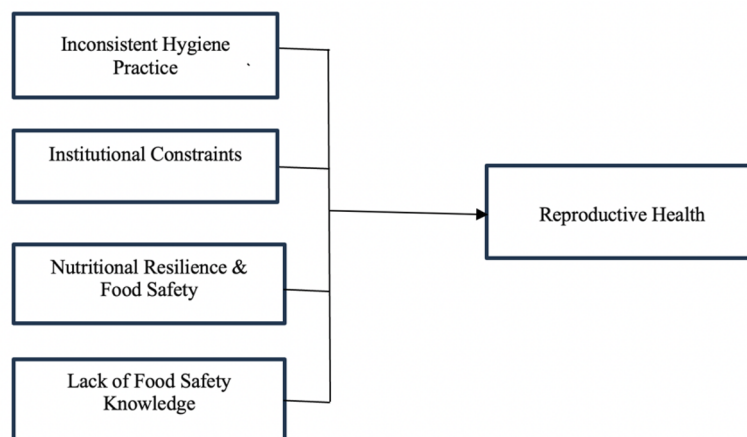


Fig. 2. Conceptual Framework for Enhancing Adolescent Reproductive Health through Nutrition and Food Safety in *Pesantren*

4 Conclusion

This study has revealed the complex interplay between nutritional resilience, food safety practices, and adolescent reproductive well-being in Islamic boarding schools (*pesantren*) located in coastal Jepara. Through qualitative exploration involving administrators, food handlers, teachers, and female students, we identified five critical domains affecting student health: inconsistent hygiene practices, limited food safety knowledge, unhealthy dietary behaviors, institutional constraints, and the absence of reproductive health discourse. These challenges are deeply rooted in infrastructural inadequacies, socio-cultural norms, and ecological vulnerabilities unique to the coastal *pesantren* context. Despite the religious and moral guidance provided by *pesantren*, basic health and nutrition standards are frequently overlooked. Food handlers operate without formal training; meals are prepared under conditions that compromise hygiene; and students, especially adolescent girls, resort to consuming processed foods high in sodium and low in essential nutrients. These patterns not only undermine general well-being but also contribute to reproductive health issues, such as fatigue, irregular menstruation, and psychosocial distress, which are often invisible in school reporting systems.

To address these concerns, we propose a conceptual framework that emphasizes four interlinked pillars: nutritional resilience, food safety, reproductive health literacy, and institutional governance. A resilient *pesantren* food system requires cross-sectoral collaboration involving school leadership, local health offices, and religious education bodies. This integration is crucial for embedding nutrition and health education into *pesantren* curricula in culturally respectful ways. Investing in food infrastructure, providing targeted training for kitchen staff, and empowering teachers as health advocates are all essential steps. Moreover, regular monitoring and the inclusion of student voices in food policy discussions can create sustainable change from within. These efforts must be coupled with external support from health and education authorities to ensure long-term impact. In conclusion, improving adolescent reproductive health through better nutrition and food safety is not only a matter of public health but also a matter of equity, education, and institutional transformation. Strengthening *pesantren* as holistic health environments will contribute significantly to Indonesia's broader goals of reducing adolescent malnutrition, improving reproductive health outcomes, and fostering resilient future generations. This study explored the nexus between nutritional resilience, food safety, and adolescent reproductive health in coastal *pesantren* in Jepara. The findings show that inadequate hygiene practices, low food safety knowledge, unhealthy dietary patterns, institutional limitations, and the

absence of reproductive health discourse collectively compromise the well-being of students, particularly adolescent girls.

To address these challenges, a four-pillar framework is proposed: nutritional resilience, food safety, reproductive health literacy, and institutional governance. This framework underscores the need for strengthening food infrastructure, providing systematic training for food handlers, empowering teachers as health advocates, and engaging students in participatory health governance. Integrating these strategies within the *pesantren* context ensures that health interventions are both culturally grounded and practically sustainable. This study makes two key contributions. First, it highlights *pesantren* as not only educational institutions but also as residential ecosystems where daily dietary environments directly affect adolescent reproductive outcomes. Second, it offers a culturally sensitive intervention framework that connects institutional governance, food systems, and health literacy an approach rarely examined in Indonesian or global literature. By advancing a model that is context-specific yet adaptable, this research provides actionable insights for policymakers, educators, and health practitioners. Strengthening *pesantren* health systems through integrated nutrition and reproductive health strategies contributes not only to reducing adolescent malnutrition and reproductive risks but also to achieving broader Sustainable Development Goals (SDGs) on health, gender equity, and education.

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