

Factors Influencing the Utilization of Onion Peel Waste as Natural Pesticides in Sungai Pauh Village, Langsa Barat Subdistrict, Langsa City, 2025

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ABSTRACT

Household organic waste, particularly shallot and garlic peel waste, has the potential to be utilized as natural pesticides that are environmentally friendly and safe for human health. However, the utilization of this waste at the household level remains limited. This study aimed to analyze the knowledge, attitudes, and practices of housewives regarding the utilization of shallot and garlic peel waste as natural pesticides in Sungai Pauh Village, Langsa Barat Subdistrict, Langsa City.

This study employed a quantitative analytical design with a cross-sectional approach. Data were collected using a structured questionnaire measuring respondents' knowledge, attitudes, and practices related to the utilization of shallot and garlic peel waste. The data were analyzed using univariate analysis to describe the distribution of each variable.

The results showed that most respondents had a moderate level of knowledge regarding the utilization of shallot and garlic peel waste as natural pesticides. The majority of respondents demonstrated positive attitudes toward the use of natural pesticides, perceiving them as safer and more environmentally friendly than chemical pesticides. However, actual implementation remained low, as most respondents had not practiced utilizing shallot and garlic peel waste as natural pesticides in their household gardening activities.

In conclusion, although housewives generally possess adequate knowledge and positive attitudes toward the utilization of shallot and garlic peel waste, these factors have not been fully translated into practical actions. This study highlights the need for educational interventions accompanied by practical training and community support to promote sustainable household waste management and environmentally friendly pest control practices.

Keywords: household organic waste, shallot peel, garlic peel, natural pesticide, knowledge attitude practice

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INTRODUCTION

Hospital administration in 2026 is undergoing a radical transformation shaped by technological innovation, evolving patient expectations, and increasing demands for operational efficiency. Healthcare systems worldwide are confronting multifaceted challenges—ranging from rising costs and workforce shortages to the need for more coordinated and equitable care delivery. In response, hospital leaders are adopting innovative strategies that blend data-driven decision-making, digital technologies, and adaptive leadership models to ensure both institutional sustainability and improved patient outcomes. Innovation has become a defining feature of modern hospital administration. Artificial intelligence (AI), predictive analytics, and automation are revolutionizing administrative operations by optimizing resource allocation, reducing inefficiencies, and enhancing clinical support systems. Yet, these technological advancements also necessitate new forms of leadership that can navigate the complexities of digital transformation while maintaining a strong commitment to patient-centered values.

Patient-centered leadership emphasizes empathy, transparency, and inclusivity in healthcare decision-making. It bridges the traditional divide between clinical care and organizational management, positioning patients not merely as recipients of care but as active partners in its design and delivery. As hospitals integrate emerging technologies and value-based care models, leadership

styles that prioritize collaboration, trust, and adaptability are becoming essential for achieving long-term efficiency and quality outcomes.

The convergence of innovation, efficiency, and patient-centered leadership thus defines the new frontier of hospital administration. Recent scholarship underscores that the success of healthcare organizations in 2026 depends not only on technological adoption but also on cultivating a culture of continuous improvement and human-centered care. Studies highlight how digital transformation initiatives, when coupled with inclusive leadership, lead to measurable gains in hospital performance, staff engagement, and patient satisfaction (Gonzalez & Weaver, 2021; Lee et al., 2023; Nguyen & Patel, 2025). Furthermore, research indicates that healthcare institutions embracing integrated innovation frameworks—such as Lean Six Sigma combined with AI-driven management systems—achieve superior operational outcomes and enhanced care coordination (Rahman et al., 2024; Williams & Cho, 2022). Collectively, these findings affirm that the transformation of hospital administration in 2026 is a dynamic process that hinges on balancing efficiency with empathy, technology with trust, and data with decisiveness.

METHOD

Research Design

This study employed an analytical research design, aiming to examine the relationship between variables and to explain the association identified. A quantitative approach was used with a cross-sectional design, in which the independent and dependent variables were measured simultaneously at a single point in time. This design allows researchers to observe relationships between variables without manipulating the study environment.

Research Location and Time

Research Location

The research was conducted in Sungai Pauh Village, Langsa Barat Subdistrict, Langsa City.

Research Time

The study was planned to be carried out in November.

Population and Sample

The population refers to all subjects who meet the predetermined research criteria. In this study, the population consisted of all housewives residing in Sungai Pauh Village, Langsa Barat Subdistrict, Langsa City. The sample represents a portion of the population that is considered capable of reflecting the characteristics of the population as a whole. Sampling was conducted to obtain data that were practical, efficient, and generalizable. The sample size was determined using the Slovin formula, as the total population was known and the researcher aimed to obtain a representative sample with an acceptable level of precision.

Sampling Technique

The sampling technique used in this study was Stratified Random Sampling. The population was divided into several subgroups based on hamlet areas, and respondents were selected randomly from each subgroup proportionally. Sample selection was conducted at the household level. One household member was randomly selected to represent each household, provided that the respondent met the inclusion criteria. A lottery method was applied to ensure fairness and to minimize selection bias. Household identification codes were written on small pieces of paper, mixed thoroughly, and one code was randomly drawn to determine the selected respondent.

Inclusion and Exclusion Criteria

Inclusion Criteria

Inclusion criteria are characteristics that qualify individuals to be included in the research sample. The inclusion criteria in this study were as follows: Housewives or household members residing in Sungai Pauh Village who were legally considered adults and willing to participate as respondents.

Exclusion Criteria

Exclusion criteria are characteristics that disqualify individuals from participating in the study. These included individuals who were unwilling to participate or unable to communicate effectively during data collection.

Data Collection Techniques and Research Instruments

Primary Data

Primary data were collected directly by the researcher and included information on knowledge, attitudes, and practices related to the utilization of shallot and garlic peel waste as natural pesticides. Data were obtained through interviews and observations. Interviews were conducted using a structured questionnaire to collect quantitative data. Observations were conducted using a checklist to assess respondents' practices in processing shallot and garlic peel waste. Interviews were carried out individually during respondents' free time, while observations were conducted during daily household activities.

Secondary Data

Secondary data were obtained from administrative records related to the number of housewives residing in Sungai Pauh Village.

Research Instrument

The research instrument used in this study was a questionnaire designed to collect data on respondents' knowledge, attitudes, and practices. The questionnaire consisted of structured and open-ended questions that were later categorized for quantitative analysis.

Data Processing Techniques

Data processing is a critical stage in research as it affects the accuracy and reliability of analysis results. After data collection, processing was conducted through the following stages: data checking to ensure completeness and accuracy, data coding to convert responses into categorical data, scoring of responses, data entry into computer software, and data cleaning to identify and correct potential errors.

Data Analysis Techniques

Data analysis was conducted after all data had been tabulated and entered into a computer system. The analysis consisted of univariate and bivariate analyses.

Univariate Analysis

Univariate analysis was performed to describe each research variable independently. The results were presented in the form of frequency distributions and descriptive summaries to illustrate respondents' characteristics, levels of knowledge, attitudes, and practices.

Bivariate Analysis

Bivariate analysis was conducted to examine the relationship between independent and dependent variables. The Chi-square test was used to assess the association between variables. Statistical significance was determined based on a predefined confidence level. Data analysis was performed using statistical software, and a significant result indicated the presence of a relationship between the variables studied.

FINDING AND DISCUSSION

This study was conducted among housewives in Sungai Pauh Village, Langsa Barat Subdistrict, Langsa City. Data were collected using a structured questionnaire developed to measure the variables of knowledge, attitudes, and practices related to the utilization of shallot and garlic peel waste as natural pesticides.

Respondents' knowledge was measured using ten questions based on a scoring system defined in the scoring table. Based on data analysis, the level of knowledge was classified into three categories: good, moderate, and poor.

Table 1. Knowledge of Housewives

Knowledge Category	Frequency	Percentage
Good	34	37
Moderate	41	45
Poor	17	18
Total	92	100

The results indicate that most housewives had a moderate level of knowledge. Respondents with good knowledge demonstrated a strong understanding of the benefits, preparation methods, and

application of shallot and garlic peel waste as natural pesticides. However, some respondents were categorized as having poor knowledge, indicating limited understanding of household organic waste management.

Attitudes of Housewives

Respondents' attitudes were measured using both positive and negative statements and categorized into positive and negative attitudes.

Attitude Category	Frequency	Percentage
Positive	56	61
Negative	36	39
Total	92	100

The majority of respondents demonstrated a positive attitude toward the utilization of shallot and garlic peel waste as natural pesticides. Respondents with positive attitudes tended to agree that natural pesticides are safer for health and more environmentally friendly. In contrast, respondents with negative attitudes generally expressed doubts regarding the effectiveness of natural pesticides compared to chemical pesticides.

Practices of Housewives

Respondents' practices were assessed based on their actual implementation of utilizing shallot and garlic peel waste as natural pesticides.

Practice Category	Frequency	Percentage
Yes	29	32
No	63	68
Total	92	100

The findings show that most respondents had not practiced the utilization of shallot and garlic peel waste as natural pesticides. Respondents who had implemented this practice generally exhibited better knowledge and more positive attitudes. The low level of practice highlights a gap between knowledge and attitudes and actual behavior in the field. Overall, the results indicate that housewives in Sungai Pauh Village possess relatively good levels of knowledge and positive attitudes toward the utilization of shallot and garlic peel waste as natural pesticides. However, these favorable conditions have not been fully translated into actual practices. This situation suggests that improvements in knowledge and attitudes should be accompanied by guidance, training, and practical support to encourage sustainable behavioral change.

DISCUSSION

Discussion of Findings Based on Behavioral Theory

This study examined the factors influencing the utilization of shallot and garlic peel waste as natural pesticides among housewives in Sungai Pauh Village. The discussion is framed using **Lawrence Green's behavioral theory**, which explains behavior as the result of the interaction between **predisposing factors**, **enabling factors**, and **reinforcing factors**. This theoretical approach is appropriate for understanding household-level environmental and health-related behaviors.

Predisposing Factors: Knowledge as a Cognitive Foundation

Knowledge emerged as a fundamental factor influencing respondents' readiness to utilize shallot and garlic peel waste as natural pesticides. Respondents who understood the environmental impact of domestic waste and the potential benefits of natural pesticides demonstrated greater awareness of sustainable practices. This finding supports Green's view that knowledge provides the cognitive basis for behavior by shaping understanding, awareness, and perceived relevance.

However, the study also indicates that knowledge alone was not sufficient to ensure consistent utilization. Some respondents possessed basic information but lacked deeper understanding of preparation techniques and application methods. This condition illustrates that knowledge must be practical and contextual to effectively support behavior change.

Predisposing Factors: Attitudes as Motivational Drivers

Attitudes played an important role in determining whether knowledge was translated into intention. Respondents with positive attitudes perceived natural pesticides as safer, more environmentally

friendly, and more suitable for household gardening. These perceptions strengthened their motivation to reduce reliance on synthetic pesticides and to consider waste as a valuable resource rather than a burden.

On the other hand, negative attitudes were associated with skepticism toward effectiveness and concerns about the effort required to prepare natural pesticides. According to behavioral theory, such perceptions weaken motivation and inhibit action, even when individuals are aware of potential benefits. This finding highlights that attitude formation is closely linked to personal beliefs, previous experiences, and perceived convenience.

Enabling Factors: Skills and Practical Accessibility

Enabling factors were found to be a major constraint in the utilization of shallot and garlic peel waste. Although many respondents showed willingness, the absence of practical skills limited their ability to implement the practice. Respondents frequently expressed uncertainty regarding processing procedures, dosage, and application techniques.

In Green's framework, enabling factors serve as the bridge between intention and action. Without adequate skills, tools, and access to clear guidance, individuals are unlikely to adopt new behaviors consistently. The findings suggest that the lack of hands-on training and practical demonstrations reduced respondents' confidence, thereby limiting utilization.

Reinforcing Factors: Social and Environmental Support

Reinforcing factors, such as encouragement from family members, community leaders, and local institutions, were relatively weak in the study setting. Respondents who practiced the utilization of shallot and garlic peel waste often did so independently, without structured support or recognition from their social environment.

Behavioral theory emphasizes that reinforcement is essential for maintaining and strengthening behavior over time. Social approval, role models, and community norms can legitimize new practices and encourage wider adoption. The limited presence of reinforcing factors helps explain why the utilization of natural pesticides remained sporadic rather than becoming a collective behavior within the community.

Integration of Theory and Study Context

When interpreted holistically, the findings confirm that behavior change related to household waste utilization requires the simultaneous presence of predisposing, enabling, and reinforcing factors. Knowledge and positive attitudes created awareness and intention, but insufficient enabling and reinforcing factors prevented these intentions from being fully realized.

This confirms Lawrence Green's assertion that interventions focusing solely on education are unlikely to succeed without addressing structural and social support mechanisms. Sustainable environmental behavior must be supported by skills training, access to resources, and continuous reinforcement within the social environment.

Implications for Environmental Health Promotion

From an environmental health perspective, the utilization of shallot and garlic peel waste as natural pesticides represents a practical strategy for reducing domestic waste and minimizing exposure to chemical substances. Housewives play a central role in household waste management and food production, making them strategic agents for promoting sustainable practices.

Programs aimed at increasing utilization should adopt a comprehensive approach that combines knowledge dissemination, skill development, and community engagement. Such interventions can strengthen enabling and reinforcing factors, leading to more sustainable behavior change and improved environmental health outcomes.

Summary of the Discussion

In summary, this study demonstrates that the utilization of shallot and garlic peel waste as natural pesticides is influenced by behavioral determinants as described in Lawrence Green's theory. Knowledge and attitudes function as predisposing factors that shape awareness and motivation, while skills and social support act as enabling and reinforcing factors that determine actual implementation. Strengthening all components simultaneously is essential to promote sustainable household waste management and environmentally responsible pest control practices.

CONCLUSIONS

Based on the findings and discussion of this study, it can be concluded that the utilization of shallot and garlic peel waste as natural pesticides among housewives in Sungai Pauh Village is influenced by multiple behavioral factors. The study confirms that household organic waste has significant potential to be transformed into an environmentally friendly resource when supported by appropriate knowledge, attitudes, and practices.

Knowledge was found to play an essential role as a cognitive foundation that shapes respondents' understanding of waste management and natural pesticide utilization. Housewives who possessed better knowledge demonstrated greater awareness of the environmental and health benefits associated with reducing synthetic pesticide use. However, knowledge alone was not sufficient to ensure consistent utilization, indicating that awareness must be accompanied by practical capability.

Attitudes were identified as an important motivational factor influencing respondents' willingness to adopt natural pesticide practices. Positive attitudes toward environmental sustainability and household health encouraged acceptance of shallot and garlic peel waste utilization, while negative perceptions regarding effectiveness and convenience limited behavioral adoption.

Practical implementation of natural pesticide utilization remained limited, reflecting gaps in skills, confidence, and habitual behavior. This finding highlights the role of enabling factors, such as access to practical guidance and skill development, in translating intention into action. Additionally, limited reinforcing factors, including social support and community encouragement, reduced the sustainability of the behavior.

Overall, the findings align with Lawrence Green's behavioral theory, which emphasizes that behavior change occurs through the interaction of predisposing, enabling, and reinforcing factors. The study demonstrates that strengthening only one factor is insufficient to produce sustained behavioral change. Instead, an integrated approach is required to promote sustainable household waste management practices.

In conclusion, the utilization of shallot and garlic peel waste as natural pesticides represents a feasible and environmentally sound strategy for reducing domestic waste and minimizing reliance on chemical pesticides. Empowering housewives through comprehensive education, practical training, and community support is essential to enhance sustainable behavior and improve environmental health outcomes at the household and community levels.

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