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# Knowledge, Attitudes and Practices of School Snack Food Safety among Junior High School Students in Palu City

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**ABSTRACT**

Adolescents frequently consume school snacks, which may pose health risks if safety standards are not maintained. This study aimed to assess the knowledge, attitudes, and practices (KAP) of students at SMP Negeri 1 Palu regarding school snack food safety. A descriptive-analytical design was conducted in August 2023 with 256 students from grades 7–9. Data were collected using a standardized KAP questionnaire provided by the Indonesian Food and Drug Monitoring Agency (BPOM RI) via Google Forms, administered under the supervision of trained School Kids Snack Food cadres. Ethical approval was obtained from the Research Ethics Committee of Poltekkes Kemenkes Palu. Data were analyzed using SPSS 22.0 with univariate and bivariate methods. Results indicated that the majority of students demonstrated good knowledge (83.5%) about food registration, expiration dates, hygiene, and contamination risks. Positive attitudes toward safe food handling were observed in 89.8% of respondents, while safe practices, including avoidance of expired foods and contaminated packaging, were reported by 90% of students. However, occasional lapses were noted in utensil usage and purchasing from sick vendors. The findings highlight that students are generally aware of key food safety principles, but targeted educational interventions are needed to reinforce consistent safe practices. Implementing regular food safety education, canteen audits, and parental involvement may further enhance food safety compliance, contributing to improved adolescent health outcomes and safer school food environments.

## INTRODUCTION

Adolescents are a group in society whose population in Indonesia reaches almost 30% of the total population. Teenagers are the nation's asset in facing the demographic bonus that the Indonesian nation may get in the next 1-3 decades. In 2045, Indonesia will get a demographic bonus, namely 70% of Indonesia's population in productive age (15-64 years), while the remaining 30% are unproductive residents (under 14 years old and over 65 years old) in the 2020-2045 period. The demographic bonus is the biggest challenge for the Indonesian state in creating a healthy, quality and globally competitive generation[1].

Law No. 18 of 2012 states that the implementation of food aims to increase public knowledge and awareness about safe, quality, and nutritious food for public consumption[2]. Teenagers are a very important group to pay attention to, because they are the next generation of the nation who will determine the quality of a country. The commonly known consumption habits of school children are snacks that are usually obtained from school canteens and traders around the school[3–6].

Snack food plays an important role in fulfilling the energy intake and nutrition of school-age children, consisting of ready-to-eat food, processed foods from large industries (MD/ML), processed foods IRTP, and cut fruits. Microbiological, physical, and chemical hazards are very likely to contaminate snack foods due to poor food safety practices and polluted environments. Therefore, supervision of the safety of snack food and also the guidance of producers, hawkers, and consumers must be carried out to ensure their safety from production to consumption. School Kids Snack Food's security intervention activities are integrated into the Healthy Living Community Movement (GERMAS), which is a national movement initiated by the President of the Republic of Indonesia that prioritizes promotive and preventive efforts without excluding curative-rehabilitative efforts by involving all components of the nation in socializing a healthy paradigm. One of BPOM's involvement in this national movement is through the national priority project Healthy Food Consumption, with school kids snack food Security Intervention activities[7,8].

The safety and quality of food products circulating in the school environment are determined by school policies, food safety practices of school canteen managers and food vendors around the school environment as well as awareness of choosing food from the school community. One of the important elements in school independence is the school community (principal, teacher, school committee, students, parents, School Kids Snack Food traders) who actively participate in realizing food safety programs in schools, including actively socializing food safety messages. The school community can be a driving force in the implementation of food safety in schools[9–11].

The POM Center in Palu has made efforts to disseminate food safety information through Food Safety Socialization to the School Community and the Provision of Food Safety Information Products as well as producing School Food Safety Cadres, thereby encouraging school independence to carry out food safety supervision and spreading food safety messages to the school community[12,13].

Previous research on healthy school canteens shows the need for healthy school canteens[14–18]. Research in Equador shows challenges in complying with school canteen regulations, such as fees incurred by students, lack of control over street vendors around schools, and lack of trained personnel in canteens. Regarding facilities, they highlighted that hygiene and hygiene rules are easier to comply with [17]. The implementation of good hygiene practices related to food contact surfaces is correct, but the implementation of good individual hygiene practices needs increased supervision [16]. Research in Brazil shows that certification seals to encourage school canteen managers in Brazil to adopt appropriate and healthy diet promotion measures [15]. Private school canteens were classified better than public school canteens in most of the categories evaluated. In addition, school canteens that have been outsourced and also have a technical person in charge (nutritionist) show the best results [14]. Research in Indonesia shows that the health of school canteens can be improved by implementing national food policies and healthy school canteen standards accompanied by good management practices in schools, especially after the COVID-19 pandemic[18]. Previous research on knowledge and attitudes about healthy food in the canteen [19,20] shows that there is a relationship between knowledge and the behavior of elementary school canteen managers in South Kuta District. The knowledge possessed by canteen managers has a direct effect on their hygiene and sanitation behavior. This knowledge will affect the behavior of canteen managers in carrying out snack food production activities so as to improve the quality in terms of food.

The application of food safety interventions to the school community needs to be researched to determine the level of understanding of the school community on the importance of food safety, especially students, parents, school committees or other teacher councils, and School Kids Snack Food providers. The purpose of this study is to analyze the knowledge, attitudes and practices of SMPN 01 Palu students about School Children's Snack Food.

## MATERIALS AND METHODS

This descriptive-analytical study was conducted from August 1 to 16, 2023 at SMP Negeri 1 Palu, Central Sulawesi, Indonesia. The study population consisted of 256 students from grades 7 to 9. A structured KAP (knowledge, attitude, practice) questionnaire was used, based on a standardized instrument provided by the Indonesian Food and Drug Monitoring Agency (BPOM RI). The questionnaire underwent pilot testing and expert validation to ensure content validity, clarity, and relevance. Items assessed included students' knowledge of food registration, expiration dates, personal hygiene, utensil usage, and avoidance of risky food vendors, as well as their attitudes and actual practices related to school snack consumption. Ethical approval was obtained from the Research Ethics Committee of Poltekkes Kemenkes Palu, and written consent was obtained from all

participants and their parents. Data collection was performed using an online platform (Google Forms), allowing students to complete the questionnaire remotely under supervision by trained School Kids Snack Food cadres, who provided guidance while ensuring anonymity and voluntary participation. The research team consisted of personnel trained in food safety education and familiar with the administrative procedures of school-based surveys. Data entry and cleaning were conducted prior to analysis. Statistical analysis was performed using SPSS 22.0. Descriptive statistics summarized demographic characteristics and KAP responses, while bivariate analyses examined associations between demographic factors and students' KAP scores. Frequency tables and charts were prepared to present findings in a clear, interpretable manner, consistent with standard reporting guidelines for cross-sectional surveys.

## RESULTS

Respondents from Class 7 had the largest percentage, which was 58.6% of the total sample. Women have a higher percentage than men in this study sample, which is 163 people with a percentage of 63.7%. The majority of fathers in the sample have an Academy/College level education, which is 115 people with a percentage of 45.1%. Just like father's education, the majority of parents in the sample have an Academy/College level education, which is 117 people with a percentage of 45.9%.

The study assessed students' knowledge regarding the safety of school snacks, focusing on packaged and ready-to-eat foods. The majority of respondents (87.5%) were aware that processed foods in packaging must have a proper registration number, such as BPOM RI MD/ML No. or PIRT No., indicating official oversight. Awareness of expiration information was high, with 93% recognizing that products lacking expiration dates are unsafe for consumption. Regarding hygienic handling, 93.4% of students understood that using tongs to select ready-to-eat foods is safer than direct hand contact. Similarly, 84% acknowledged the health risks of consuming food sold by vendors showing symptoms of illness, such as cough or skin diseases.

Students also demonstrated strong awareness of environmental and contamination factors. Nearly all respondents (98.4%) recognized that food should be purchased from clean and enclosed locations, and the same proportion understood the risks posed by contamination with human hair or animal fur. Knowledge of improper packaging materials was notable, with 96.5% aware that used paper should not be used for wrapping food and 94.1% knowing that food containing textile dyes or spoiled food is unsafe. Likewise, 94.1% understood that damaged or dented packaging compromises food safety.

These findings indicate that students generally possess a solid understanding of fundamental food safety principles, demonstrating the ability to identify potential hazards and implement precautionary measures. Their knowledge spans regulatory compliance, hygienic practices, and

environmental considerations, reflecting effective dissemination of food safety education. The study underscores the importance of continuous education and practical guidance to maintain and reinforce students' knowledge, thereby fostering safer consumption practices and reducing the risk of foodborne illnesses among school-aged children.

The study examined students' attitudes toward school snack food safety, highlighting their perception of regulatory compliance, hygiene, and contamination risks. A majority of students (82.8%) agreed that packaged processed foods must carry a proper registration number, such as BPOM RI MD/ML No. or PIRT No., indicating official oversight. Additionally, 85.9% recognized that products without expiration date information are unsafe for consumption, reflecting their awareness of the importance of date verification. Regarding hygienic practices, 94.5% endorsed the use of tongs rather than direct hand contact when selecting ready-to-eat foods.

Students also demonstrated caution concerning vendors and the purchasing environment. About 84.4% agreed that food sold by vendors who are ill may pose health risks, while nearly all respondents (96.5–98.0%) considered it essential to buy from clean, enclosed locations and avoid foods contaminated with human hair or animal fur. Attitudes toward packaging and wrapping materials were similarly vigilant, with 75.8% and 85.2% opposing the use of recycled paper and textile dyes in food, respectively. Moreover, 97.7% of students rejected spoiled foods or damaged packaging as unsafe.

These findings indicate that students possess generally positive attitudes aligned with food safety principles, demonstrating an understanding of risk factors and precautionary measures. Their attitudes suggest readiness to apply these considerations in practice, supporting the effectiveness of educational programs and highlighting the need for ongoing reinforcement to maintain safe consumption behaviors.

The study examined students' food safety practices concerning school snacks. Most respondents (73.7%) reported never purchasing processed foods without proper registration numbers, although a small fraction (1.8%) still did so consistently. Regarding expired products, 83.9% avoided buying them, with a minority occasionally purchasing such items. Concerning hygienic handling, 46.1% used tongs when selecting ready-to-eat foods, 36.7% used them frequently, and only 6.3% never used utensils, indicating variability in hygiene practices.

In terms of vendor health, 84% of students refrained from buying food from vendors showing signs of illness, demonstrating awareness of potential contamination risks. Purchase location choices varied, with 43% selecting specific safe locations, while a smaller portion (10.2%) consistently purchased from the same spots. Most students avoided food contaminated with human hair or animal fur (81.3%) and rarely consumed foods wrapped in recycled paper (68.8%). Visual inspection of food

color was practiced occasionally by 46.1% of students, while only 9.4% always monitored it. Nearly all students (97.6%) avoided spoiled foods, and attention to packaging integrity was high, with 41% checking often and 35.9% always verifying packaging condition.

Overall, these findings indicate that students generally engage in safe food handling practices, although gaps remain in utensil use and consistent monitoring of food quality. Reinforcement through education and practical interventions is necessary to maintain and enhance these practices, reducing potential health risks associated with school snack consumption.

**Table 1. Respondent Characteristics**

| Characteristic | | n | % |
|---|---|---|---|
| Classes | 7 | 150 | 58,6 |
| | 8 | 72 | 28,1 |
| | 9 | 34 | 13,3 |
| sex | Male | 93 | 36,3 |
| | Female | 163 | 63,7 |
| Father's Education | Finishing Elementary School | 2 | 0,8 |
| | Junior High School Graduation | 9 | 3,5 |
| | High School Finish | 81 | 31,8 |
| | Graduating Academy/College | 115 | 45,1 |
| | Don't know | 48 | 18,8 |
| Mother's Education | Not Finishing Elementary School | 1 | 0,4 |
| | Finishing Elementary School | 1 | 0,4 |
| | Junior High School Graduation | 11 | 4,3 |
| | High School Finish | 82 | 32,2 |
| | Graduating Academy/College | 117 | 45,9 |
| | Don't know | 43 | 16,9 |

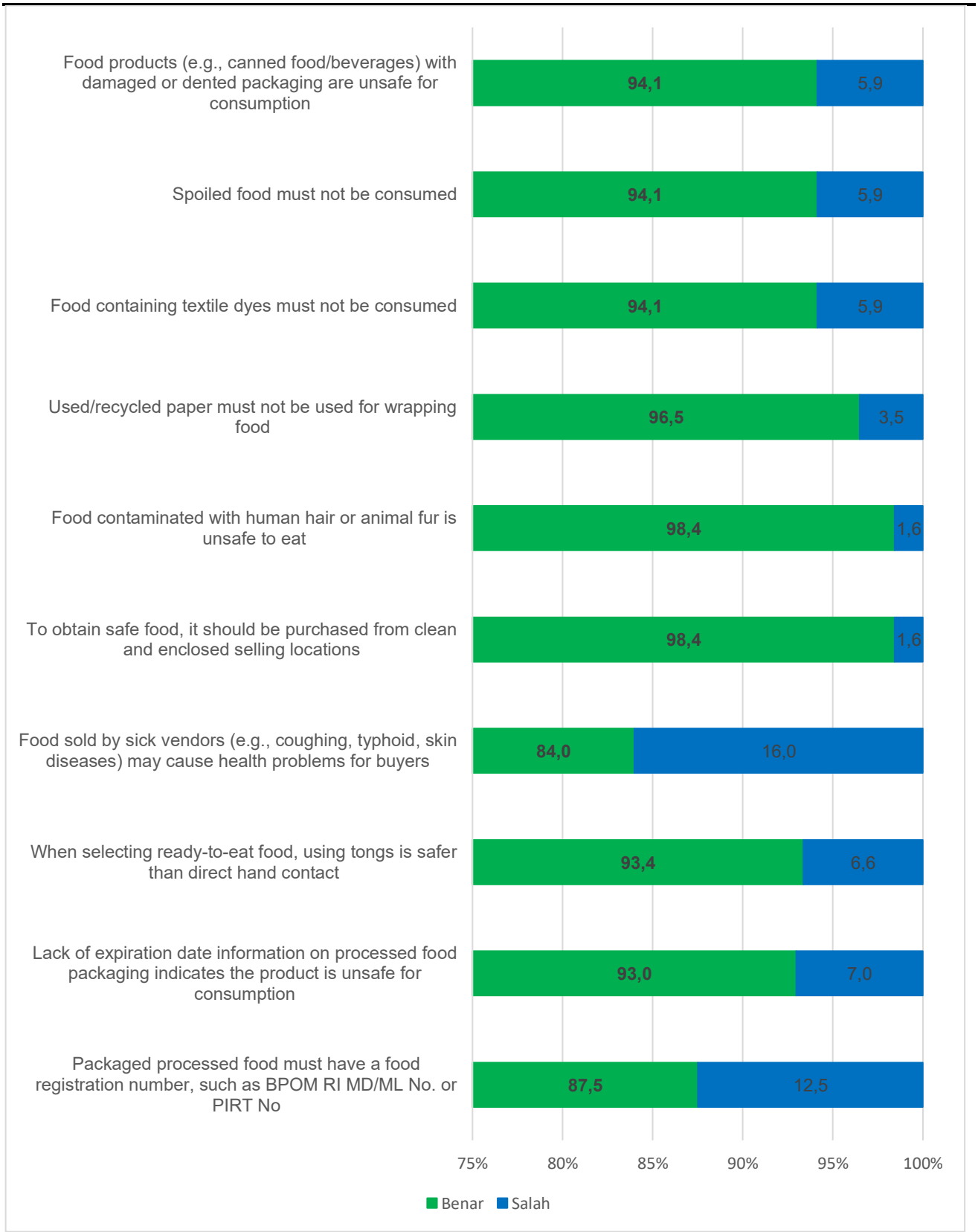


Figure 1. Students' Knowledge of School Snack Food Safety.

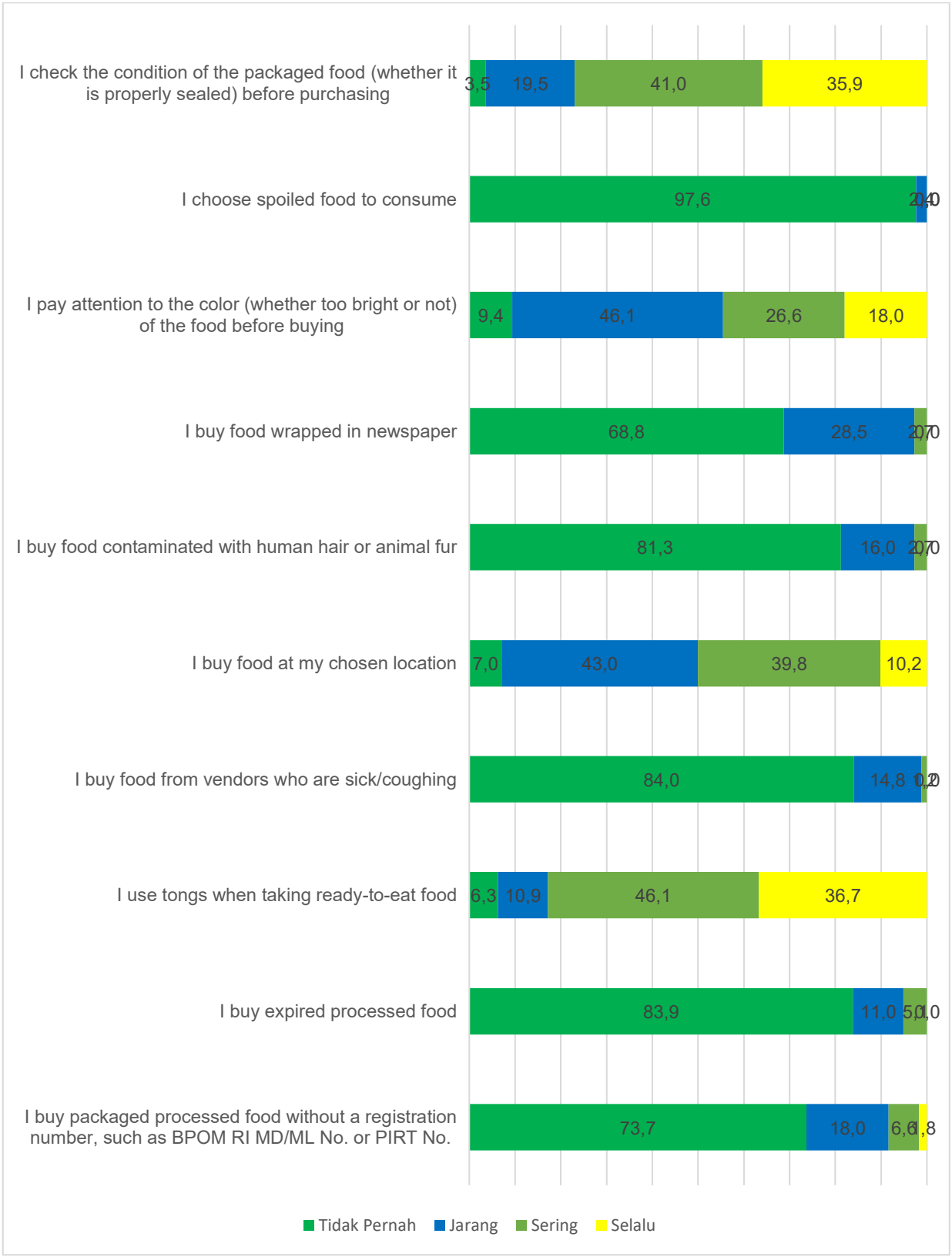


Figure 2. Student Practices on Food Safety for School Snacks

## DISCUSSION

The present study provides a comprehensive analysis of the knowledge, attitudes, and practices (KAP) of students at SMP Negeri 1 Palu concerning school snack food safety. The findings demonstrate that the majority of students possess substantial knowledge about key food safety principles, including the requirement for processed foods to have proper registration numbers, checking expiration dates, using utensils during food selection, and avoiding food sold by sick vendors. Specifically, 87.5% of students recognized the necessity of food registration numbers, and 93% were aware of the risks associated with expired products. These results reflect an encouraging level of awareness among adolescents regarding regulatory compliance and hazard prevention. Such knowledge is consistent with prior studies emphasizing that targeted educational interventions and school-based health programs effectively enhance students' food safety awareness [21] [22].

Attitudes toward food safety were similarly positive, with most students agreeing on the importance of hygienic handling practices, proper vendor selection, and safe purchase locations. The data indicated that 94.5% of students endorsed the use of utensils to minimize direct hand contact, and 96.5% acknowledged that purchasing food from clean, enclosed locations was safer. These attitudes align with behavioral theories suggesting that positive perception of risk and preventive measures strongly correlate with compliance and safe practice adoption. This supports the working hypothesis that higher awareness and positive attitudes foster responsible consumption behaviors among adolescents. Moreover, the consistency between knowledge and attitudes observed in this study underscores the interrelated nature of cognitive understanding and belief systems in shaping preventive behaviors.

Practice patterns, while generally aligned with the knowledge and attitudes, revealed areas needing further attention. While the majority refrained from buying unregistered or expired foods, only 46.1% consistently used utensils when selecting ready-to-eat items, and minor proportions occasionally purchased snacks from vendors displaying symptoms of illness. This indicates that despite awareness, the translation of knowledge and attitudes into consistent behavioral practices may be influenced by external factors such as peer behavior, convenience, and habit formation. These findings corroborate previous research emphasizing the gap between theoretical knowledge and real-world practice, particularly in school environments where social and environmental cues can modulate behavior [23] [24]

Demographic factors, such as grade level, gender, and parental education, were notable in interpreting the results. A predominance of grade 7 students (58.6%) may have influenced overall KAP scores, as younger students may be more responsive to structured educational interventions. The higher representation of female students (63.7%) is also consistent with literature suggesting that

girls often exhibit greater health-conscious behavior and adherence to food safety guidelines than boys. Parental education levels, with approximately 45% of fathers and mothers holding tertiary degrees, likely contributed to the home environment fostering awareness and reinforcement of safe eating practices. This aligns with socioecological models, which posit that family education and parental guidance are pivotal in shaping adolescent health behaviors.

The study's findings also highlight critical aspects of food safety education in school settings. Nearly all students recognized the dangers of food contamination by hair or animal fur and the risks posed by improper wrapping materials. Similarly, awareness of unsafe color additives in food and the importance of inspecting packaging integrity was widespread. These insights indicate that current school-based food safety interventions, likely influenced by BPOM-led programs and GERMAS initiatives, have effectively communicated basic principles of hygiene and hazard identification. However, the minor lapses in utensil use and occasional risky purchases suggest that reinforcement strategies, practical demonstrations, and continuous engagement are necessary to sustain behavioral adherence.

From a broader public health perspective, promoting consistent safe practices among adolescents has multiple implications. School canteens are pivotal environments where students regularly interact with snack foods, and proper management can prevent foodborne illnesses, support nutritional adequacy, and reduce health disparities. Educating students not only imparts individual responsibility but also creates peer-driven normative behaviors that can influence collective adherence to food safety standards. Furthermore, integrating food safety into curricula and extracurricular activities can enhance long-term habit formation, preparing adolescents to make informed decisions beyond the school context.

Comparing the present findings with international studies, similarities emerge regarding the impact of structured food safety programs. In Ecuador, regulatory compliance in school canteens was limited by student spending capacity and lack of vendor oversight, highlighting the interplay between environmental and social factors [14–18]. Studies in Brazil have shown that certification and technical supervision improved adherence to dietary standards in canteens, particularly when external professionals such as nutritionists were involved. These parallels suggest that while knowledge and attitudes can be effectively transmitted through educational programs, consistent implementation requires supportive infrastructure, monitoring, and continuous evaluation.

The current study also contributes to understanding the KAP model in an Indonesian context. By examining a local population, the research identifies culturally and institutionally specific factors influencing food safety behavior. The predominance of adolescents from households with high parental education may have enhanced receptivity to school-based messages, yet the occasional lapses indicate that environmental reinforcement and practical facilitation remain essential.

Additionally, peer influence and habitual behavior may partially explain deviations from ideal practices, highlighting the need for behaviorally-informed interventions that combine knowledge transfer, attitude shaping, and habit reinforcement.

Both studies highlight the importance of school-based interventions for improving dietary knowledge, hygiene, and food handling behaviors. Like ProGAS, the Palu KAP study demonstrates increased awareness of safe food practices, yet gaps remain in habitual application and nutritional adequacy, emphasizing the need for education, monitoring, and parental involvement[25].

In conclusion, the study demonstrates that students at SMP Negeri 1 Palu possess substantial knowledge and positive attitudes regarding school snack food safety, with most practices reflecting these cognitive and affective dimensions. Nonetheless, targeted interventions are required to address inconsistencies in utensil use and vendor selection. Integrating ongoing educational programs, practical training, parental engagement, and structured canteen management will enhance safe food handling behaviors. These findings underscore the importance of multi-level strategies to improve adolescent food safety practices, contributing to broader public health outcomes and the promotion of healthier, safer school food environments.

## CONCLUSION

The study revealed that students at SMP Negeri 1 Palu possess good knowledge, positive attitudes, and generally safe practices regarding school snack food safety. To further enhance adherence, continuous education, practical guidance, and structured canteen management are recommended to strengthen understanding and consistent application of safe food handling behaviors.

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## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest with any party related to this research. The study was conducted impartially and without any external influence.

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