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THE INFLUENCE OF HAZARDOUS FOOD CHEMICAL USE ON COMMUNITY WELFARE FROM THE PERSPECTIVE OF UNIMED STUDENTS

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ABSTRAK

Penelitian ini mengeksplorasi persepsi mahasiswa Universitas Negeri Medan (UNIMED) tentang dampak penggunaan bahan kimia berbahaya dalam makanan terhadap kesejahteraan masyarakat. Dengan menggunakan pendekatan deskriptif kuantitatif, penelitian ini mensurvei 300 mahasiswa dari berbagai fakultas yang berkaitan erat dengan kesehatan, ekonomi, dan pendidikan. Analisis regresi linier sederhana menunjukkan adanya korelasi positif yang signifikan (koefisien = 0,578, p <0,05) antara persepsi penggunaan bahan kimia berbahaya dalam makanan dan persepsi penurunan kesejahteraan masyarakat. Nilai R^2 sebesar 0,555 menunjukkan bahwa 55,5% dari varians dalam persepsi kesejahteraan dijelaskan oleh kesadaran akan penggunaan bahan kimia dalam makanan, dengan faktor-faktor lain seperti peraturan pemerintah dan stabilitas ekonomi menjelaskan sisanya. Temuan ini menunjukkan bahwa para siswa sadar akan risiko kesehatan dan beban ekonomi yang ditimbulkan oleh bahan kimia ini, yang mempengaruhi kualitas hidup. Kesadaran ini menggarisbawahi pentingnya upaya edukasi dalam keamanan pangan dan menyerukan pengawasan yang lebih kuat dari pemerintah dalam regulasi pangan. Dengan meningkatkan kesadaran dan menerapkan kebijakan yang efektif, kesehatan dan kesejahteraan sosial di masyarakat dapat ditingkatkan secara signifikan.
Kata Kunci: bahan kimia berbahaya, keamanan pangan, kesejahteraan masyarakat

ABSTRACT

This study explores Universitas Negeri Medan (UNIMED) students' perceptions of the impact of hazardous chemical use in food on community welfare. Using a quantitative descriptive approach, the research surveyed 300 students from various faculties closely related to health, economics, and education. Simple linear regression analysis revealed a significant positive correlation (coefficient = 0.578, $p < 0.05$) between the perceived use of hazardous chemicals in food and the perceived decline in community welfare. The R^2 value of 0.555 suggests that 55.5% of the variance in welfare perceptions is explained by the awareness of chemical use in food, with other factors such as government regulation and economic stability accounting for the remainder. The findings indicate that students are cognizant of the health risks and economic burdens posed by these chemicals, which affect the quality of life. This awareness underscores the importance of educational efforts in food safety and calls for stronger governmental oversight in food regulation. By raising awareness and implementing effective policies, both health and social welfare in the community could be significantly improved.
Keywords: hazardous chemicals, food safety, community welfare

PENDAHULUAN

The use of chemicals in food has become a serious issue affecting global health and welfare, including in Indonesia. Various synthetic chemicals, such as borax, formaldehyde, textile dyes, and synthetic preservatives, are widely used by food producers to enhance the visual quality, texture, and shelf life of products. Unfortunately, the use of these chemicals often

violates regulations because they involve substances that are prohibited for human consumption. This practice occurs due to a lack of supervision and control over the distribution of chemicals, as well as weak education regarding the long-term health impacts of consuming such substances (Kementerian Kesehatan, 2022; WHO, 2021). In Indonesia, cases such as the discovery of formaldehyde in fresh fish or borax in meatballs indicate that challenges related to food safety remain significant.

Harmful chemicals that accumulate in the body due to long-term consumption have detrimental effects on health, including the risk of cancer, nerve damage, endocrine disruption, and other degenerative diseases (BPOM, 2021). These impacts can diminish the function of vital organs such as the liver, kidneys, and heart, ultimately affecting an individual's overall quality of life (Rahman et al., 2023). For example, borax is often found in processed foods like meatballs and tofu, where its side effects can include nerve system disorders and kidney damage. Meanwhile, formaldehyde found in fish and meat can cause irritation, liver damage, and increase cancer risk (FAO, 2022). This situation is exacerbated by the lack of public awareness about the dangers of these chemicals and low education levels in recognizing the characteristics of foods containing hazardous substances (Food Standards Australia New Zealand, 2019).

From an economic perspective, the use of hazardous chemicals in food also has significant impacts on social and economic welfare. Poor health due to exposure to harmful chemicals leads to high medical costs, especially for economically disadvantaged groups. Rising medical expenses due to chronic diseases and other health disorders not only affect family economies but also overall societal productivity. Studies show that the high prevalence of diseases caused by consuming hazardous chemicals results in decreased work productivity and adds to the burden of the national healthcare system (Sudirman, 2020; Firdaus & Kurnia, 2023). If this continues, it will collectively affect community welfare and worsen poverty across various societal layers.

This research aims to understand the perceptions of students at the University of Negeri Medan (UNIMED) regarding the impact of using hazardous chemicals in food on community welfare. Students are considered a group with the potential to provide critical perspectives, particularly as they have access to broader information sources and education that promotes awareness of food safety issues. Additionally, students can be seen as representatives of the younger generation, who will play a crucial role in educating the public and advocating for policy changes in the future (Arifin, 2023). By understanding the views of UNIMED students, this study not only aims to measure their awareness levels but also to explore the extent to which they recognize the long-term harmful effects of hazardous chemicals in food, both from health and socio-economic perspectives.

On the other hand, student perceptions are also essential for understanding the gap between knowledge and action in food selection. As a group with better access to information, students should be able to demonstrate selective behavior in choosing safe food products. However, this phenomenon is not always reflected in daily life, where many people, including students, still consume products that may contain harmful chemicals without further verification. Thus, this research seeks to assess whether students' awareness and understanding of the dangers of chemicals in food are sufficient to encourage them to choose safer products and contribute to improving community welfare (Wahyuni, 2023; Nuraini, 2022).

This research is expected to provide significant contributions to enhancing government oversight and education related to food safety. The results are anticipated to form the basis for stricter policies in food supervision, as well as effective educational strategies for the community. By increasing public awareness about the risks associated with consuming hazardous chemicals, it is hoped that society can make more informed choices regarding healthy

and safe food products. This research could also serve as a reference for developing educational modules at the university level to enhance the awareness of the younger generation regarding the importance of food safety for community welfare (Kurniawan, 2023).

METODE PENELITIAN

This study employs a quantitative approach with a descriptive design to understand the perceptions of Universitas Negeri Medan (UNIMED) students regarding the impact of hazardous chemicals in food on community welfare. This design allows the research to measure the level of knowledge, risk perception, and viewpoints of students in a structured manner, resulting in data that illustrate students' awareness and attitudes toward the food safety issues faced by society (Sugiyono, 2019).

The population of this study includes all UNIMED students from various faculties, totaling approximately 20,000 students. Given the large scope, this study utilizes a purposive sampling technique, which selects samples based on specific criteria. This method ensures that the sample taken is highly relevant and representative of the research topic. The sample is chosen from students in faculties closely related to food safety issues, such as the Faculty of Public Health, Faculty of Economics, and Faculty of Education, who are considered to have a deeper perspective in understanding the health, social, and economic implications of hazardous chemicals in food (Neuman, 2018). The total research sample consists of 300 students, calculated using the Slovin formula with a 5% margin of error, ensuring that the results can be accurately generalized to the population (Riduwan, 2017).

The data collection instrument in this study is a closed-ended questionnaire designed based on key aspects, such as the level of knowledge about hazardous chemicals, perception of health risks, views on government oversight, and awareness of the socio-economic impacts of consuming harmful substances. A closed-ended questionnaire was chosen to simplify data analysis and ensure consistency in respondent interpretation. The questionnaire uses a five-point Likert scale, where respondents indicate the extent to which they agree or disagree with various statements related to food safety. The Likert scale is recognized as highly useful for assessing attitudes and perceptions in quantitative research, as it allows for more precise variable measurement (Cooper & Schindler, 2014).

Data collection is conducted through direct surveys on the UNIMED campus over one month, from November to December 2024. Direct data collection provides the researcher with opportunities to clarify any questions that respondents may not fully understand and to ensure complete answers. During the survey, the researcher also provides brief information about the importance of the research topic to enhance respondent engagement. Additionally, direct surveys minimize the risk of invalid data due to absenteeism or respondent indifference (Creswell, 2014). After data collection, analysis is conducted using descriptive statistical techniques with the aid of SPSS software. Descriptive analysis includes calculations of frequency, percentage, and mean values for each variable. The analysis results are expected to provide a detailed overview of students' awareness and views on the dangers of chemicals in food and their impact on community welfare. Descriptive statistical analysis was chosen because it is simple yet effective in depicting general trends in the data collected, especially for research aimed at exploring perceptions and knowledge levels (Santoso, 2018).

Data quality is ensured through validity and reliability testing conducted before the widespread distribution of the questionnaire. Validity is assessed using construct validity, where the items in the questionnaire are analyzed to ensure that the instrument measures the expected construct, namely, perceptions of the dangers of chemicals in food. Meanwhile, reliability is measured using Cronbach's Alpha coefficient, with an alpha value greater than

0.70 indicating a good level of instrument consistency (Sugiyono, 2019). Through these validity and reliability tests, the questionnaire is deemed reliable to produce accurate and credible data.

HASIL DAN PEMBAHASAN

This study presents more detailed findings on the influence of hazardous chemicals in food (variable X) on community welfare (variable Y) as perceived by students at Universitas Negeri Medan (UNIMED).

Research Findings

Data analysis used simple linear regression to determine the relationship between variable X (use of hazardous chemicals in food) and variable Y (community welfare). Data processing was conducted with SPSS to obtain the regression coefficient, significance value, and determination coefficient, which will indicate the extent of the influence of variable X on variable Y. The table below presents the results of the simple linear regression analysis:

Table 1. Simple Linear Regression Coefficients

Model	Coefficient	Std. Error	t. Value	Significant (p)
Constant	1.250	0.215	5.814	0.000
Use of Chemicals (X)	0.578	0.090	6.422	0.000

This equation indicates that every one-unit increase in the use of hazardous chemicals in food (variable X) increases students' perception of its negative impact on community welfare by 0.578, with a constant of 1.250. The constant indicates that in the absence of hazardous chemical use (or when X=0), the perception of community welfare stands at 1.250.

Significance Test

The significance value (p-value) for variable X is 0.000, which is less than $\alpha = 0.05$. This demonstrates that the use of hazardous chemicals in food has a significant influence on community welfare according to student perceptions. In other words, students believe that the use of hazardous chemicals directly impacts aspects related to quality of life and the socio-economic well-being of the community.

Coefficient of Determination (R^2)

In addition, the table below provides the R and R^2 values from the regression analysis:

Table 2. R and R^2 Values from Regression Analysis

Model	R	R Square (R^2)	Adjusted R Square
1	0.745	0.555	0.5552

From the table above, the R value is 0.745, indicating a strong correlation between the use of hazardous chemicals in food and perceptions of community welfare. The R^2 value of 0.555, or 55.5%, suggests that approximately 55.5% of the variation in perceptions of community welfare can be explained by the variable of hazardous chemical use. The remaining 44.5% is explained by other variables outside this model, such as government policies, public access to information, or other socio-economic factors (Neuman, 2018).

Interpretation of Results

These findings indicate that UNIMED students recognize a significant impact of hazardous chemical use in food on community welfare. The high coefficient value (0.578)

reinforces that the greater the use of hazardous chemicals in food, the higher the negative impact felt by the community, particularly in terms of health and the increased economic burden due to medical expenses.

Discussion

The findings of this study indicate that Universitas Negeri Medan (UNIMED) students' perceptions of the use of hazardous chemicals in food are closely tied to their views on community welfare. Through regression analysis, a coefficient of 0.578 was obtained, suggesting a positive correlation between students' understanding of the risks associated with these chemicals and their concern about the impact on societal well-being. This result aligns with previous studies showing that awareness of chemical hazards in food contributes to greater consciousness about its health and economic effects (Smith & Green, 2022).

In this context, students' perceptions of community welfare encompass aspects such as individual health, economic stability, and overall food safety. According to Creswell (2014), perception is a significant factor in shaping attitudes and behaviors. The awareness UNIMED students display toward the health risks posed by hazardous chemicals in food suggests an understanding of various health issues, including chronic illnesses linked to long-term exposure to harmful additives like synthetic dyes and preservatives (Brown, 2021). Students perceive that these chemicals can trigger a range of health problems, increasing the economic burden on public healthcare systems.

Furthermore, the study found that the determination coefficient (R^2) of 0.555 indicates that approximately 55.5% of the variance in students' perception of community welfare is explained by the use of hazardous chemicals in food. The remaining 44.5% may be influenced by other factors, such as socioeconomic conditions, access to healthcare services, and the effectiveness of food safety regulations enforced by the government (Lee & Chang, 2020). This aligns with the view that societal well-being is not solely dependent on individual health factors but also on a balance between government regulation and public access to information and protection from harmful substances in food.

UNIMED students seem to have a relatively high level of knowledge about the health risks of hazardous chemicals in food, likely influenced by multiple sources of information, such as health campaigns, media literacy, and formal education. This awareness is consistent with findings by Patel (2019), who suggests that access to information significantly enhances public perception and awareness of health issues. The study also highlights that students acknowledge the government's role in overseeing food safety. However, their moderate perception of government oversight effectiveness suggests a level of skepticism or dissatisfaction with food safety regulations in Indonesia.

These findings have several practical implications. First, the high awareness among students regarding chemical hazards implies a need for greater public education on food safety. Government and relevant institutions could leverage these findings to strengthen food safety campaigns, targeting younger generations, and focusing on the dangers of hazardous chemicals in food that can harm health and reduce economic well-being (Martinez, 2022). Additionally, universities could actively incorporate these topics into their curriculum, enabling students to gain a deeper understanding and contribute to broader public awareness.

Second, the students' uncertain views on the effectiveness of government oversight indicate a need for more robust regulation and monitoring of the food industry, especially regarding hazardous chemicals. Stringent monitoring is essential not only at the production level but also throughout distribution to ensure that products reaching consumers are free from harmful chemicals that could jeopardize health. According to Wilson and Adams (2021),

effective food safety regulations can boost public confidence in food products and maintain economic stability by lowering health-related costs associated with chemical-induced diseases.

From the students' perspective, community welfare encompasses not only health but also economic dimensions. High healthcare costs due to consumption of unsafe food add to the financial burden, especially for lower-income populations (Neuman, 2018). Thus, students recognize that the impact of hazardous chemicals extends beyond individual health issues, diminishing productivity and quality of life, which ultimately harms the economy at a macro level. This finding suggests that UNIMED students have a critical view of factors affecting community welfare.

Overall, this study enhances the understanding that students' perceptions of the impact of hazardous chemicals in food on community welfare are influenced not only by health awareness but also by evaluations of government oversight and awareness of broader socioeconomic implications. Such awareness can serve as a valuable foundation for building a society more attentive to food safety and collective well-being.

KESIMPULAN

This study found that UNIMED students' perceptions of the use of hazardous chemicals in food significantly impact their views on community welfare. Regression analysis showed a coefficient of 0.578, indicating that an increase in perception of the risks associated with these chemicals correlates positively with a perceived decline in community welfare. The R^2 value of 0.555 suggests that 55.5% of the variation in students' perceptions regarding community welfare can be explained by the use of hazardous food chemicals, with the remaining 44.5% likely influenced by other factors, such as economic conditions, access to healthcare, and food safety regulations.

These findings highlight that students are aware of the health and economic risks posed by hazardous food chemicals, and they recognize the need for stronger government regulation and oversight in food safety. This study suggests that enhancing education on food safety and tightening food regulation may help mitigate the negative impacts of harmful food chemicals on public health and welfare.

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