

Counterproductive Food Waste and Portrait of Poverty, Stunting, and Food Insecurity in Riau Province

Yusnarida Eka Nizmi^{1*}, Herry Wahyudi², Hasan Warso Syahputra³, Ahmad Ibrahim Roni Surya Hasibuan¹, Rahmi Yulia¹, Tuah Kalti Takwa¹

¹Universitas Riau, Indonesia

²Universitas Maritim Raja Ali Haji, Indonesia

³Dinas Pangan, Tanaman Pangan dan Hortikultura Propinsi Riau, Indonesia

ARTICLE INFO

Article history:

Received January 27, 2024

Revised February 29, 2024

Accepted March 14, 2024

Available online April 30, 2024

Keywords:

Food Waste; Food Security; Food Vulnerability; Poverty; Stunting



This is an open access article under the [CC BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license. Copyright © 2024 by Author. Published by Universitas Pendidikan Ganesha.

ABSTRACT

Riau Province faces three social problems: poverty, stunting, and food insecurity. The public understands food waste as a threat to food security. Suppose the continuous food waste issue needs to be addressed. In that case, it will directly impact sustainable food availability due to the massive amount of wasted food that is still fit to eat and nutritionally adequate. This research aims to elaborate on the counter productiveness of food waste with a portrait of poverty, stunting, and food insecurity in Riau Province, which are interconnected. Qualitative methods are used in this research, with the data collection techniques used being interviews, questionnaires, and literature analysis. The findings reveal that food waste behavior contradicts Riau Province's efforts to address its main problems. Collaboration with related agencies is essential to raise awareness and combat food waste, ensuring it does not hinder the fight against poverty, stunting, and food insecurity in Riau Province.

1. INTRODUCTION

Poverty is always correlated with stunting in an area. This is what happened in Riau Province. The average stunting rate in Riau Province is 23.3%, with the 6 districts with the highest prevalence contributing the highest number above 23% (Kusnandar, 2022). The districts are Rokan Hilir, Indragiri Hilir, Rokan Hulu, Kampar, Indragiri Hulu, and Meranti Islands. Meanwhile, the prevalence of stunting nationally is at 24.4%, and the target is to decrease to 14% by 2024 (Kusnandar, 2022). This is what makes Riau's condition worthy of discussion, in line with the phenomenon of food waste and food insecurity that follows. Xue and Liu (in Galanakis & EBSCOhost, 2019) revealed that food waste has become an issue that has captured the attention of many parties, both at the national and global levels. In 2017, the United Nations even aimed to reduce this food waste per capita globally, at both the retail and consumer levels, including reducing food loss in food production and supply sectors by 2030. This issue has captured the attention of many parties because it is directly related to the sustainability of food availability and poses a real threat to the environment.

The FAO defines food waste as food that is unconsumed or has exceeded its time limit due to consumer carelessness and is often repurposed for other uses, such as animal feed (Organizacion de la Naciones Unidas para la Alimentacion y Agricultura FAO, 2013). Starovoytova (2018a) further explain that food waste encompasses garbage, food scraps, and kitchen waste, indicating that these items were once intended for human consumption but are no longer viable. Kelleher and Robbins (2013) (in Evans & Siemens, 2016) categorize food waste as a type of waste related to food, including inedible items consumed by some but not all and food still edible or drinkable before being discarded. Thyberg et al. (2015) highlight food waste as a social, economic, and environmental issue that has become a global concern. Numerous studies have delved into food waste, particularly in the context of consumer behavior in developed nations. WRAP et al. (2009) conducted comprehensive research on food waste in the UK, while Kantor et al. (2013) examined the issue in the United States. Gooch et al. (2010) focused on food waste in Canada, and Beretta et al. (2017) emphasized its significance in Switzerland. Oelofse & Nahman (2012) work provides insight into food waste in developing countries like South Africa.

*Corresponding author

E-mail addresses: eka.nizmi@lecturer.unri.ac.id

Garnett (2011) notes that food waste contributes to greenhouse gas emissions, impacting the environment negatively. Foley et al. (2011) and Godfray et al. (2010) stress the need to address food waste behavior to ensure sustainable food availability. Considering the critical issue of food availability, it is essential to analyze this research, particularly in Riau Province, which continues to grapple with stunting due to unmet nutritional needs and varying levels of food insecurity. This situation is ironic as food waste behavior persists among the younger generation despite efforts to combat food insecurity, poverty, and stunting. It is crucial to educate the younger generation about the importance of food availability, environmental consciousness, and appreciation for food to minimize food waste. These fundamental values can be instilled through a "zero waste" approach, especially among young communities, to mitigate increasing food waste while addressing food insecurity.

2. METHOD

This research is qualitative. Data collection for this research was carried out by interviewing 131 informants who were directly related to the problems analyzed, namely food waste behavior and food security. Questions asked of informants included their understanding of food waste, the impact of food waste on social, economic, and environmental conditions, the types of food that are most often wasted, and open acknowledgment of whether there were informants who committed food waste or rejected food waste behavior. Information was also collected by analyzing selected references and documents related to the central issues studied in this research, namely poverty, stunting, food insecurity, and food waste.

3. RESULT AND DISCUSSION

Mapping of Poverty, Stunting, and Food Insecurity Points in Riau Province

The province of Riau has identified six groups for food security and nutrition security based on the severity and causes of the situation. Priority 1 encompasses areas with high food insecurity, Priority 2 includes areas with moderate vulnerability, and Priority 3 covers low-vulnerability.

According to data from The Department of Food Crops and Horticulture (DPTPH) Riau Province in 2022, there are six (6) districts/cities categorized as food vulnerable (priorities 1, 2, and 3) spread across thirteen (13) sub-districts. Bengkalis Regency has three sub-districts classified as food vulnerable with priority categories 1, 2, and 3. Indragiri Hilir Regency is also recorded as having five (5) food-vulnerable sub-districts. Rokan Hilir Regency and Indragiri Hulu Regency have one vulnerable food sub-district. Pekanbaru City also has one sub-district identified as food-weak (Badan Pangan Indonesia, 2022).

The results of the Food Security and Vulnerability Atlas (FSVA) analysis in 2022 conducted by the Riau Province DPTPH successfully identified 13 sub-districts out of 169 in Riau Province that fall under Priority 1-3 food insecurity, as presented in Table 1.

Table 1. Data on Districts with Food-Vulnerable Conditions in Riau Province

No.	Priority Category	Subdistrict	Quantity
1.	1 (High Food Insecurity level)	-	0
2.	2 (Moderate Food Insecurity level)	Rakit 5 Kulim Subdistrict Kuala Indragiri Subdistrict Condong Subdistrict Pasri Limau Kapas Subdistrict	4
3.	3 (Low Food Insecurity level)	Enok Subdistrict Tanah Merah Subdistrict Teluk Belongkong Subdistrict Kampar Kiri Hulu Subdistrict XIII Koto Kampar Subdistrict Talang Muandau Subdistrict Buki Batu Subdistrict North Rupert Subdistrict Rumbai Pesisir Subdistrict	9
			Total: 13

Source: Data processing from (Badan Pangan Indonesia, 2022)

There are three categories in classifying food vulnerable conditions in a region: 1 high food insecurity, 2 moderate food insecurity, and three low food insecurity. Based on the data, 13 Districts fall into the food vulnerable category, and none fall into the high food insecurity category. However, it should be noted that 4 Subdistricts fall into the moderate food insecurity category that needs government attention.

In addition to food-vulnerable conditions, the Riau Province still struggles to reduce its percentage of poor population scattered in several sub-districts and regencies. Poverty becomes a real threat, which, if not addressed, will undoubtedly affect other sectors in the future, such as education, society, and crime in society. The mapping of the percentage of poor people in Riau Province can be seen in the table below.

Table 2. Percentage of the Poor Population in Vulnerable Group Subdistrict in Riau Province, 2021

No.	Impoverished people percentage	Subdistrict	Regency
1.	42.105	Concong	Indragiri Hilir
2.	29.29	Kampar Kiri Hulu	Kampar
3.	28.43	Rakit Kulim	Indragiri Hulu
4.	25.22	Tasik Putri Puyu	Kepulauan Meranti
5.	24.71	Pasir Limau Kapas	Rokan Hilir
6.	22.21	Rupat Utara	Bengkalis
7.	22.08	Bangun Purba	Rokan Hulu
8.	22.01	Pulau Merbai	Kepulauan Meranti
9.	20.91	Rupat	Bengkalis
10	20.88	Rangsang Pesisir	Kepulauan Meranti

Source: Data processing from (Dinas Sosial Provinsi Riau, 2021)

Table 2 shows that the highest percentage of poor people in Riau Province is in the Concong Subdistrict, reaching 42.10 percent (42.10%). Meanwhile, the poor population in this province is spread across seven regencies, including Indragiri Hilir, Kampar, Indragiri Hulu, Kepulauan Meranti, Rokan Hilir, Rokan Hulu, and Bengkalis. Concong is a Subdistrict located in Indragiri Hilir Regency, Riau. This Subdistrict has an area of 40.12 km² and a population of 3,382 people, with a population density of 14,156/km². This area is located along the river at the sea's edge, where the edges are planted with plants such as Nipah trees. This condition gives the Concong Subdistrict great potential in fisheries, plantations, and agriculture. Therefore, most people in Concong work as fishermen, fishery laborers, civil servants, and traders (Concong Subdistrict Office, 2014). Poverty, food insecurity, and stunting are three significant issues that the Riau Province must face. The distribution of stunting problems in children is quite worrying in several sub-districts. The lowest percentage of stunted toddlers is found in the Sukajadi Subdistrict, while the highest figures are in Batang Tuaka and Kateman Subdistricts, precisely in Indragiri Hilir Regency, with very high percentages of 91 percent. The mapping of stunting spread across several Regencies/Subdistricts in Riau Province can be seen in Table 3.

Table 3. Mapping of Vulnerable Groups of Toddlers with Height Below Standard in Riau Province in 2022

No.	Subdistrict	Regency	Stunting Percentage
1.	Singingi	Kuantan Singingi	34.97
2.	Kuantan Tengah	Kuantan Singingi	61.74
3.	Sentaro jaya	Kuantan Singingi	23.27
4.	Pangean	Kuantan Singingi	26.04
5.	Cerenti	Kuantan Singingi	34.67
6.	Pasir penyau	Indragiri Hulu	24.22
7.	Reteh	Indragiri Hilir	71.00
8.	Tanah Merah	Indargiri Hilir	76.00
9.	Kualu Indragiri	Indragiri Hilir	56.00
10.	Concong	Indragiri Hilir	41.00
11.	Tembilahan	Indragiri Hilir	80.00
12.	Tembilahan hulu	Indragiri Hilir	68.00
13.	Tempuling	Indragiri Hilir	45.00
14.	Kempas	Indragiri Hilir	36.00
15.	Batang Tuaka	Indragiri Hilir	91.00
16.	Mandah	Indragiri Hilir	44.00
17.	Kateman	Indragiri Hilir	91.00
18.	Pelangiran	Indragiri Hilir	20.00
19.	Teluk Belengkong	Indragiri Hilir	84.00
20.	Pulau Burung	Indragiri Hilir	25.00
21.	Bandar Seikijang	Pelelawan	35.05
22.	Bunut	Pelelawan	36.96
23.	Pelelawan	Pelelawan	42.17
24.	Kuala Kampar	Pelelawan	37.37
25.	Koto Gasib	Siak	20.57
26.	XIII Kota Kampar	Kampar	35.44
27.	Tapung	Kampar	39.01

28.	Tapung Hilir	Kampar	27.01
29.	Tanah Putih	Rokan Hilir	23.78
30.	Bagan Sinembah Raya	Rokan Hilir	31.10
31.	Kubu	Rokan Hilir	29.70
32.	Pasir Limau Manis	Rokan Hilir	20.00
33.	Sinaboi	Rokan Hilir	22.41
34.	Pakistan	Rokan Hilir	24.80

Source: Food Security and Vulnerability Atlas (FSVA) Data processing from (Badan Pangan Indonesia, 2022)

Based on the above data, it is evident that Indragiri Hilir Regency has the highest percentage figures, with its four Subdistricts occupying the highest percentage positions overall, namely Batang Tuaka Subdistrict 91%, Kateman 91%, Teluk Belengkong 84%, and Tembilahan 80%. Meanwhile, other regencies only have around 20-30% percentage figures. This condition indicates that Indragiri Hilir Regency needs more attention due to the high stunting figures in the area. According to the Ministry of Health (2023), stunting is a condition of failure to grow in toddlers due to chronic malnutrition, especially in the first 1000 days of life. The causes of stunting include nutritional intake, health status, food security, social environment, health environment, and settlement environment. Stunting is no longer just a concern for parents within a family. Stunting is a condition that requires attention from many parties. Local governments are responsible for ensuring adequate nutrition for their people to avoid stunting, especially in areas with food insecurity conditions. Food insecurity is a condition where a region or community does not have enough food to meet its basic needs for growth and health. This condition is closely related to the nutritional fulfillment of a community. Communities with food insecurity conditions struggle to meet their daily dietary needs. Therefore, when an area has a high percentage of stunting, it can be seen that it is also in a food-vulnerable condition.

Food Waste as Counterproductive Behavior Against the Environment

(Hudson & Messa, 2015) in (Starovoytova & Namango, 2018b) stated that food waste requires energy, land, water, time, and other human resources, as well as money for the production process, transportation, packaging, selling, buying, and even cooking. Referring to Schaffnit-Chatterje (2011) in (Starovoytova & Namango, 2018a), it is explained that the agricultural sector is the most significant concerning three substances that trigger the greenhouse effect, such as CO2 (carbon dioxide), Nitrous Oxide, and methane gas, all of which contribute to global warming/climate change. WRAP in (Starovoytova, 2018a) stated that one ton of food waste can produce as much carbon dioxide as 4.5 tons. (Starovoytova & Namango, 2018b) explained in their writing that when land is filled with food residues containing methane gas, its potency to trigger global warming is twenty-four times greater than carbon dioxide. FAO, as well as Lipsinki in (Starovoytova, 2018b), clearly explain that when food waste is eventually buried or disposed of in the soil, it will pose a pollution hazard to groundwater, and the polluted land surface will have a very negative impact on ecosystems, biodiversity, and global temperature rise. From the 131 informants who were the subjects of this study, there are several reasons why they engage in food waste (Figure 1).

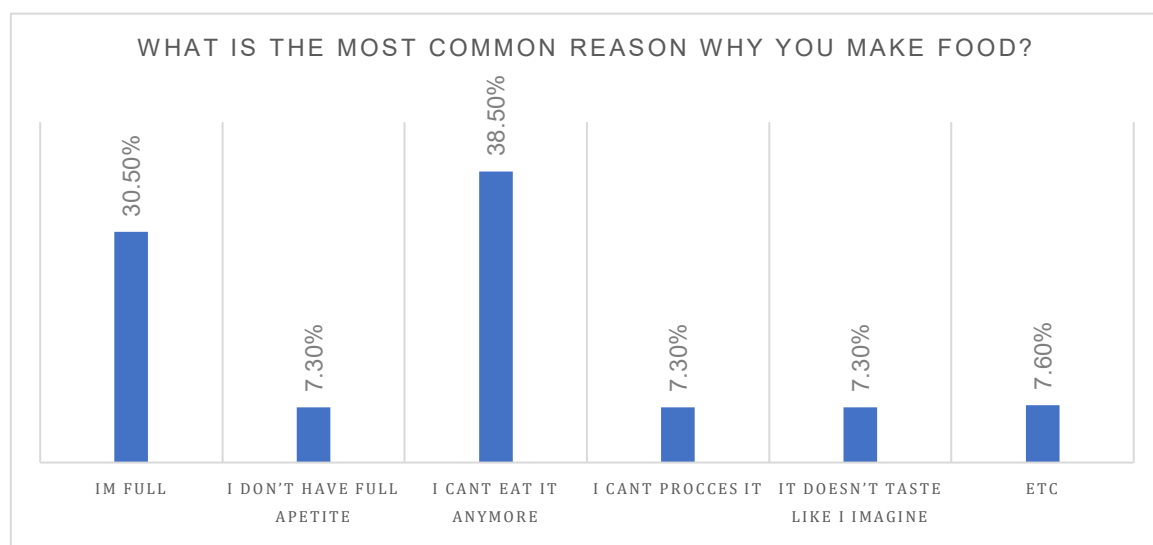


Figure 1. Informant's Reasons for doing Food waste

Based on the above findings, it is evident that most informants, with a percentage of 38.2%, dispose of food because they believe it is no longer fit for consumption. This is followed by the reason of being full, with a percentage of 30.5%. Furthermore, various other reasons are also given, such as not having a taste for it, not being able to cook it, and not tasting as expected. Both reasons indicate a habit of buying excessive food that cannot be consumed within a timeframe when the food is still edible.

Food Waste as a Counterproductive Behavior Against Food Security

(Hidayat et al., 2020) stated that food security is essential. They also mentioned that there are several things to consider in the context of food security, such as the availability of food, guaranteed food accessibility, maximizing food utilization, and maintaining food stability. Food security is closely related to the issue of hunger. According to data from the International Food Policy Research Institute (2017), as a developing country categorized as severe in the issue of hunger, Indonesia should prioritize addressing food waste. The Ministry of Agriculture (2019) presents data showing that Indonesia has a significant amount of food waste, with each person wasting 300 kilograms per year. This data is supported by Tamara et al. in (Hidayat et al., 2020), explaining that the 300 kilograms of food wasted per person per year could meet the food needs of 28 million people.

The Ministry of Agriculture in (Hidayat et al., 2020) firmly presents data showing a contradiction between Indonesia's position as a developing country with a severe hunger classification and its ranking as the world's second-highest food waste. Food behavior affects future food security. The government must make various efforts to ensure people understand the risks when food security is disrupted. This behavior is also part of the 131 respondents related to the issue of food waste in Riau Province. Based on data published by the (Organizacion de la Naciones Unidas para la Alimentacion y Agricultura FAO, 2013), it is quite surprising that 15 percent of the population in developing countries suffer from hunger, while some countries experience an extraordinary surge in food consumption. Data from the United Nations Population Division (UNDP) (2013) even estimates that the global population will become a food waste generation (Donelan, 2019).

From the 131 informants who provided data for this study, all informants were asked if they were aware of this issue, and the responses showed that 90.9 percent were aware of the global problem of food waste. In contrast, only 9.1 percent had never heard of or were unaware of the issue.

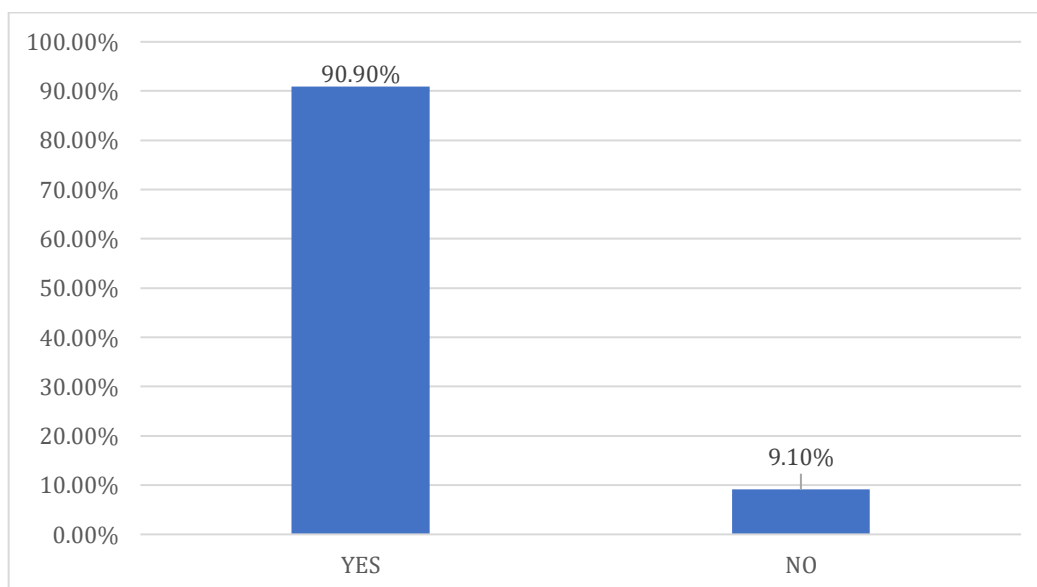


Figure 2. Percentage of Informants' Knowledge of Food Waste Issues.

Regarding whether they were part of the food waste behavior group, the responses from the informants in this study showed that 76.4 percent stated that they were part of the food waste generation. This is a concerning figure for the sustainability of food availability. If food waste behavior continues, it will also affect the sustainability of food availability in Riau Province.

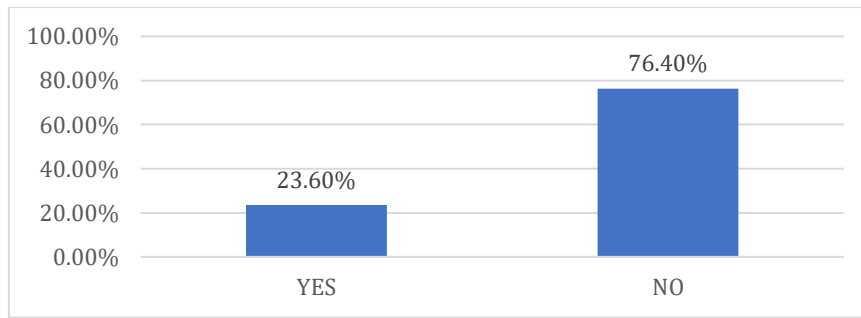


Figure 3. Percentage of Food Waste and Non-food waste Behavior

Responsible Consumption and Production as a Form of Mitigation

Promoting sustainable and responsible consumption and production, including reducing food waste, needs to be a concern for everyone, including addressing the three main issues facing the Riau Province. Campaigns such as 'Zero Waste' and 'Against food waste' may need to be promoted to reduce poverty, stunting, and food vulnerability in the Riau Province. The government and related parties need to continue their efforts to demonstrate their seriousness in achieving this target. Of the informants interviewed in this study, 48.1 percent expressed that their families and social circles do not understand the issue of food waste at all. This indicates the need for a campaign to promote responsible food consumption, which will significantly impact efforts to address poverty, stunting, and food vulnerability. Among the informants interviewed, some are aware of the issue related to food waste, while others are completely unaware.

"I have only heard about the issue of food waste for the first time and do not know what it is because my family and friends have never discussed it" (interview with informant 1).

The answers varied during the interviews when asked about the most frequently wasted food.

"I often throw away vegetables because they are not in good condition, they have turned yellow, and they have withered due to being stored in the refrigerator for too long" (interview with informant 6). *"Rice often ends up in the trash because every time I buy food, the portion of rice is too much for me"* (Informant 5).

Another response from an informant in the study stated:

"I usually throw away food such as bread crusts, leftover dishes, and foods that can no longer be consumed because they are stale and expired" (interview with informant 2).

Another informant responded about the food they often throw away and why they discard it.

"When shopping at the supermarket, I am always tempted to try new varieties of food that I see. And when I try them, it turns out that the taste does not suit my palate, so I throw them away" (interview with informant 4).

From the 131 informants who were the data source in this study, the types of food that are often discarded or in the trash can be mapped (Figure 4).

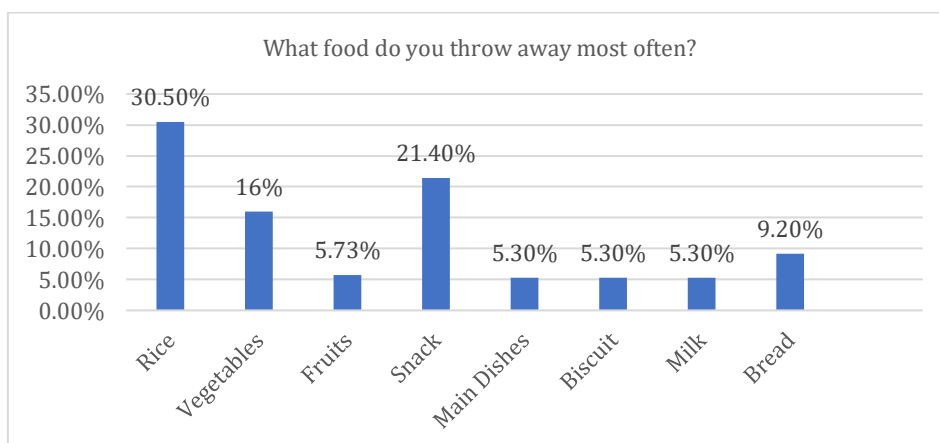


Figure 4. Types of Food Most Often Thrown Away

Mitigating Food Waste as Part of an Integral Solution

(Organizacion de la Naciones Unidas para la Alimentacion y Agricultura FAO, 2013) states that preventing ongoing food waste impacts the reduction of natural resource utilization. Minimizing food waste means reducing threats to ecology, society, and the economy. Several approaches can be taken to reduce food waste, including enhancing food security, maximizing food safety, and improving communication and cooperation among various parties in the form of strengthening values that can increase awareness of the issue of food waste 23.6 percent of respondents who do not engage in food waste behavior gave several reasons why they do not discard food. Some reasons for throwing away food include being whole, not having an appetite, not liking the taste of the food, or wanting to try other foods. This shows that only 23.6 percent do not throw away food for wasteful reasons. Many people still cannot consume anything due to various limitations and feel guilty about not finishing their food. Even parental teachings that prohibit wasting food influence non-food waste behavior.



Figure 5. Reasons for Avoiding Food Waste

Based on the findings above, most informants do not throw away food if they like it. This is followed by reasons that are chronic and developed in the family, such as "*there are still many people who cannot eat*" and "*feeling guilty.*" This shows that habit is still the leading cause of food waste behavior. When done unconsciously, these small and ordinary things have a significant impact when done continuously and in large populations.

The causes of food waste behavior are complex to stop because of the lack of awareness and bias towards such behavior. According to Marsh (2009) in (WRAP, 2022), food waste is a complex problem because this behavior is often considered trivial. It starts with one person's perception that throwing away food has no significant impact, but it turns out that this thinking applies to most of us. Therefore, efforts to overcome it are made by raising awareness and changing behavior.

Food security improvement strategies need to be carried out through two approaches. The first approach is a short-term approach in the form of agricultural-based economic development and rural development to provide jobs and income and develop the potential of local food production (sago). The second approach is a medium and long-term approach. This approach can be done by providing food for the poor and food-insecure groups through empowerment activities involving all stakeholders' participation and active roles.

Various parties are expected to play their respective roles to the maximum. Relevant institutions and institutions need to coordinate and synergize their efforts to mitigate food waste. Zero waste campaigns or socializations need to be carried out by pertinent various agencies such as the Ministry of Agriculture, Ministry of Environment, and Ministry of Education and Culture, which also involve environmental organizations and community organizations at numerous levels, emphasizing the above values, may be done so that the number of those who promote non-food waste behavior continues to increase. The amount of wasted food can be minimized. Fostering a sense of concern for the issue of food waste among various sectors of society is also an important point to consider, in addition to forming a task force that will specifically address this issue so that multiple types of food that are often thrown away, such as vegetables, fruits, rice, and other types of food, can be reduced in portion for responsible consumption and production.

Based on the severity and underlying reasons of the crisis, the province of Riau has designated six groups for food security and nutrition security. High food insecurity areas are covered by Priority 1, moderately vulnerable areas are covered by Priority 2, while low-vulnerability areas are covered by Priority 3. Encouraging sustainable and responsible production and consumption—which includes cutting down on food waste—should be a top priority for everyone. This includes taking care of the three primary problems the Province of Riau is currently facing. To lessen food vulnerability, stunting, and poverty in the Riau Province, campaigns like "Zero Waste" and "Against Food Waste" may need to be encouraged. The government and associated entities must persist in their endeavors to exhibit their earnestness in accomplishing this objective. Of the informants in this research, 48.1% said that nobody in their social or familial circles really gets the problem of food waste. This shows that there is a need for a campaign to encourage sensible food consumption, as this will have a big influence on initiatives to deal with hunger, poverty, and stunting.

The economy, society, and ecosystem are all less threatened when food waste is minimized. Food waste can be minimized by a variety of strategies, such as strengthening values that raise awareness of the problem, increasing food security, and fostering better collaboration and communication amongst diverse stakeholders. The results above indicate that most informants do not discard food that they enjoy. Chronic family-developed motives such as "feeling guilty" and "there are still many people who cannot eat" follow this. This demonstrates that the primary cause of food waste behavior is still habit. These seemingly insignificant, everyday actions, when carried out consistently and among a huge number of people, have a profound effect.

Two methods must be used to implement plans for improving food security. The first strategy is a short-term one that focuses on rural and agricultural development to create jobs, generate money, and expand the possibility of regional food production (sago). The second strategy is a long-term, medium-term strategy. This strategy can be implemented by empowering stakeholders by active roles and involvement in empowerment activities, hence supplying food for food-insecure and impoverished populations.

4. CONCLUSION AND RECOMMENDATION

The phenomena of poverty, stunting, and food insecurity are crucial issues that should be a priority for the Riau Province to address due to the accompanying threats such as hunger, environmental damage, and food security. The lack of information about the correlation between food waste and its various threats, the desire to try something new, and the limited ability to process food are reasons for the massive food waste behavior in the Riau Province. Various related agencies and institutions are expected to work together to provide campaigns, socialization, and education to all layers of society to support non-food waste behavior. Regulations are also likely to be present to reduce the rates of poverty, stunting, and food insecurity that occur in several subdistricts in the Riau Province. Implementing various positive values still held by some young communities is expected to be part of preventive action against the massive food waste behavior. Mitigating food waste is a shared priority for all elements of Riau society as part of the international community committed to achieving food security and sustainable food availability as an integral solution to the problems of poverty, stunting, and food insecurity.

5. REFERENCES

- Badan Pangan Indonesia. (2022). *Food Security and Vulnerability Atlas (FSVA) Provinsi Riau*. <https://fsva.badanpangan.go.id/>. <https://fsva.badanpangan.go.id/>
- Beretta, C., Stucki, M., & Hellweg, S. (2017). Environmental Impacts and Hotspots of Food Losses: Value Chain Analysis of Swiss Food Consumption. *Environmental Science & Technology*, 51. <https://doi.org/10.1021/acs.est.6b06179>
- Dinas Sosial Provinsi Riau. (2021). *Percentage of the Poor Population in Vulnerable Group Subdistrict in Riau Province 2021*. <https://dinsos.riau.go.id/web/>. <https://dinsos.riau.go.id/web/>
- Donelan, J. (2019). The state of Food Insecurity in the World. In J. Donelan (Ed.), *Information Display* (Vol. 35, Issue 1). FAO. <https://doi.org/10.1002/msid.1007>
- Evans, A., & Siemens, A. (2016). *Food waste behaviours: Influences and impacts on residential waste and waste reduction* (Issue August). <https://www.edmonton.ca/sites/default/files/public-files/assets/PDF/Sustainability-Scholars-2016-final-report-Amanda-Evans.pdf>
- Foley, J. A., Ramankutty, N., Brauman, K. A., Cassidy, E. S., Gerber, J. S., Johnston, M., Mueller, N. D., O'Connell, C., Ray, D. K., West, P. C., Balzer, C., Bennett, E. M., Carpenter, S. R., Hill, J., Monfreda, C., Polasky, S., Rockström, J., Sheehan, J., Siebert, S., ... Zaks, D. P. M. (2011). Solutions for a cultivated planet. *Nature*, 478(7369), 337–342. <https://doi.org/10.1038/nature10452>
- Galanakis, C. M., & EBSCOhost. (2019). *Saving Food: Production, Supply Chain, Food Waste and Food*

- Consumption* (C. M. Galanakis (ed.)). Academic Press an imprint of Elsevier.
- Garnett, T. (2011). Where are the best opportunities for reducing greenhouse gas emissions in the food system (including the food chain)? *Food Policy*, 36, S23–S32. <https://doi.org/https://doi.org/10.1016/j.foodpol.2010.10.010>
- Godfray, H. C. J., Beddington, J. R., Crute, I. R., Haddad, L., Lawrence, D., Muir, J. F., Pretty, J., Robinson, S., Thomas, S. M., & Toulmin, C. (2010). Food Security: The Challenge of Feeding 9 Billion People. *Science*, 327(5967), 812–818. <https://doi.org/10.1126/science.1185383>
- Gooch, M., Felfel, A., & Marenick, N. (2010). Food waste in Canada: opportunities to increase the competitiveness of Canada's agri-food sector, while simultaneously improving the environment. *Value Chain Manage. Centre*.
- Hidayat, S., Ardhany, Y., & Nurhadi, E. (2020). Kajian Food Waste untuk Mendukung Ketahanan Pangan (Study of Food Waste to Support Food Security). *AGRIEKONOMIKA*, 9(2), 171–182. <https://doi.org/10.21107/agriekonomika.v9i2.8787>
- Hudson, U., & Messa, M. (2015). Position Paper On Food Losses and Waste. *Slow Food, Contributing authors : Anke Klitzing, Cristina Agrillo, Paola Roveglia, Cinzia Scaffidi, Francesco Mele Editor: Simone Gie, Gethyn Hudson*.
- Kantor, P. F., Lougheed, J., Dancea, A., McGillion, M., Barbosa, N., Chan, C., Dillenburg, R., Atallah, J., Buchholz, H., Chant-Gambacort, C., Conway, J., Gardin, L., George, K., Greenway, S., Human, D. G., Jeewa, A., Price, J. F., Ross, R. D., Roche, S. L., ... Wong, K. (2013). Presentation, diagnosis, and medical management of heart failure in children: Canadian Cardiovascular Society guidelines. *The Canadian Journal of Cardiology*, 29(12), 1535–1552. <https://doi.org/10.1016/j.cjca.2013.08.008>
- Kusnandar, V. B. (2022). *Ini Wilayah dengan Prevalensi Balita Stunting Terbesar di Riau pada 2021 (This is the region with the largest prevalence of stunted toddlers in Riau in 2021)*. <https://Databoks.Katadata.Co.Id/>. <https://databoks.katadata.co.id/datapublish/2022/07/20/ini-wilayah-dengan-prevalensi-balita-stunting-terbesar-di-riau-pada-2021>
- Oelofse, S., & Nahman, A. (2012). Estimating the magnitude of food waste generated in South Africa. *Waste Management & Research: The Journal of the International Solid Wastes and Public Cleansing Association, ISWA*, 31. <https://doi.org/10.1177/0734242X12457117>
- Organisation de la Naciones Unidas para la Alimentacion y Agricultura FAO. (2013). Food wastage footprint. In FAO. BIO-Intelligence Service, France. www.fao.org/publications
- Starovoytova, D. (2018a). Solid Waste Management (SWM) at a University Campus (Part 1/10): Comprehensive-Review on Legal Framework and Background to Waste Management, at a Global Context. *Journal of Environment and Earth Science*, 8(4), 68–116.
- Starovoytova, D. (2018b). *Solid Waste Management (SWM) at a University Campus (Part 1/10): Comprehensive-Review on Legal Framework and Background to Waste Management, at a Global Context*.
- Starovoytova, D., & Namango, S. (2018a). *Solid Waste Management at University Campus (Part 7/10): Food Waste and Preliminary Design of Aerobic Composter*.
- Starovoytova, D., & Namango, S. S. (2018b). Solid Waste Management at a University Campus (Part 3/10): Waste Generators, Current Practices, and Compliance with relevant-law-provisions. *Journal of Environment and Earth Science*, 8, 140–170. <https://api.semanticscholar.org/CorpusID:55573229>
- Thyberg, K. L., Tonjes, D. J., & Gurevitch, J. (2015). Quantification of Food Waste Disposal in the United States: A Meta-Analysis. *Environmental Science and Technology*, 49(24), 13946–13953. <https://doi.org/10.1021/acs.est.5b03880>
- WRAP. (2022). *Love Food Hate Waste Toolkit*. WRAP. <https://wrap.org.uk/taking-action/citizen-behaviour-change/collection/love-food-hate-waste-toolkit>
- WRAP, Quested, T., & Johnson, H. (2009). *Household food and drink waste in the UK: Final report* (Issue October). <https://wrap.org.uk/resources/report/household-food-and-drink-waste-uk-2009>