

The Effect Of 'Germas' Policy Implementation And Community Participation On Reducing The Risk Factors Of Non-Communicable Diseases Due To Low Fruit And Vegetable Consumption In Riau Province, Indonesia

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Keywords:	Abstract
Community Participation, Germas Implementation, Non-Communicable Diseases Riau Province, Indonesia.	Non-communicable diseases (NCDs) in Indonesia, including in Riau Province, have increased significantly, with low fruit and vegetable consumption as one of the risk factors. To address this, the government initiated the Healthy Living Community Movement (GERMAS) to encourage healthy living behaviors. This study aims to evaluate the implementation of the GERMAS policy and community participation in reducing NCD risk factors, especially low fruit and vegetable consumption in Riau Province. This study used a quantitative approach with a cross-sectional survey design and inferential analysis. Samples were selected using cluster random sampling technique from 12 districts with a total population of $n = 1,437$. Data analysis was performed using logistic regression. The results showed that 90.30% of respondents did not fulfill their daily intake of fruits and vegetables. Although 82.24% were aware of the GERMAS program, only 43.31% participated. Factors that increase participation include knowledge about GERMAS ($\text{Exp(B)} = 17.968$; $p < 0.001$), particularly regarding physical activity knowledge ($\text{Exp(B)} = 2.339$; $p < 0.001$), and participation in health promotion ($\text{Exp(B)} = 8.493$; $p < 0.001$). Indragiri Hilir and Rokan Hulu districts showed higher participation rates than Pekanbaru (capital city of Riau Province). The gap between awareness and engagement in GERMAS remains high. More effective health education and district-based interventions are needed to increase community participation in the program.

INTRODUCTION

Health is a fundamental human right and a critical determinant of a nation's productivity and development. The World Health Organization (WHO) emphasizes that health is more than the absence of disease; it encompasses complete physical, mental, and social well-being (WHO, 2022b). However, globally, health systems are increasingly burdened by the rapid rise in non-communicable diseases (NCDs), which account for 74% of all deaths each year—killing 41 million people worldwide, including 17 million premature deaths under age 70 (WHO, 2022c). Low- and middle-income countries bear a disproportionate burden, with Southeast Asia, including Indonesia, among the most affected regions.

A major contributor to the surge in NCDs is unhealthy lifestyle behaviors, particularly insufficient consumption of fruits and vegetables. Despite public health recommendations, global dietary patterns have shifted—especially in urbanized and developing countries—toward processed foods and sugary beverages (Colozza et al., 2023). Indonesia reflects this global trend, with Basic Health Research (Riskesdas) data showing an increase in stroke (10.9%), hypertension (8.4%), diabetes (2.0%), heart disease (1.5%), and cancer (1.8%) between 2013 and 2018 (MoH, 2018). Among the modifiable risk factors, low fruit and vegetable intake stands out: 76.8% of Indonesians fail to meet the recommended daily intake (MoH, 2019), making this a critical public health concern. Furthermore, high

consumption of sugary drinks (27.9%) and an increasing rate of overweight or obesity (15.8%) exacerbate the problem (Pengpid & Peltzer, 2019).

To address these concerns, the Indonesian government launched the Gerakan Masyarakat Hidup Sehat (GERMAS), or Healthy Living Community Movement, through Presidential Instruction No. 1 in 2017. This policy aims to reduce the prevalence of NCDs by encouraging physical activity, routine medical check-ups, and increased consumption of fruits and vegetables (MoH, 2016a; MoH, 2020a). The GERMAS initiative aligns with WHO's global strategy on promoting healthy lifestyles (WHO, 2023b). Community participation is central to the success of GERMAS, as health behavior change requires not only individual awareness but also collective engagement and supportive environments (Susilawati & Nasution, 2023).

However, implementation of GERMAS varies widely across regions due to differences in economic resources, infrastructure, health service access, and local government capacity. Riau Province, one of the western provinces of Indonesia, has demonstrated particularly low implementation rates of GERMAS—33.3% in 2019, and even lower in subsequent indicators (MoH, 2022). This is concerning given the continued rise in NCD prevalence in the province and the gap between policy awareness and actual community participation in healthy behaviors.

To date, limited empirical research has examined the implementation of GERMAS and the role of community participation in influencing its effectiveness at the subnational level. There is also a lack of studies that analyze specific behavioral risk factors, such as low fruit and vegetable consumption, in the context of policy enforcement and public engagement. This highlights both the novelty and urgency of this study. By focusing on Riau Province, which represents a microcosm of Indonesia's broader health challenges, this study addresses a critical gap in the literature.

Therefore, the purpose of this research is to evaluate the implementation of the GERMAS policy and community participation in reducing NCD risk factors, particularly low fruit and vegetable consumption, in Riau Province, Indonesia.

Based on this background, this study focuses on the implementation of the Healthy Living Community Movement (GERMAS) policy in an effort to reduce non-communicable disease (NCD) risk factors in Riau Province, Indonesia. In addition, this study also highlights the level of community participation in the implementation of the program, considering that active community involvement is one of the determining factors for its success. One of the main risk factors for NCDs of concern in this study is the low consumption of fruits and vegetables among the community. The results of the study are expected to contribute to strengthening policies that encourage GERMAS implementation and community participation, increase public awareness of the importance of balanced nutrition, and identify more effective strategies to improve healthy living in everyday life. The findings can also serve as a basis for stakeholders in designing more inclusive and sustainable programs to reduce the incidence of NCDs in Riau Province.

RESEARCH METHODS

Design Study

This study adopts a quantitative approach with a cross-sectional design and inferential analysis to evaluate the implementation of the Healthy Living Community Movement (Germas) policy in Indonesia. The main focus of this study is to understand how changes in non-communicable disease risk factors such as low fruit and vegetable consumption relate to community involvement in the program. A quantitative approach will be taken through distributing online questionnaires to the public to measure their participation in implementing healthy living behaviors. Riau Province was chosen as the research location due to its significant area of 87,023.66 km², as well as its population of 6,614,400 people. The province consists of two cities, Pekanbaru and Dumai, and ten regencies, namely Siak, Kampar, Pelalawan, Kuansing, Bengkalis, Meranti, Rohul, Rohil, Inhu, and Inhil.

Sample/Participants

The research population includes people who live in Riau Province and have been recorded by the Riau Province Statistics Agency. Primary data will be collected from the community regarding their participation in healthy living behaviors for the quantitative approach.

The author will look at community participation in implementing a healthy lifestyle that is influenced by Germas activities. Based on previous data (Meilyawati, 2019), the proportion of people who apply Germas behavior is 31.9%. Due to the influence of decentralization on different resources, each district has a different population and problems. Therefore, this study will use cluster random sampling in 12 districts in Riau province for the quantitative research design. Therefore, the sample formula used is Design Effect. This will be more effective for cluster random sampling, as respondents within the same cluster tend to be similar to each other. In addition, sample sizes within clusters are consistently larger than random samples or stratified samples due to the "deff" factor (Iedunote, 2022; Killip et al., 2004; Shackman, 2001).

Sample Size

Sample size for this study follows the criteria as following.

Proportion of community do Germas = 31.9% (p) (Meilyawati, 2019)

Type 1 error (Z = 1.96)

Margin of error (d = 3%)

$$n = \frac{z^2 p(1-p)}{d^2} \times \text{deff} \quad \text{DEFF} = 1 + \delta (n - 1)$$

$$n = \left[\frac{1.96^2 \times 0.319 \times (1 - 0.319)}{(0.03)^2} \times 1.55 \right]$$

$$n = 1,437$$

Based on 12 districts in Riau province and 1,437 people from the total sample, the researcher divided into 12 districts based on the population size in each district using cluster random sampling. However, the population size that will be used is 15-59 years old, as this age is the same as the Ministry of Health's Basic Health Research (Riskesdas) and WHO STEPwise. Therefore, this age will be taken as the research sample. Therefore, the sample size in each district is as follows.

Table 1. Number of Samples in Each District

No	City/ District	Number of Populations (age 15-59)	District Sample
1	Pekanbaru	664,152	228
2	Dumai	213,436	73
3	Kampar	541,095	186
4	Pelalawan	265,488	91
5	Siak	302,565	104
6	Kuantan Singigi	224,108	77
7	Bengkalis	369,303	127
8	Kepulauan Meranti	133,055	45
9	Indragiri Hulu	293,636	101
10	Indragiri Hilir	405,863	139
11	Rokan Hulu	369,843	127
12	Rokan Hilir	405,687	139
TOTAL (Riau Province)		4,188,231	1,437

The inclusion criteria for quantitative research design are the following.

- People who aged ≥ 15 to 59 years old (based on age in WHO and Basic Health Research of Ministry of Health of Indonesia in background);
- Capable to answer the questionnaire; and

- c. Available to fill the form in.

Exclusion criteria are the following

- a. People who are not capable answer because of mental disorder
- b. People who do not have internet connection because of using online questionnaire platform

Measurement Tools & Results

In the quantitative design, an online questionnaire will be used to measure the level of community participation in implementing healthy living behaviors as an impact of the Germas program. The questionnaire was developed in Indonesian based on the Healthy Living Community Movement (Germas) from the 2017 Presidential Instruction. It followed the WHO standard for five servings of fruit and vegetables consumption every day. The data collection process begins with obtaining permission from the Governor of Riau Province as a local authority for province and districts. After permission was obtained, the author and research assistants collected data through questionnaires.

Variables

Independent Variable: Germas policy implementation.

Dependent Variables: Community participation in Germas and changes in NCD risk factors due to low fruit and vegetable consumption.

Control Variables: Gender, age, marital status, religion, and income.

Validity

It is using IOC (Item Objective Congruence) with three Public Health experts, including:

- ❖ From Academic (Lecturer & PhD in Faculty of Public Health at University in Riau Province)
- ❖ From Health Department of Riau Province (PhD in Public Health who works as a Health Epidemiologist at the Provincial Government in Riau Province)
- ❖ Medical doctor & PhD in Public Health who has knowledge and experience in public health in many years

Total average of three experts will be counted, and if the average is > 0.5

Statistical Analysis

Data analysis in this study aims to see the relationship between Germas policy and non-communicable disease risk factors, whether it has increased or decreased. In quantitative analysis, the relationship between the independent variables and community participation in Germas will be analyzed through descriptive analysis and analysis of variance. To identify the interaction between the independent variables and the level of community participation, logistic regression was applied. In addition, data visualization was used to compare a fruit and vegetables consumption across districts to find the factors that contribute to the level of community participation in Germas.

The unit of analysis in this study is regencies and cities (districts) in Riau Province, not individuals. Based on these issues, this study formulated two main hypotheses. The first hypothesis examines the effect of Healthy Living Community Movement (Germas) policy implementation on reducing the risk factors of non-communicable diseases caused by low fruit and vegetable consumption in Riau Province. Meanwhile, the second hypothesis assesses the effect of community participation in Germas on reducing the risk factors of non-communicable diseases caused by the lack of fruit and vegetable consumption. If the null hypothesis is accepted, then there is no significant influence between the implementation of the Germas policy or community participation with reducing the risk factors of non-communicable diseases due to low fruit and vegetable consumption. Conversely, if the alternative hypothesis is accepted, then there is a significant influence between these variables.

Limitations

This study has several limitations that need to be considered in the interpretation of the results. The generalizability of the findings is limited to communities in Riau Province and may not necessarily reflect national conditions, given the social, economic and policy differences in different regions that may affect the effectiveness of the implementation of the Healthy Living Community Movement

(Germas). In addition, the online data collection method has the potential to cause bias as people without internet access or limited use of digital technology may not have been involved in the study. The use of self-report questionnaires may also introduce subjectivity bias among respondents, who may give social-ideal answers or less accurately describe their actual health habits, thus affecting the accuracy of measuring participation in Germas.

RESULTS

The study involved 1,577 participants who were selected by considering design effects and a potential drop-out rate of 10%. The sample size was allocated proportionally based on the in each district. A total of 1,577 participants were involved in this study. Based on result analysis, the majority of participants were from Pekanbaru city, the capital of Riau province, which represented 21.43% of the total participants, while the rest of the respondents were recruited from other districts. In terms of demographic and socioeconomic factors, the average age of participants was 36.5 years, with the largest age group being 30 to 44 years (48.5%). The sample was predominantly female (59.73%). Education levels were generally high, with 52% of participants having a diploma or undergraduate degree, and 14.52% having postgraduate qualifications.

Regarding religion, 95% of the participants claimed to be Muslim. In addition, 73.43% were married. In terms of employment, 57.7% reported having regular working hours, and 53.46% earned above the provincial minimum wage of IDR 3,300,000 per month. In terms of Body Mass Index (BMI) measurement, only 8.43% of individuals were within the normal BMI range, while the highest proportion were categorized as Class 1 Obesity (30.56%) and underweight (28.09%).

The results of this study were attributed to behavioral risk factors that contribute to noncommunicable diseases, particularly low fruit and vegetable consumption. Based on the data obtained, some participants met the recommended standards in these behaviors to support better health, while others did not. An overview of these risk factors is provided in Table 3 below:

Table 2. Percentage of Variable Outcomes in Riau Province

Variables		Freq.	%
Knowing that eating healthy and nutritious food can help prevent disease and improve health	No	6	0.38
	Yes	1,571	99.62
Motivation to eat healthy and nutritious food	No	20	1.27
	Yes	1,557	98.73
Frequency of doing healthy living activities such as eating healthy and nutritious food	Never	10	0.63
	Less (1-2x a week)	100	6.34
	Rarely (3-4x a week)	216	13.70
	Quite (5-6x a week)	545	34.56
	Often every day (7x a week)	706	44.77
Family encouragement to eat vegetables and fruit	Never	11	0.70
	Sometimes	269	17.06
	Often	1,297	82.24
Health standard of eating fruit and vegetables everyday (5 types in 1 day)	Not standard	1,424	90.30
	Standard	153	9.70
You or family have chronic diseases (NCDs)	No	1,169	74.13
	Yes	408	25.87
Motivation to eat healthy and nutritious food after knowing Healthy Living Community Movement Program	No	91	5.77
	Yes	1,486	94.23
Risk Factors in order from Easiest to Most Difficult to Implement	Healthy eating (fruit and vegetables)	282	17.88

Data analysis showed variation in the prevalence of behavioral risk factors for non-communicable diseases across districts in Riau Province, with low fruit and vegetable consumption

being the main challenge, as the majority of participants did not consume the five types of fruits and vegetables daily according to nutritional guidelines.

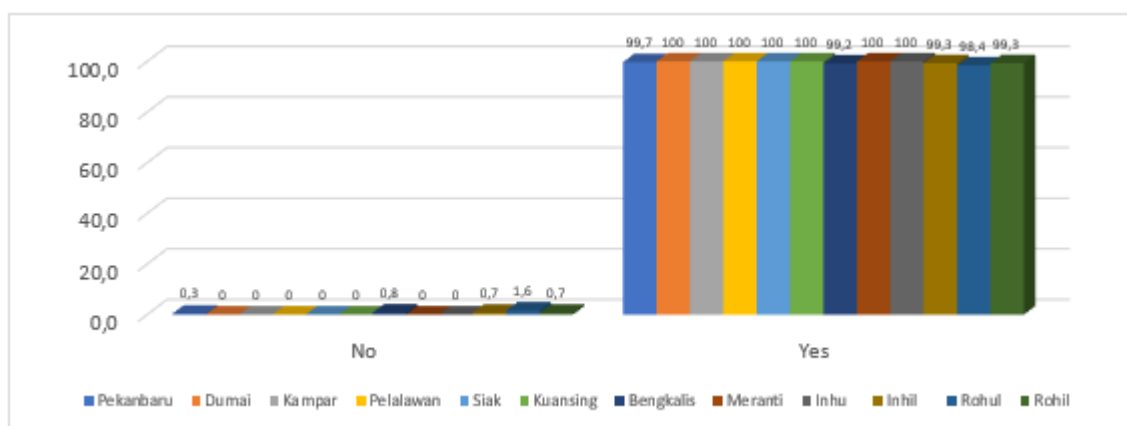


Figure 1. Knowing that eating healthy and nutritious food can help prevent disease and improve health in each district

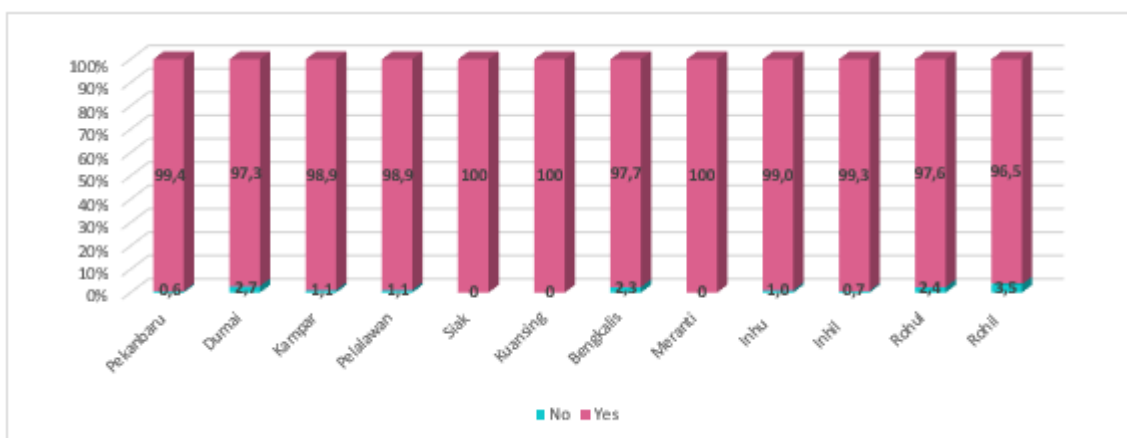


Figure 2. Motivation to eat healthy and nutritious food in Each District

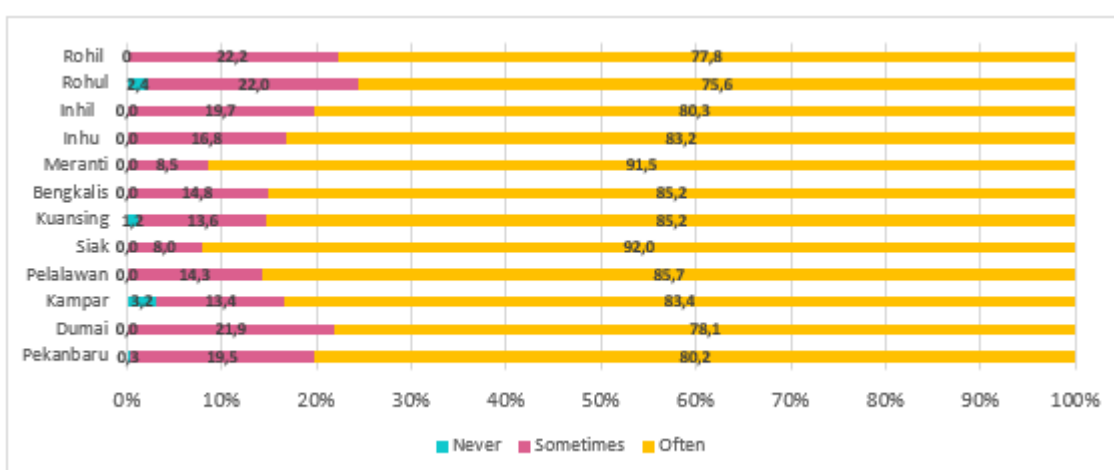


Figure 3. Family encouragement to eat vegetables and fruit in Each District

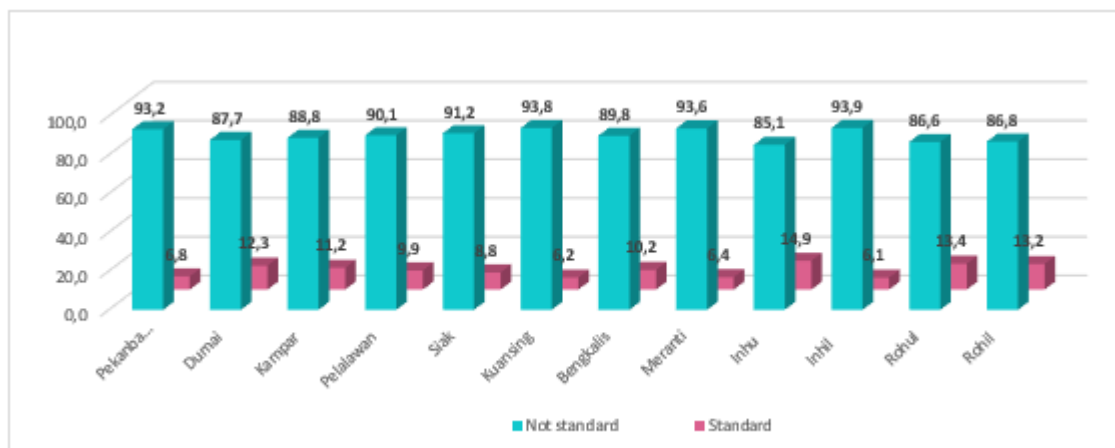


Figure 4. Health standard of eating fruit and vegetables everyday (5 types in 1 day) in Each District

Comparison of the outcome variable, lack of eating fruits and vegetables, across twelve districts in Riau Province showed different patterns, which were influenced by urbanization, health education, economic factors, and public health infrastructure. This study highlights the dominant characteristics and variation in the outcome variable, which represents a behavioral risk factor for non-communicable diseases across districts. These findings are outlined in the sections below.

The proportion of people consuming at least five types of fruits and vegetables daily is very low across districts, with more than 85% failing to meet the recommended intake. This may be due to limited benefits from local agricultural connections or difficulties accessing fresh produce. Notably, in Siak and Meranti districts, more than 90% of individuals reported receiving family support to consume fruits and vegetables, and 100% indicated awareness and motivation to do so. These findings highlight potential challenges related to food availability, economic constraints or dietary preferences.

All districts in Riau Province face various issues and challenges related to behavioral risk factors for non-communicable diseases. According to respondents, 25.87% of them and their families have been affected by chronic diseases (NCDs). Strategies tailored to the strengths and weaknesses of each district are essential to improve behavior and health outcomes in Riau Province.

Policy and Public Facilities Variable Description

Behavioral risk factors for non-communicable diseases can be influenced by individual and family factors. In addition, government support also plays a role in shaping these behaviors. Data collection showed several factors that influence the behavioral risk of non-communicable diseases in Riau Province, as highlighted in the table below.

Table 3. Percentage of Policy and Public Facilities in Riau Province

Variables		Freq.	%
The quality of health services at the public health centre or primary healthcare	Very Bad	4	0.25
	Not Good	39	2.47
	Quite Good	267	16.93
	Good	733	46.48
	Very Good	534	33.86
Difficulties access to the health services	Never	1,091	69.18
	Yes, I have	486	30.82
The adequacy of healthcare services facilities in your area living	Incomplete	585	37.10
	Complete	992	62.90

The quality of health staff during treatment	Very Bad	5	0.32
	Not Satisfied	44	2.79
	Quite Satisfied	459	29.11
	Satisfied	682	43.25
	Very Satisfied	387	24.54
Having health insurance	No	203	12.87
	Yes	1,374	87.13
Knowing about Healthy Living Community Movement Program	No	280	17.76
	Yes	1,297	82.24
Participation in the Healthy Living Community Movement Program	Never	894	56.69
	Yes, I have	683	43.31
People' knowing whether there are central or local government policies on implementing Healthy Living Community Movement	No	730	46.29
	Yes	847	53.71
Having seen or heard an advertisement about clean and healthy living in residential area	Never	509	32.28
	Yes, I have	1,068	67.72
Having seen or heard an advertisement about clean and healthy living on applications or social media	Never	372	23.59
	Yes, I have	1,205	76.41
Health promotion or information about healthy living in the residential area / social media	Not interesting	119	7.55
	Quite interesting	846	53.65
	Very interesting	612	38.81
Attending as a participant in health education activities in living area	No	748	47.43
	Yes	829	52.57
Is there a health screening/early detection program in your area of residence?	No	445	28.22
	Yes	1,132	71.78
Is there a health screening/early detection program at your workplace/ school?	No	478	30.31
	Yes	1,099	69.69
The medical check-up regularly	Never	325	20.61
	Yes, once a year	1,039	65.88
	Yes, once 3 years	138	8.75
	Yes, once 5 years	75	4.76
Are there any vegetable/fruit plants in the area around your house?	No	418	26.51
	Yes	1,159	73.49
Motivation to eat healthy and nutritious food after knowing Healthy Living Community Movement Program	No	91	5.77
	Yes	1,486	94.23
Risk Factors in order from Easiest to Most Difficult to Implement	Healthy eating (fruit and vegetables)	282	17.88

The implementation of the Healthy Living Community Movement (GERMAS) in Riau Province has shown significant progress in addressing behavioral risk factors for non-communicable diseases (NCDs) such as the challenge of low fruit and vegetable consumption in the province. To understand the impact of government policies and support, it is necessary to assess GERMAS implementation and outcomes at the district level. Each district has unique challenges and opportunities related to infrastructure, community engagement and cultural norms that influence access to health services, community awareness and the effectiveness of government facilities and programs. Reviewing district policies can help identify best practices and areas that require further intervention, ensuring GERMAS is successful across the province.

1. Quality of Health Services

The quality of health services at community health centers varies widely between districts. Most respondents rated the services as “Good” or “Very Good”, with Meranti achieving the highest satisfaction (51.1% rated “Very Good”), while Bengkalis and Kampar followed close behind. In contrast, dissatisfaction was more pronounced in Rohul and Rohil, where lower ratings were more prevalent (figure 5). This disparity underscores the need for targeted policy interventions to ensure uniformity in health service quality.

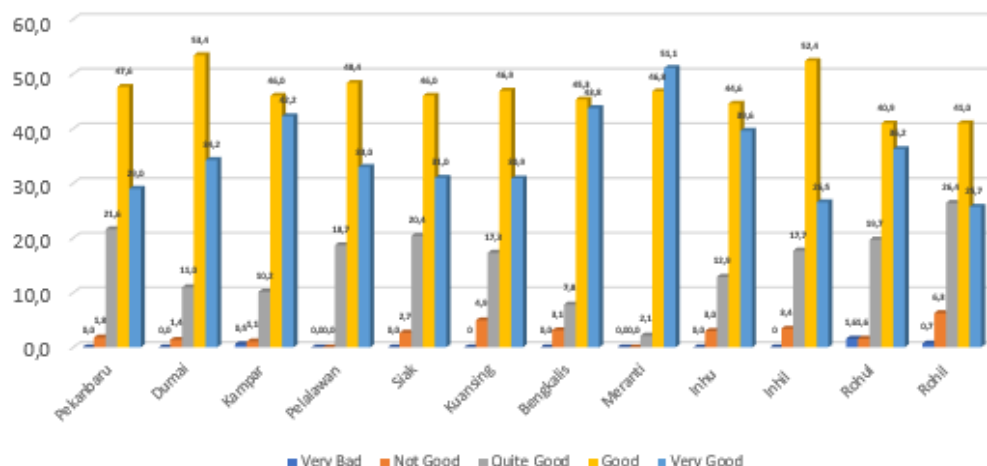


Figure 5. The quality of health services at the public health centre or primary healthcare

2. Access and Adequacy of Health Facilities

Access to health services was largely considered unproblematic, with more than 70% of respondents in most districts reporting no difficulties. An exception was Rohil, where 53.5% experienced difficulties (Figure 6). Similarly, the adequacy of health facilities was found to be complete in districts such as Dumai (79.5%) and Pekanbaru (77.8%), but inadequate in districts such as Inhil (49.0%) and Rohil (73.6%) in figure 7. These findings suggest an unequal distribution of health resources which may hinder the equitable implementation of GERMAS initiatives.

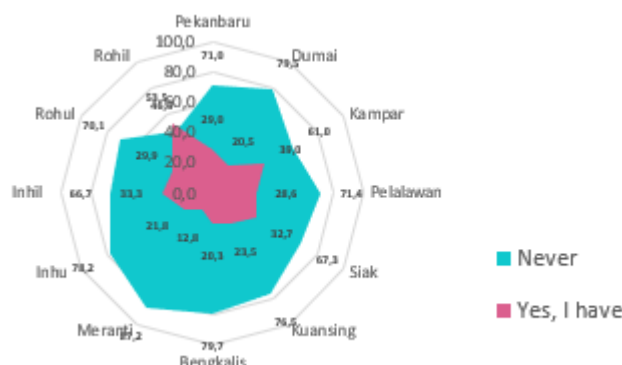


Figure 6. Difficulties access to the health services

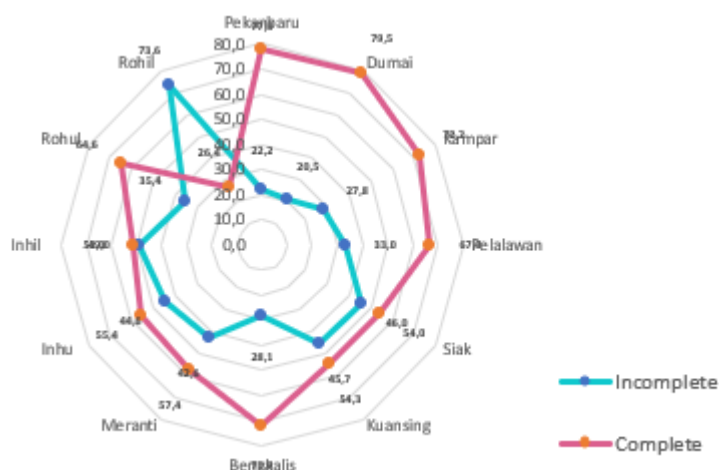


Figure 7. The adequacy of healthcare services facilities in their area living

3. Awareness And Participation In Germas

Awareness of the GERMAS policy is high, with Dumai (94.5%) and Siak (92.9%) leading the way in terms of recognition (figure 8). However, participation rates show a gap; districts such as Pekanbaru and Rohil in figure 9 have higher non-participation rates (65.7% and 72.2%). This suggests that while awareness campaigns are effective, additional strategies are needed to convert awareness into active participation.

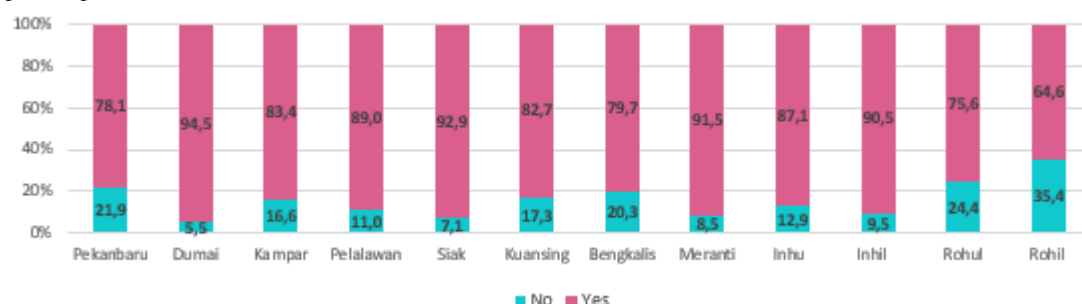


Figure 8. Knowing about Healthy Living Community Movement Program

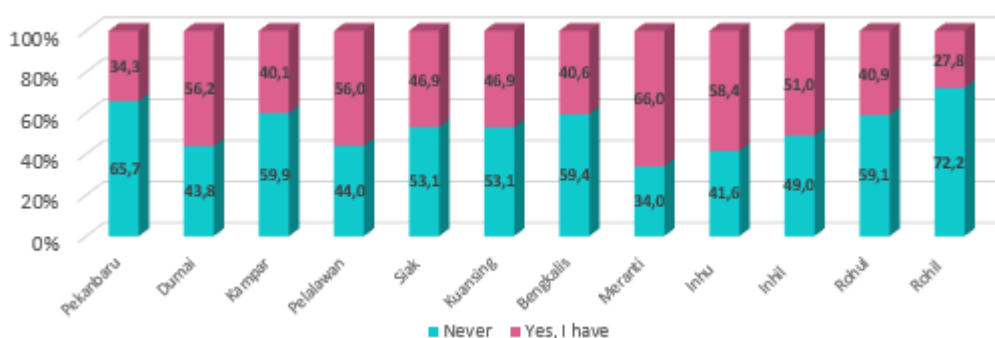


Figure 9. Participation in the Healthy Living Community Movement Program

4. Promotion and Education Campaign

Community engagement through health promotion campaigns was particularly strong in Dumai and Siak (Figure 10), where more than 70% of respondents had seen GERMAS-related advertisements (Figure 11). In addition, in Figure 12, promotional content was considered “Very Interesting” by around 47% of respondents in Kampar and Dumai, indicating that customized and engaging messages can effectively increase community interest.

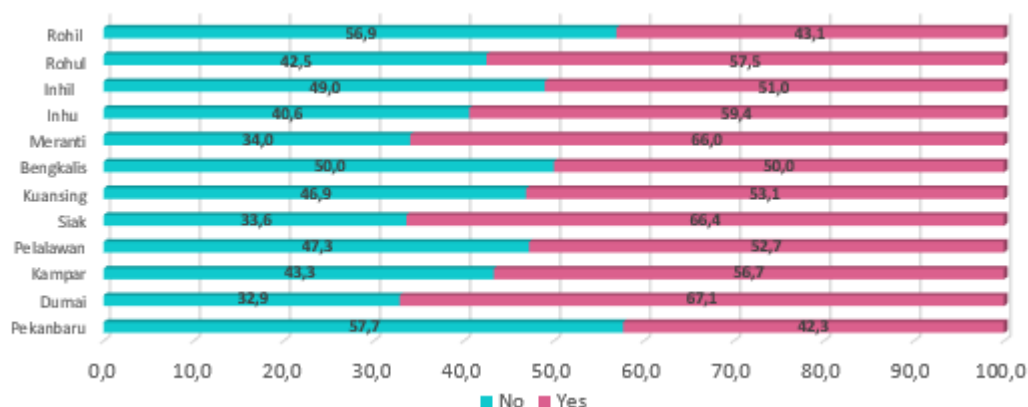


Figure 10. Attending as a participant in health education activities in living area

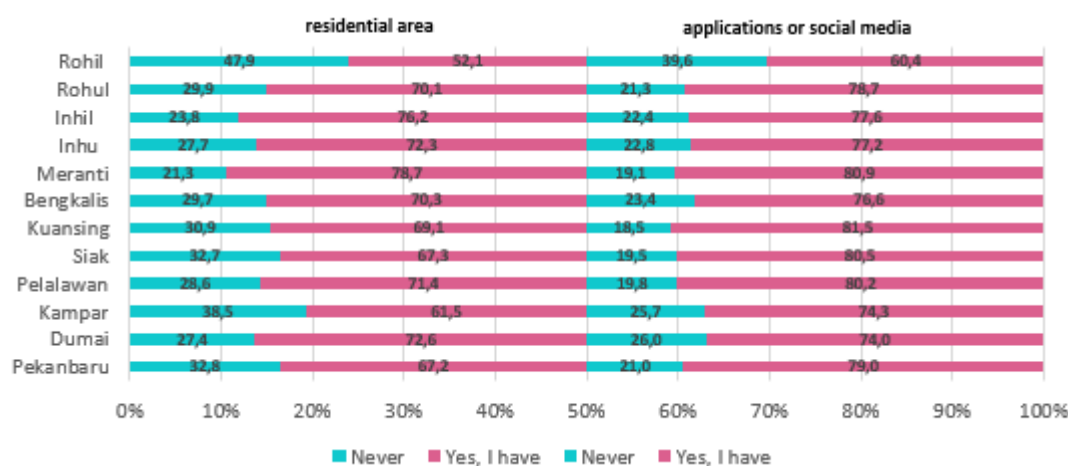


Figure 11. Having seen or heard an advertisement about clean and healthy living in residential area, and applications or social media

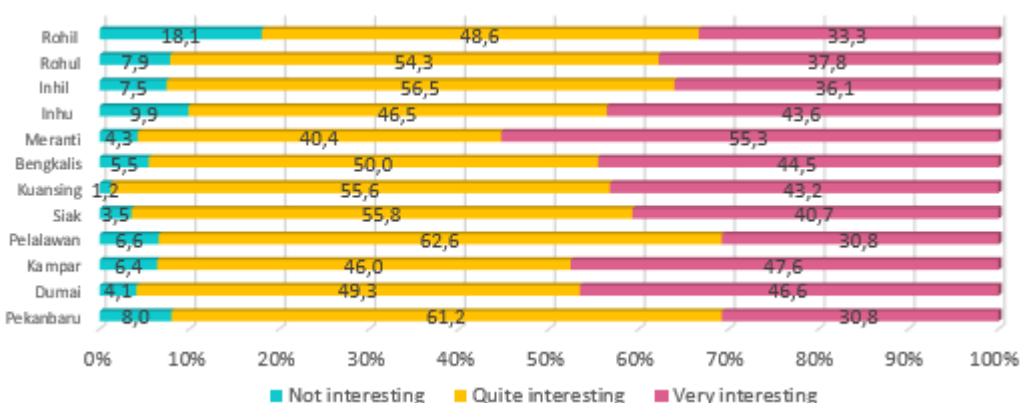


Figure 12. Health promotion or information about healthy living in the residential area / social media

5. Health Insurance, Health Checkup and Prevention Program

High health insurance coverage in most districts, such as Meranti (100%) and Kuansing (97.5%), underscores strong government support for access to health services (figure 13). In addition, prevention programs such as health check-ups are well established in districts such as Meranti (89.4%) and Dumai (83.6%), reflecting proactive government efforts, while districts such as Rohil (63.2%) and Pekanbaru (58.9%) require improvements in coverage and implementation (figure 14). Routine health check-ups in figure 15 also show variation, with Meranti (85.1%) and Dumai (79.5%) achieving the highest annual participation, indicating a correlation between available facilities and community health engagement.

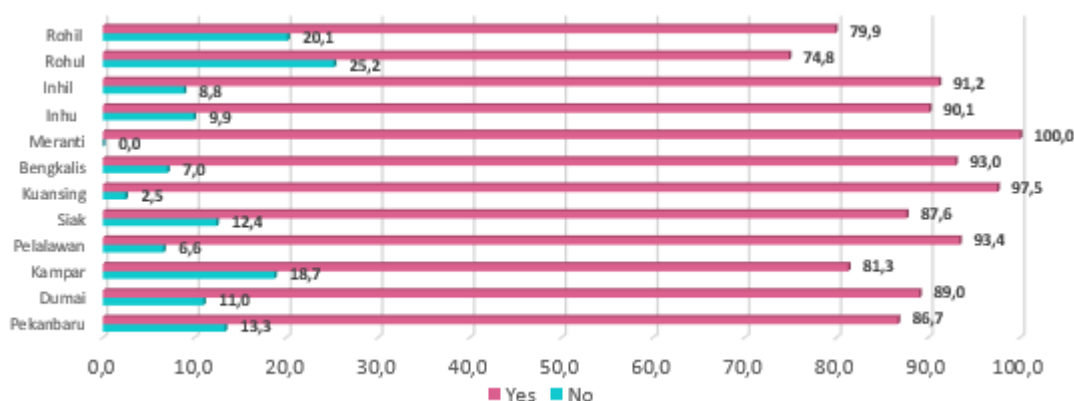


Figure 13. Having health insurance

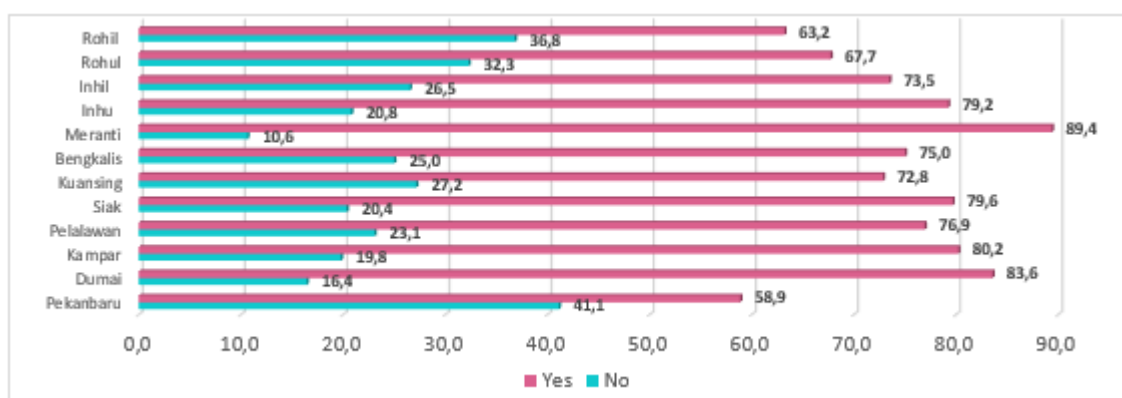


Figure 14. The health screening/early detection program in their area of residence

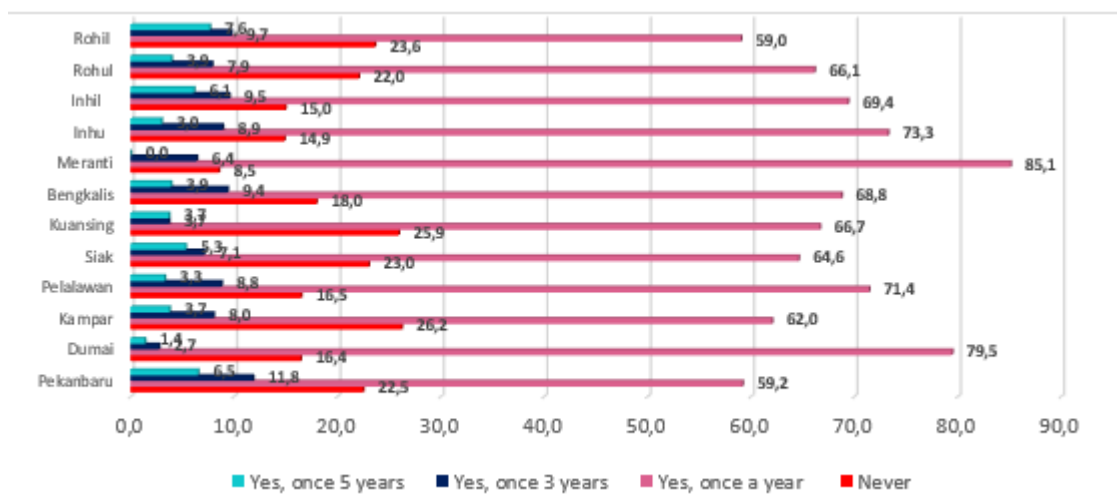


Figure 15. The medical check-up regularly

6. Motivation and Behavior Change After GERMAS Awareness

GERMAS awareness significantly motivates healthy behaviors, including healthy eating. More than 90% of respondents across all districts reported increased motivation. Nonetheless, there are still challenges in implementing these practices consistently, especially in districts such as Rohil and Rohul in terms of eating healthy food as shown in Figure 16.

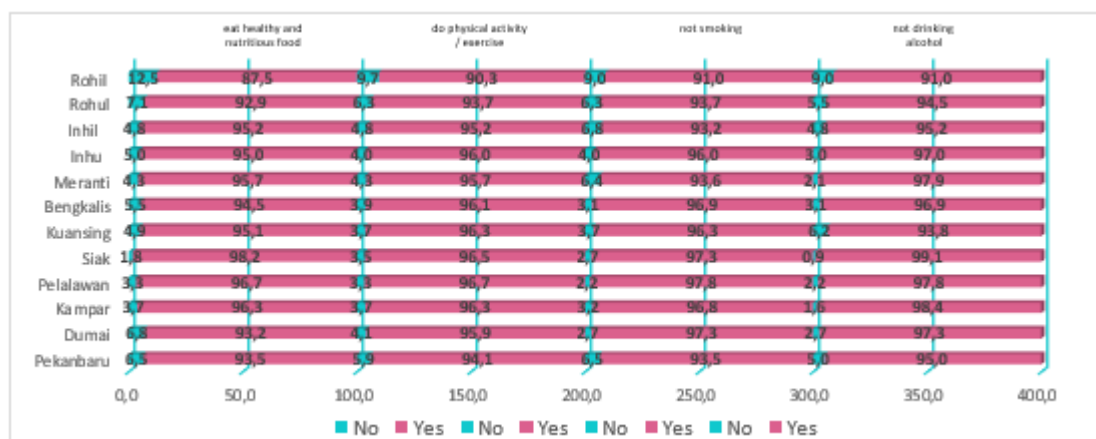


Figure 16. Motivation after knowing Healthy Living Community Movement (Germas) Program

7. Awareness Of Government Policy On Germas

The Healthy Living Community Movement (GERMAS) has become a key initiative in Indonesia to reduce risk factors for non-communicable diseases (NCDs). Understanding the extent of community awareness of government policies, both at the central and local levels, is critical to evaluating the impact and effectiveness of GERMAS implementation. The data showed a marked variation in community knowledge across districts on the existence of GERMAS-related policies.

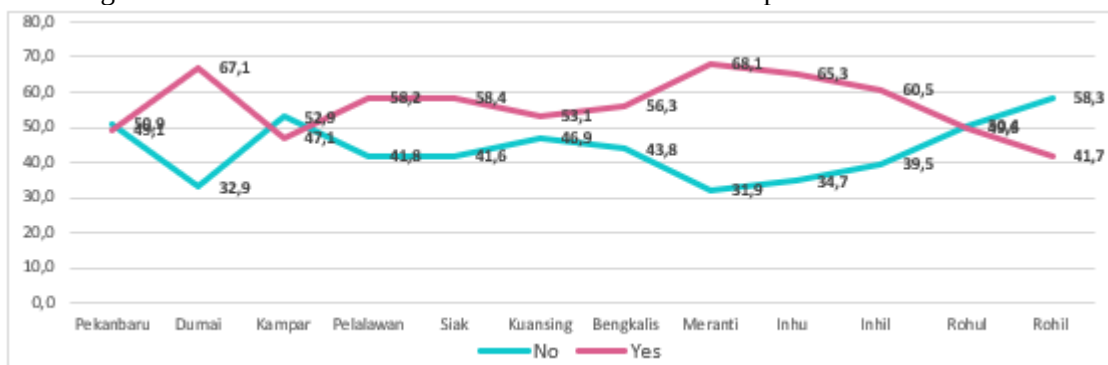


Figure 17. People' knowing whether there are central or local government policies on implementing Healthy Living Community Movement (Germas)

In some districts (Figure 17), many respondents were aware of government policies. For example, awareness was highest in Dumai, Meranti, and Inhu districts, where 67.1%, 68.1%, and 65.3% of respondents acknowledged GERMAS-related policies. This indicates more effective information dissemination or engaged efforts in these areas, which may be driven by active participation of local government or well-targeted public health campaigns.

In contrast, districts such as Pekanbaru, Kampar and Rohil showed lower levels of awareness, with only 49.1%, 47.1% and 41.7% of respondents indicating good knowledge of the GERMAS policy. This gap may reflect gaps in communication or the need for stronger policy advocacy at the local level.

The data further underscores the almost equal distribution of awareness in some areas, such as Rohul District, where 49.6% of respondents are aware, while the other 50.4% are still unaware. This trend highlights opportunities for improvement, especially in areas where almost half of the population remains unaware of initiatives targeting critical health risks.

Overall, the findings highlight the importance of consistent and widespread policy socialization and community engagement to ensure the success of GERMAS. Strategies tailored to the needs and challenges of each region can significantly increase community awareness and participation, thereby reducing NCD risk factors more effectively.

8. Behavioral Risk Factor Challenge

The most challenging behavior to implement is adopting a healthy diet for fruit and vegetable consumption, especially in districts like Kuansing (figure 18). To overcome this challenge, intensive education campaigns, stricter policy enforcement, and accessible support programs are needed. In addition, increased investment in health infrastructure, especially in underserved districts, will significantly increase the impact of GERMAS.

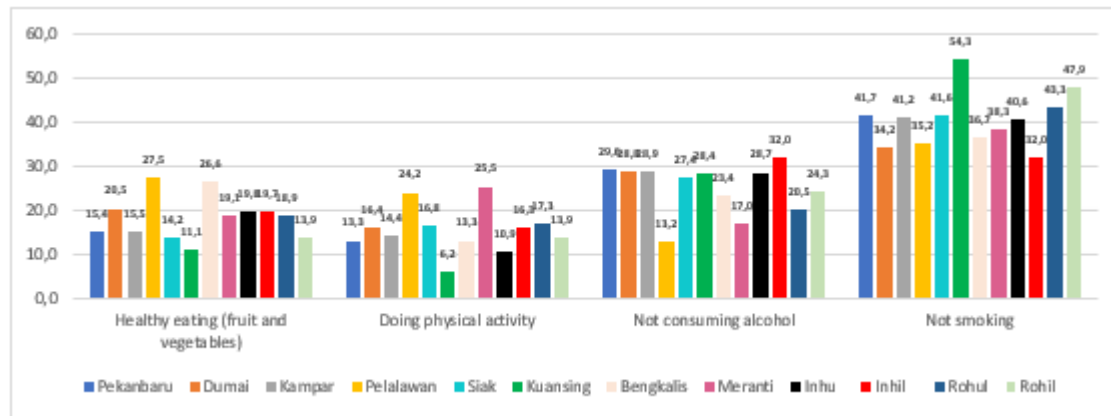


Figure 18. Risk Factors from Easiest to Hardest to Implement

From the figure above it can be shown that, while GERMAS implementation in Riau Province has shown positive results in reducing NCD risk factors, there are still significant disparities between regions in terms of policy effectiveness, adequacy of facilities and community participation. Strategic efforts focusing on infrastructure development, equitable policy implementation and community engagement are essential to achieve equitable success across all districts.

Logistic Regression on Germas Participation

The Healthy Living Community Movement (GERMAS) aims to increase community participation in healthy living behaviors to reduce risk factors associated with non-communicable diseases (NCDs) such as due to low fruit and vegetable consumption. Table 5 presents the results of a logistic regression model describing the relationship between various demographic, social, and behavioral variables and community participation in the GERMAS program in various districts in Riau Province. The main independent variables include demographic characteristics, health knowledge, behavior, and district-level differences, while community participation in GERMAS is the main dependent variable.

Table 5. Logistic Regression Model related to Germas Participation

		B	Sig.	Exp(B)	95% C.I. for EXP(B)	
					Lower	Upper
Sex	Female (ref)					
	Male	0.000	0.998	1.000	0.668	1.498
Age	Age (year)	-0.004	0.760	0.996	0.974	1.020
Marital status	Married (ref)		0.812			
	Single	-0.184	0.548	0.832	0.457	1.516
	Divorced/widowed	0.084	0.844	1.088	0.472	2.507
Religion	Others (ref)					

	Muslim	-0.028	0.94 2	0.973	0.463	2.045
District	Pekanbaru (ref)		0.54 7			
	Dumai	0.514	0.20 8	1.673	0.752	3.722
	Kampar	0.290	0.36 5	1.336	0.714	2.500
	Pelalawan	0.549	0.16 0	1.731	0.805	3.721
	Siak	0.197	0.57 1	1.217	0.617	2.402
	Kuansing	0.666	0.10 1	1.947	0.878	4.318
	Bengkalis	0.213	0.52 2	1.237	0.645	2.373
	Kepulauan Meranti	0.837	0.09 8	2.311	0.857	6.231
	Indragiri Hulu	0.389	0.29 6	1.476	0.711	3.062
	Indragiri Hilir	0.652	0.04 3	1.918	1.020	3.607
	Rokan Hulu	0.771	0.02 6	2.161	1.097	4.260
	Rokan Hilir	0.277	0.43 9	1.320	0.654	2.663
Education	No formal education (ref)		0.67 6			
	Primary School	0.504	0.75 5	1.655	0.070	39.35 0
	Junior High School	0.137	0.93 1	1.147	0.051	25.90 5
	Senior High School	0.332	0.83 2	1.394	0.065	29.81 3
	Diploma/Bachelor	-0.023	0.98 8	0.977	0.045	21.38 2
	Postgraduate	0.230	0.88 5	1.258	0.055	28.60 8
Type of working hours	Fix hours working (ref)		0.20 7			
	Non fix/Flexible hours	-0.240	0.39 9	0.787	0.450	1.374
	Student	-0.662	0.10 8	0.516	0.230	1.156
	Unemployed	0.203	0.52 2	1.225	0.658	2.283
Income per month (Provincial Minimum Wages)	< Rp. 3,300,000 (ref)					
	≥ Rp. 3,300,000	0.133	0.47 7	1.142	0.792	1.649

BMI	Normal (ref)		0.533			
	Underweight	-0.436	0.168	0.646	0.348	1.202
	Overweight	-0.607	0.079	0.545	0.277	1.072
	Obesities 1	-0.438	0.193	0.645	0.333	1.248
	Obesities 2	-0.487	0.185	0.614	0.299	1.264
Living with families	No					
	Yes	0.328	0.331	1.388	0.717	2.687
You or family have chronic diseases (NCDs)	No					
	Yes	0.165	0.372	1.179	0.821	1.693
Knowing about Healthy Lifestyle	No					
	Yes	1.213	0.286	3.362	0.362	31.192
Knowing that eating healthy and nutritious food can help prevent disease and improve health	No					
	Yes	0.422	0.825	1.525	0.037	63.681
Motivation to eat healthy and nutritious food	No					
	Yes	-0.048	0.962	0.953	0.129	7.031
Frequency of doing healthy living activities such as eating healthy and nutritious food	Never, Less (1-2x s week), Rarely (3-4x), Quite (5-6x), Often everyday	0.211	0.050	1.235	1.000	1.526
Family encouragement to eat vegetables and fruit	Never, Sometimes, Often	-0.239	0.347	0.787	0.478	1.296
To what extent does your family support you in living a healthy lifestyle	Not supportive, Less supportive, Supportive, Strongly supportive	-0.270	0.269	0.764	0.473	1.231
The quality of health services at the public health centre or primary healthcare	Very bad, Not good, Quite good, Good, Very good	0.236	0.100	1.267	0.956	1.679
Difficulties access to the health services	Never					
	Yes, I have	0.154	0.434	1.167	0.793	1.718
The adequacy of healthcare services facilities in your area living	Incomplete					
	Complete	0.077	0.692	1.080	0.739	1.577
The quality of health staff during treatment	Very bad, Not satisfied, Quite	-0.043	0.763	0.958	0.726	1.265

	satisfied, Satisfied, Very satisfied					
Having health insurance	No					
	Yes	-0.236	0.37 7	0.790	0.467	1.333
Knowing about Healthy Living Community Movement Program	No					
	Yes	2.889	0.00 0	17.968	7.780	41.50 0
Knowing the Healthy Living Community Movement program related to the healthy food & nutrition	No					
	Yes	0.103	0.61 9	1.108	0.739	1.663
Knowing the Healthy Living Community Movement program related to physical activity	No					
	Yes	0.850	0.00 0	2.339	1.551	3.527
Knowing the Healthy Living Community Movement program related to healthy life behaviour	No					
	Yes	0.107	0.57 3	1.113	0.767	1.617
Knowing the Healthy Living Community Movement program related to healthy living education	No					
	Yes	-0.032	0.85 7	0.969	0.687	1.366
Knowing the Healthy Living Community Movement program related to prevention & early detection diseases	No					
	Yes	0.291	0.13 3	1.338	0.915	1.957
Knowing the Healthy Living Community Movement program related to clean & healthy environmental	No					
	Yes	-0.020	0.92 8	0.980	0.632	1.519
People' knowing whether there are central or local government policies on implementing Healthy Living Community Movement	No					
	Yes	0.468	0.00 8	1.597	1.128	2.263
Participation in health promotion	Never					
	Yes, I have	2.139	0.00 0	8.493	6.042	11.93 9
Having seen or heard an advertisement about clean and healthy living in residential area	Never					
	Yes, I have	0.039	0.85 9	1.040	0.677	1.597
Having seen or heard an advertisement about clean and healthy living on applications or social media	Never					
	Yes, I have	0.361	0.13 5	1.435	0.893	2.305
Health promotion or information about healthy	Not interesting, Quite	0.043	0.78 1	1.044	0.769	1.418

living in the residential area / social media	interesting, Very interesting					
Attending as a participant in health education activities in living area	No					
	Yes	0.588	0.001	1.800	1.271	2.550
Is there a health screening/early detection program in your area of residence?	No					
	Yes	0.386	0.089	1.472	0.943	2.297
Is there a health screening/early detection program at your workplace/ school?	No					
	Yes	-0.121	0.579	0.886	0.579	1.356
The medical check-up regularly	Never (ref)		0.203			
	Yes, once a year	0.433	0.119	1.542	0.895	2.655
	Yes, once 3 years	0.464	0.210	1.590	0.771	3.279
	Yes, once 5 years	-0.172	0.706	0.842	0.346	2.052
The type of health check-up	Never health check-up		0.196			
	Basic health check-up	-0.183	0.518	0.833	0.479	1.450
	Comprehensive health check-up	-0.555	0.110	0.574	0.291	1.134
Knowing about environmental health in your home	No					
	Yes	0.958	0.144	2.606	0.720	9.428
Types of home toilets	Non-Proper Sanitary					
	Proper Sanitary	-2.100	0.072	0.122	0.012	1.207
Having clean/ adequate drinking water at home	No					
	Yes	0.024	0.970	1.024	0.301	3.477
The source of drinking water	Others		0.970			
	Non treated water	0.026	0.927	1.026	0.586	1.798
	Treated water	-0.022	0.945	0.978	0.522	1.831
Home garbage disposal site	Others		0.940			
	Open trash bin	-0.014	0.970	0.986	0.482	2.019
	Closed trash bin	-0.075	0.840	0.928	0.448	1.920
Final waste disposal	Others		0.899			

	Thrown freely around the house	0.109	0.881	1.115	0.269	4.614
	Burned	-0.208	0.612	0.812	0.364	1.814
	Picked up by officers	-0.235	0.557	0.790	0.360	1.733
Are there any vegetable/fruit plants in the area around your house?	No					
	Yes	-0.114	0.536	0.892	0.622	1.281
The number of types of protein eaten	No eating protein, 1/2/3/4/5 protein	-19.333	1.000	0.000	0.000	
Eating Protein (Fish)	No					
	Yes	19.226	1.000	223807972.581	0.000	
Eating Protein (Egg)	No					
	Yes	18.760	1.000	140354120.500	0.000	
Eating Protein (Chicken)	No					
	Yes	19.296	1.000	239972128.509	0.000	
Eating Protein (Meat)	No					
	Yes	19.525	1.000	301799103.765	0.000	
Eating Protein (Vegetable Protein: Tempe Tofu)	No					
	Yes	19.299	1.000	240595946.248	0.000	
No Eating Protein	No					
	Yes	-0.685	0.455	0.504	0.084	3.044
Frequency of eating protein in daily life	Never, 1-3x a week, 4-6x a week, Everyday	0.018	0.879	1.018	0.813	1.275
Frequency of eating fruit in daily life	Never, 1-3x a week, 4-6x a week, Everyday	0.132	0.226	1.141	0.921	1.413
Frequency of eating vegetables in daily life	Never, 1-3x a week, 4-6x a week, Everyday	-0.029	0.793	0.972	0.783	1.205
Health standard of eating fruit and vegetables everyday (5 types in 1 day)	Not standard					
	Standard	0.114	0.684	1.121	0.648	1.937
Motivation to eat healthy and nutritious food after knowing Healthy Living Community Movement Program	No					
	Yes	0.118	0.817	1.125	0.416	3.044

The table above shows that knowledge about GERMAS has a significant effect on community participation ($\text{Exp}(B) = 17.968$; 95% CI: 7.780-41.500, $p < 0.001$), particularly regarding physical activity knowledge, it has a significant positive relationship ($\text{Exp}(B) = 2.339$; 95% CI: 1.551-3.527, p

<0.001). Participation was higher in Indragiri Hilir ($\text{Exp(B)} = 1.918$; 95% CI: 1.020-3.607, $p = 0.043$) and Rokan Hulu ($\text{Exp(B)} = 2.161$; 95% CI: 1.097-4.260, $p = 0.026$) compared to Pekanbaru. Frequency of eating healthy food had a marginally significant effect ($\text{Exp(B)} = 1.235$; 95% CI: 1.000-1.526, $p = 0.050$). Sociodemographic factors such as gender, age, marital status, religion, and income were not significant. Participation in health promotion increased the odds of participation ($\text{Exp(B)} = 8.493$; 95% CI: 6.042-11.939, $p < 0.001$). Attending health education sessions increased participation ($\text{Exp(B)} = 1.800$; 95% CI: 1.271-2.550, $p = 0.001$). Knowledge of the GERMAS policy increased participation ($\text{Exp(B)} = 1.597$; 95% CI: 1.128-2.263, $p = 0.008$).

DISCUSSION

Non-communicable diseases (NCDs) remain a critical global health challenge, especially in low- and middle-income countries such as Indonesia. Among the leading risk factors for NCDs is the low intake of fruits and vegetables, which contributes to the prevalence of obesity, hypertension, cardiovascular diseases, and diabetes (Siddiq et al., 2023; Chayati et al., 2023). Despite the known benefits of consuming at least five servings of fruits and vegetables daily, public adherence to this recommendation remains low, particularly in Indonesia.

This study found that although 99.62% of respondents in Riau Province were aware of the importance of consuming nutritious food and 98.73% had the motivation to do so, only 9.7% met the health standard of daily fruit and vegetable intake. This gap between knowledge and actual behavior highlights a critical issue in health behavior change: awareness alone does not guarantee implementation. Similar patterns have been observed in other low- and middle-income countries, where structural and socio-cultural barriers inhibit healthy lifestyle adoption (Smith et al., 2022; Devirgiliis et al., 2024).

The Healthy Living Community Movement (GERMAS) was initiated as a policy tool to address such risk factors and promote healthy living through physical activity, regular medical check-ups, and nutritious diets. While the policy has shown promise, the results of this study indicate inconsistencies in implementation and public participation across districts in Riau Province. Notably, although awareness of the GERMAS program reached 82.24%, only 43.31% of respondents had participated in its activities.

These findings suggest that the effectiveness of GERMAS is highly influenced by several factors: health education, accessibility of health facilities, socio-economic conditions, and district-level infrastructure. For instance, districts such as Indragiri Hilir and Rokan Hulu demonstrated higher participation rates than urban areas like Pekanbaru, possibly due to stronger local initiatives, health promotion programs, or community engagement strategies.

Logistic regression analysis further revealed that knowledge about GERMAS significantly influenced participation ($\text{Exp(B)} = 17.968$; $p < 0.001$), especially awareness of physical activity ($\text{Exp(B)} = 2.339$; $p < 0.001$). Participation in health promotion and health education activities also had a strong positive impact ($\text{Exp(B)} = 8.493$ and 1.800 respectively), indicating that active community engagement plays a vital role in shaping health behavior.

Interestingly, demographic variables such as gender, age, marital status, and income were not significant predictors of participation. This suggests that regardless of individual characteristics, knowledge and exposure to health programs are more decisive in influencing behavior. However, the gap between awareness and action reflects systemic issues such as limited access to fresh produce, inadequate support systems, or competing economic priorities in daily life.

Moreover, while health service quality was generally rated positively—with 80% of respondents rating it “Good” or “Very Good”—approximately 37.1% of participants still perceived local health facilities as incomplete, and 30.8% reported difficulty accessing services. These factors may hinder full engagement with GERMAS initiatives and the broader goal of reducing NCD risk factors.

The results also highlight the importance of environmental and structural support in promoting healthy eating. Although 73.49% of respondents had access to vegetable or fruit plants near their homes, this did not translate into increased consumption, indicating that physical availability is not the only

determinant. Behavioral interventions, community encouragement, and sustained health communication campaigns are equally important in converting access into action.

This study adds to existing literature by providing regional insights into the implementation of a national health policy. While previous studies (Mardiah et al., 2022; Sari et al., 2022) have evaluated GERMAS at a conceptual or local level, this research highlights district-level disparities and offers empirical evidence from a large-scale survey. The novelty of this study lies in its comprehensive approach—linking policy implementation, public awareness, and actual behavior in relation to fruit and vegetable consumption.

Limitations of the study include reliance on self-reported data, which may introduce bias, and the restriction of generalizability to Riau Province. Future studies could explore qualitative insights from local leaders, health workers, and community members to understand deeper social and cultural barriers to healthy living. Additionally, longitudinal studies could assess the long-term impact of GERMAS on NCD trends.

This research highlighted while GERMAS has been successful in raising awareness, its effectiveness is limited by the gap between knowledge and behavior. Strengthening community participation through continuous health education, improving accessibility to healthy food, and ensuring policy enforcement at the district level are essential steps toward reducing NCD risk factors in Indonesia. Tailored, region-specific interventions that build on local strengths and address infrastructure gaps will be key to ensuring the sustainability and impact of GERMAS.

CONCLUSIONS

This study shows that community participation in the GERMAS program in Riau Province is still low, despite most respondents being aware of the initiative. The main factors influencing participation are the level of knowledge about GERMAS, awareness of the importance of physical activity, and involvement in health promotion and education activities. Logistic regression analysis revealed that individuals who had a better understanding of GERMAS and participated in health promotion activities had a higher chance of participating. In contrast, sociodemographic factors such as gender, age, marital status, and income did not show a significant association with involvement in the program. Inter-district variations in participation were also seen, with Indragiri Hilir and Rokan Hulu showing higher participation rates than Pekanbaru.

To improve the effectiveness of GERMAS, a stronger communication strategy is needed to increase community awareness and engagement. A more district-specific approach is needed, with tailored interventions based on local characteristics. Future research could explore other factors that may contribute to low participation, such as cultural aspects, dietary habits, and the role of social media in disseminating health information. In addition, a long-term evaluation of the impact of GERMAS on reducing the risk of NCDs also needs to be conducted to ensure the effectiveness of this program over a longer period of time.

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