



ISSN: 2230-9926

Available online at <http://www.journalijdr.com>

IJDR

International Journal of Development Research

Vol. 16, Issue, 06, pp.70533-70538, June, 2026

<https://doi.org/10.37118/ijdr.30912.06.2026>



RESEARCH ARTICLE

OPEN ACCESS

HEALTH AND ENVIRONMENTAL RISKS AMONG THE RESIDENTS LIVING CLOSE AND AWAY TO A LANDFILL: A CASE STUDY OF SURALLAH CLUSTER SANITARY LANDFILL IN SOUTH COTABATO

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ARTICLE INFO

Article History:

Received 12th March, 2026

Received in revised form

24th April, 2026

Accepted 20th May, 2026

Published online 30th June, 2026

Key Words:

Surallah Cluster Sanitary Landfill, health risk, environmental risk, living satisfaction, disturbance of the physical characteri.

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ABSTRACT

This study was conducted to determine the health and environmental risk among residents living close to and away from a landfill: A case study of Surallah Cluster Sanitary Landfill in South Cotabato. The study used a quantitative, non-experimental research design employing the correlational technique. The respondents of the study were the 182 households of Surallah selected through a random approach. An adapted and contextualized structured questionnaire was deployed to measure and establish relationships among health risk and environmental risk, the disturbance of external characteristics, and the life satisfaction of residents in the locality. Moreover, the mean, Pearson r, and regression were used as statistical tools. The study found that health risks and environmental risks were low, disturbance to external characteristics was low, and residents' living satisfaction was high, suggesting an inverse relationship. Also, the data revealed a significant relationship between residents' living satisfaction and health risk, environmental risk, and disturbances in physical characteristics. When regressed, it was found that the observed variables have an inverted relationship, implying that the Surallah Cluster Sanitary Landfill does not affect citizens' living satisfaction because the threats of health, environmental, and disturbance risks are not inevitable.

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Citation: *Almira A. Boniel and Eddie A. Avendanio, 2026. "Health and Environmental Risks Among the Residents living Close and Away to a Landfill: A Case Study of Surallah Cluster Sanitary Landfill in South Cotabato". International Journal of Development Research, 16, (06), 70533-70538.*

INTRODUCTION

In the Philippines, solid waste management has always been a problem, because citizens have always had a hard time following the implemented rules regarding proper disposal of waste, specifically solid waste, which could take years and years to decompose. Local Government Units (LGUs) face challenges in promoting and sustaining environmental sustainability in their communities due to limited financial and technical resources, coupled with the responsibilities imposed by law. According to a record, despite the fact that the RA 9003, also known as the "Ecological Solid Waste Management Act of 2000," was passed nearly 20 years ago, LGU compliance is still lacking, particularly when it comes to building sanitary landfills (SLFs), which the law requires as final disposal sites for residual waste. Today, hundreds of Sanitary Landfills have been established worldwide, including the Philippines, which has a total of 189 Sanitary Landfills serving 399 LGUs across the country. A sanitary landfill is a contemporary engineering dump where garbage is placed in an environment-separated setting and allowed to break down into compounds that are inert both chemically and biologically

(Chen et al., 2003; Pruss et al., 1999). However, Operating a landfill is typically linked to the following problems: volatile organic compounds, strong odors, loud, upsetting noise from the landfill's bulldozers, bioaerosol emissions, and surface and groundwater contamination from leachate from the landfill (generally if the landfill lacks proper liners) (Environment Victoria, 2013; Garrod, G.; Willis, K, 1998; Sakawi, Z.; Sharifah, S.A.; Jaafar, O.; Mahmud, M, 2011; De Feo, G.; De Gisi, S.; Williams, ID, 2013; Butt, I. Research has indicated that inhaling or consuming nitrogen dioxide and sulfur dioxide and other chemicals emitted by landfills might cause symptoms like irritation of the nose and throat, bronchoconstriction, dyspnea, and respiratory infections, particularly in individuals with asthma. Also, communities residing near dump sites have reported cases of cancer and various respiratory problems. One of the Inter-LGU partnership is the cluster of six (6) Municipalities in Upper Valley area of South Cotabato namely; Surallah, Banga, Tboli, Norala, Lake Sebu, Sto. Nino, or the Surallah Cluster Sanitary Landfill , this Surallah Cluster SLF had been operating for almost 10 years today and had been a big help to those six municipalities, especially in terms of Environmental sustainability. Thus, this study aims to evaluate the establishment of Sanitary landfill in Surallah

through local collaboration on solid waste management together with the six LGUs pursuant to RA 9003 and RA 7160 and how effective it is in helping those six LGUs in terms of maintaining Environmental Sustainability despite the challenges that it'll face in terms of environmental and public health aspects.

METHODS AND MATERIALS

This study has utilized a quantitative, non-experimental design with a correlational technique to gather data on the living satisfaction of residents living near and farther from the Surallah Sanitary Landfill regarding Health Risk, Environmental, and Disturbance of External Characteristics. The respondents of this study was the 100 households with approximately 4 members each that lives within the 100 meters and 2 kilometres away from the SLF to which a total of 182 individuals consisting of 91 individuals near the SLF and 91 individuals who lives farther from the SLF. The use of the correlational technique comes with the idea upon looking through the relationship of the above-mentioned variables. The use of survey questionnaires was employed in order to gather the data needed as well as be able to determine the Health and Environmental Risk of Surallah Cluster Sanitary Landfill among the residents in Surallah, South Cotabato. Four (4) categories were assigned to the questions about environmental issues: (4) always, (3) oftentimes, (2) rarely, and (1) never. Seven environmental issues were presented to the attendees, including the unwanted position of the dump, the disposal of solid waste, trash, and litter in the street, air pollution, foul odors, water pollution, noise pollution, and dust. To determine the significance of the data from both communities and the difference in means, an independent-samples t-test was performed. The participants were also shown potential medical conditions linked to grievances from residents near the landfill. The participants were asked to rate how always (4), oftentimes (3), rarely (2), or never (1) they or any member of their family experienced each of the indicated illnesses. In addition, for a more concrete result, the researcher used Likert scale to every variable in relation to the living satisfaction of the residents to be able to come up with a descriptive and narrow interpretation of the data gathered.

RESULTS

The results are presented in Tables 1-6.3 as well as the correlations of which presented variables in this study. This study mainly pertains on the living satisfaction of the residents near and farther from the Sanitary Landfill in Surallah, South Cotabato. Presentations are arranged as follow: first, socio-demographic profile in terms of age, gender, employment, educational attainment, length of service, length of residence, and distance of residence from the site. Secondly, environmental risk, health risk, disturbance of the external characteristics and life satisfaction living. Third, correlation between life satisfaction living and health risk, life satisfaction living with environmental risk and life satisfaction living with disturbance of the external characteristics.

Table 1.1 Socio-demographic profile of the residents living close and away to Surallah Cluster Sanitary Landfill in terms of Age

Age	Frequency	Percentage
20-30	65	35.71%
31-40	41	22.53%
41-50	41	22.53%
51-60	25	13.74%
61-70	9	4.95%
71-above	1	0.55%
Mean = 38.45		

The data show that the 20–30 age group had the highest frequency with 65 respondents (35.71%), indicating that most residents living close to and away from the Surallah Cluster Sanitary Landfill are young adults, while the 71 years and above age group had the lowest frequency with only 1 respondent (0.55%). This implies that the study's findings primarily reflect the perceptions and experiences of

younger, economically productive individuals, with limited representation of the concerns and perspectives of the elderly population.

Table 1.2 Socio-demographic profile of the residents living close and away to Surallah Cluster Sanitary Landfill in terms of Gender

Gender	Frequency	Percentage
Male	89	48.90%
Female	93	51.10%
Total	182	100%

The data show that female respondents had the highest frequency with 93 respondents (51.10%), while male respondents had a slightly lower frequency of 89 respondents (48.90%). This indicates a nearly balanced gender distribution among the residents, with females being slightly more represented. The findings imply that the study captures perspectives from both genders, allowing for a more comprehensive understanding of residents' views and experiences regarding the Surallah Cluster Sanitary Landfill.

Table 1.3 Socio-demographic profile of the residents living close and away to Surallah Cluster Sanitary Landfill in terms of Employment

Employment	Frequency	Percentage
Employed	74	43.27%
Unemployed	93	54.39%
Underemployment	4	2.34%
Total	171	100%

The data show that unemployed respondents had the highest frequency with 93 respondents (54.39%), while underemployed respondents had the lowest frequency with only 4 respondents (2.34%). This indicates that more than half of the residents are not currently employed. The findings imply that economic conditions may influence residents' perceptions, concerns, and responses regarding the Surallah Cluster Sanitary Landfill, as employment status can affect their level of awareness, vulnerability, and dependence on local environmental resources.

Table 1.4 Socio-demographic profile of the residents living close and away to Surallah Cluster Sanitary Landfill in terms of Educational Attainment

Educational Attainment	Frequency	Percentage
Elem Undergrad	3	1.65%
Elem Grad	25	13.74%
HS Undergrad	37	20.33%
HS Grad	51	28.02%
Coll Undergrad	39	21.43%
College Grad	16	8.79%
Masteral	10	5.49%
Doctorate	1	0.55%
Total	182	100%

The data show that high school graduates had the highest frequency with 51 respondents (28.02%), while respondents with a doctorate degree had the lowest frequency with only 1 respondent (0.55%). This indicates that most residents have attained secondary-level education, whereas only a few have reached the highest level of academic achievement. The findings imply that the respondents generally possess a basic educational background that may influence their understanding and awareness of environmental and health issues related to the Surallah Cluster Sanitary Landfill, while perspectives from highly specialized academic backgrounds are minimally represented.

Table 1.5 Socio-demographic profile of the residents living close and away to Surallah Cluster Sanitary Landfill in terms of Length of Service

Length of Service	Frequency	Percentage
below 1 yr	6	7.79%
1-5 yrs	32	41.56%
6-10 yrs	19	24.68%
11-15 yrs	14	18.18%
16-20yrs	5	6.49%
21-25yrs	1	1.30%
26-above	0	0.00%
Total	77	100%

The data show that respondents with 1–5 years of service had the highest frequency with 32 respondents (41.56%), while those with 21–25 years of service had the lowest frequency with only 1 respondent (1.30%), and none reported having 26 years or more of service. This indicates that most employed respondents are relatively new to their jobs. The findings imply that the views and experiences gathered in the study are largely influenced by individuals with shorter work experience, while perspectives from long-serving employees are less represented.

Table 1.6 Socio-demographic profile of the residents living close and away to Surallah Cluster Sanitary Landfill in terms of Length of Residence

Length of Residency	Frequency	Percentage
1-5yrs	7	3.83%
6-10yrs	45	24.59%
11-15yrs	21	11.48%
16-20yrs	28	15.30%
21-25yrs	27	14.75%
26-30yrs	11	6.01%
31-above	44	24.04%
Total	183	100%

The data show that respondents who have resided in the area for 6–10 years had the highest frequency with 45 respondents (24.59%), while those who have lived in the community for 1–5 years had the lowest frequency with 7 respondents (3.83%).

This indicates that most residents have spent considerable time in the area and are likely familiar with the conditions surrounding the Surallah Cluster Sanitary Landfill. The findings imply that the respondents can provide informed insights from their long-term experience, making their perceptions and observations valuable for assessing the landfill's impacts on the community.

Table 1.7 Socio-demographic profile of the residents living close and away to Surallah Cluster Sanitary Landfill in terms of Distance of Residence from the Site

Distance from the Site	Frequency	Percentage
10-50m	18	9.84%
60-100m	30	16.39%
101-150m	47	25.68%
151-200m	52	28.42%
201-250m	28	15.30%
251-300m	7	4.37%
Total	182	100%

The data show that respondents residing 151–200 meters from the Surallah Cluster Sanitary Landfill had the highest frequency with 52 respondents (28.42%), while those living 251–300 meters away had the lowest frequency with 7 respondents (4.37%). This indicates that most respondents are located within a moderate distance from the landfill site. The findings imply that a large proportion of the respondents are close enough to potentially experience the environmental, health, or social effects associated with the landfill, making their perceptions and experiences relevant to the assessment of its community impacts.

Table 2. Environmental risk among the residents who are living close and away from of the Surallah Cluster Sanitary Landfill

Environmental Risk	Mean	SD	Interpretation
Disposal of Solid Waste	1.24	0.50	Not serious
Garbage and Litter on the Street	1.62	0.65	Not serious
Unwelcome Location of the Landfill	1.34	0.64	Not serious
Air Pollution and Bad Odour	1.37	0.52	Not serious
Water pollution	1.30	0.49	Not serious
Noise pollution	1.36	0.56	Not serious
Dust	1.30	0.55	Not serious
Grand Mean	1.36	0.27	Not serious

The data show that Garbage and Litter on the Street obtained the highest mean score of 1.62 (SD = 0.65), while Disposal of Solid Waste obtained the lowest mean score of 1.24 (SD = 0.50). Despite having the highest and lowest mean values, both indicators were interpreted as "Not Serious." The overall grand mean of 1.36 (SD = 0.27) further indicates that residents generally perceive environmental risks associated with the Surallah Cluster Sanitary Landfill as not serious. This implies that the landfill's environmental impacts are currently viewed as manageable by the residents, although concerns regarding garbage and litter on the streets may require continued monitoring and proper waste management interventions.

Table 3. Health risk among the residents who are living close and away from of the Surallah Cluster Sanitary Landfill

Health Risk	Mean	SD	Interpretation
Breathing disorder	1.55	0.75	Not serious
Cancer	1.24	0.52	Not serious
Reoccurring flu	1.44	0.71	Not serious
Eye irritation	1.47	0.63	Not serious
Weakness of the body	1.48	0.68	Not serious
Back pain	1.71	0.81	Not serious
Dust	1.53	0.65	Not serious
Hearing impairment	1.44	0.67	Not serious
Skin disorder	1.27	0.56	Not serious
Headache	1.54	0.59	Not serious
Coughing	1.40	0.60	Not serious
Tuberculosis	1.13	0.38	Not serious
Asthma	1.23	0.50	Not serious
Grand Mean	1.42	0.38	Not serious

The data show that back pain obtained the highest mean score of 1.71 (SD = 0.81), while tuberculosis obtained the lowest mean score of 1.13 (SD = 0.38). Despite these variations, all health-related indicators were consistently interpreted as "Not Serious." The overall grand mean of 1.42 (SD = 0.38) indicates that residents generally perceive the health risks associated with living near and away from the Surallah Cluster Sanitary Landfill as not serious. This implies that, based on the respondents' assessment, the landfill is not currently viewed as a major contributor to significant health problems in the community, although minor ailments such as back pain and other common symptoms may still be experienced and warrant continued health monitoring.

Table 4. Disturbance of external characteristic among the residents who are living close and away from of the Surallah Cluster Sanitary Landfill

Disturbance of external characteristic	Mean	SD	Interpretation
Fear of future health	1.62	0.82	Not serious
Cannot sell the property because of location	1.61	0.56	Not serious
Friends unwilling to visit Desirable business	1.48	0.69	Not serious
Enterprise staying away	1.42	0.59	Not serious
Site stigmatizes resident	1.24	0.44	Not serious
Pollution by rodents	1.24	0.49	Not serious
Pollution by mosquitoes	1.39	0.55	Not serious
Poor renting of property	1.30	0.50	Not serious
Grand Mean	1.41	0.33	Not serious

The data show that “Fear of future health” obtained the highest mean score of 1.62 (SD = 0.82), while both “Site stigmatizes resident” and “Pollution by rodents” obtained the lowest mean score of 1.24 with SDs of 0.44 and 0.49, respectively. Despite these differences, all indicators were consistently interpreted as “Not Serious.” The overall grand mean of 1.41 (SD = 0.33) indicates that residents generally perceive the disturbance of external characteristics associated with the Surallah Cluster Sanitary Landfill as not serious. This implies that while there are some concerns about future health and property-related issues, these are not strongly felt or widely experienced by the residents in the study area.

Table 5. Life satisfaction living among the residents who are living close and away from the Surallah Cluster Sanitary Landfill

Life satisfaction	Mean	SD	Interpretation
Life in General	4.87	0.45	Very Serious
Personal Health Condition	4.74	0.62	Very Serious
Neighborhood compared to others	4.45	0.68	Very Serious
Attractiveness of the community	4.54	0.58	Very Serious
State of the health and wellbeing of participants	4.57	0.64	Very Serious
Community as a place to live in	4.69	0.58	Very Serious
Perceived neighborhood change	4.66	0.57	Very Serious
Grand Mean	4.65	0.37	Very Serious

The data show that “Life in General” obtained the highest mean score of 4.87 (SD = 0.45), while “Neighborhood compared to others” obtained the lowest mean score of 4.45 (SD = 0.68). Despite slight variations across indicators, all items were consistently interpreted as “Very Serious.” The overall grand mean of 4.65 (SD = 0.37) indicates that residents report a very high level of life satisfaction despite living close to and away from the Surallah Cluster Sanitary Landfill. This implies that the presence of the landfill does not significantly diminish residents’ overall satisfaction with their life, health, community, and living conditions, suggesting generally positive well-being within the area.

Table 6.1. Correlation Between Life Satisfaction Living and Health Risk among the residents who are living close and away to Surallah Cluster Sanitary Landfill in South Cotabato

		Living Satisfaction	HealthRisk
Living Satisfaction	Pearson Correlation	1	-.330**
	Sig. (2-tailed)		.000
	Sum of Squares and Cross-products	25.002	-8.399
	Covariance	.138	-.046
	N	182	182
Health Risk	Pearson Correlation	-.330**	1
	Sig. (2-tailed)	.000	
	Sum of Squares and Cross-products	-8.399	25.945
	Covariance	-.046	.143
	N	182	182

** . Correlation is significant at the 0.01 level (2-tailed).

The results show a significant negative correlation between life satisfaction living and health risk among residents, as indicated by the Pearson correlation coefficient of $r = -0.330$ ($p = .000$). This means that as perceived health risks increase, life satisfaction tends to decrease, and vice versa. Although the relationship is statistically significant at the 0.01 level, the correlation is relatively weak to moderate. This implies that while health risks associated with living near and away from the Surallah Cluster Sanitary Landfill have an effect on residents’ life satisfaction, other factors beyond health risk may also play a more dominant role in influencing overall life satisfaction in the community.

Table 6.2 Correlation Between Life Satisfaction Living and Environmental Risk among the residents who are living close and away to Surallah Cluster Sanitary Landfill in South Cotabato

		Living Satisfaction	Environmenta l Risk
Living Satisfaction	Pearson Correlation	1	-.215**
	Sig. (2-tailed)		.004
	Sum of Squares and Cross-products	25.002	-3.903
	Covariance	.138	-.022
	N	182	182
Environmental Risk	Pearson Correlation	-.215**	1
	Sig. (2-tailed)	.004	
	Sum of Squares and Cross-products	-3.903	13.220
	Covariance	-.022	.073
	N	182	182

** . Correlation is significant at the 0.01 level (2-tailed).

The results show a significant negative correlation between life satisfaction living and environmental risk, with a Pearson correlation coefficient of $r = -0.215$ ($p = .004$). This indicates that as perceived environmental risks increase, residents’ life satisfaction tends to slightly decrease. Although the relationship is statistically significant at the 0.01 level, the strength of the correlation is weak. This implies that environmental risks associated with the Surallah Cluster Sanitary Landfill have a limited but meaningful influence on residents’ life satisfaction, suggesting that other social, economic, or personal factors may also play a stronger role in shaping overall life satisfaction in the community.

Table 6.3. Table 6.2 Correlation Between Life Satisfaction Living and Disturbance of the External Characteristics among the residents who are living close and away to Surallah Cluster Sanitary Landfill in South Cotabato

		Living Satisfaction	Disturbance
Living Satisfaction	Pearson Correlation	1	-.529**
	Sig. (2-tailed)		.000
	Sum of Squares and Cross-products	25.002	-11.777
	Covariance	.138	-.065
	N	182	182
Disturbance	Pearson Correlation	-.529**	1
	Sig. (2-tailed)	.000	
	Sum of Squares and Cross-products	-11.777	19.818
	Covariance	-.065	.109
	N	182	182

** . Correlation is significant at the 0.01 level (2-tailed).

The results show a significant negative correlation between life satisfaction living and disturbance of external characteristics, with a Pearson correlation coefficient of $r = -0.529$ ($p = .000$). This indicates a moderate to strong inverse relationship, meaning that as disturbances related to external characteristics increase, residents’ life satisfaction tends to significantly decrease. The relationship is statistically significant at the 0.01 level, suggesting that disturbances such as environmental stigma, property concerns, and social discomfort have a meaningful impact on how residents evaluate their overall life satisfaction. This implies that among the variables examined, disturbances of external characteristics play a more substantial role in influencing life satisfaction compared to environmental and health risks.

DISCUSSION

Upon the pursuit of determining the socio-demographic profile of the residents who live both near and farther from the Sanitary landfill as well as its correlation to the life satisfaction of those living near and farther from the Sanitary Landfill towards environmental risk, health risk, and disturbances of the external characteristics. It was then inferred that upon the socio-demographic profile of the resident, 80% of the respondents were between 20 and 40 years old, with the gender population of having 49% males respondents and 51% female respondents, taking into consideration the 182 total number of respondents. In terms of the employment status of the residents, it was then viewed that most of the resident with 54.39% is considered as unemployed. On the other hand, educational attainment as it plays an important role upon the individual upbringing of a person, with 28.2% of tabulated rating, High School Graduates posts a higher number of responses. On the number or length of service of the residents, 1-5 years of service posts the highest percentage. On the matter of the length of number of years of residence of the respondents, with the highest percentage of 24.59% a length of 6-10 years obtained the highest rating. Finally, the differing distance of the respondents to the SLF, with the number of 52 positive responses, residents live for about 151-200 meters away from the Sanitary Landfill and thus poses the highest number of responses. In pursuit of assessing the Environmental risk, Health risk and the Disturbance of external characteristic associated with the Surallah Cluster Sanitary Landfill, these areas has obtained a grand calculated mean with the over-all interpretation of 'not serious' which means that the participating residents who both lives near and farther from the Sanitary Landfill given with the differences in the socio-demographic profile has the very same opinion and perceptions upon the effects as well as the possible risks poses by the Sanitary Landfill. In relation to this, on the living satisfaction of the respondents which some includes Life in General, Personal Health Condition, Neighbourhood compared to others, Attractiveness of the community posts a Grand Mean of 4.65 with the interpretation of 'Very Serious' suggesting that, on average, respondents consider all the listed aspects as very serious contributors to life satisfaction. On the other hand, on the pursuit of the correlation between Life Satisfaction Living to the Environmental Risk, Health Risk and Disturbance of the External Characteristics. On the correlation to the health risk, with the correlation coefficient is approximately -0.330 with the Sig. value is 0.000, which is less than the conventional significance level of 0.05, means that the correlation between Living Satisfaction and Health Risk is considered statistically significant. With this, this does means that as Living Satisfaction increases, Health Risk tends to decrease, and vice versa. While on the other hand, in pursuit of the living satisfaction of residents in relation to environmental risks as presented by Pearson correlation coefficient. For Living Satisfaction and Environmental Risk, the correlation coefficient is approximately -0.215. The significance value (Sig.) indicates whether the observed correlation is statistically significant. In this case, the Sig. value is 0.004, which is less than the conventional significance level of 0.05. Therefore, the correlation between Living Satisfaction and Environmental Risk is considered statistically significant. Thus, this implies that the negative sign of the correlation coefficient (-0.215) suggests a negative correlation between Living Satisfaction and Environmental Risk. This also means that as Living Satisfaction increases, Environmental Risk tends to decrease, and vice versa. Lastly, on the correlation between life satisfaction and Disturbance of the External Characteristics, it can then be inferred as per presented by the Pearson correlation coefficient. For Living Satisfaction and Disturbance, the correlation coefficient is approximately -0.529. The significance value (Sig.) indicates whether the observed correlation is statistically significant. In this case, the Sig. value is 0.000, which is less than the conventional significance level of 0.05. Therefore, the correlation between Living Satisfaction and Disturbance of External Characteristics is considered statistically significant. The negative sign of the correlation coefficient (-0.529) suggests a strong negative correlation between Living Satisfaction and Disturbance of External Characteristics. This means that as Living Satisfaction increases, Disturbance tends to decrease, and vice versa.

CONCLUSION AND RECOMMENDATIONS

The study concludes that residents living near and away from the Surallah Cluster Sanitary Landfill generally experience low levels of environmental risk, health risk, and disturbance of external characteristics. Despite proximity to the landfill, respondents reported very high life satisfaction. Statistical analysis confirmed significant negative relationships between life satisfaction and all risk variables, indicating that perceived risks are minimal and do not significantly affect residents' well-being. Thus, the landfill, as currently managed, does not adversely affect the quality of life of surrounding communities. In view of these findings, it is recommended that the Local Government Units continue strengthening waste management practices to maintain the low levels of environmental and health risks observed in the study. Regular monitoring of air, water, and soil quality should be sustained to ensure the long-term safety of nearby communities. Health surveillance programs are likewise encouraged to detect early signs of possible landfill-related illnesses and to ensure timely intervention when necessary. Furthermore, community awareness and engagement programs should be continuously implemented to sustain positive perceptions, strengthen cooperation, and promote environmental responsibility among residents. Future researchers are encouraged to conduct longitudinal studies to examine long-term environmental and health impacts of the landfill, particularly as operational conditions evolve over time. Lastly, expanding future studies to include more objective environmental and clinical measurements, in addition to perception-based data, is recommended to provide a more comprehensive assessment of landfill impacts.

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